Dr Gummer's
GOOD PLAY GUIDE

in partnership with:

the **toy**
association ™

Inspiring Generations of Play

Your STEAM toy accreditation report

Contents

About the report

This STEAM accreditation report has been produced by a reviewer for Dr Gummer's Good Play Guide™, in partnership with The Toy Association™, for your information. **You may publish the report in part or in full**, but must include full credit to Dr Gummer's Good Play Guide for the content, along with the year the report was published.

I About the report

The following report looks at whether or not your toy or game meets the criteria in three (3) areas of The Toy Association™'s Science, Technology, Engineering, Arts, and Mathematics (STEAM) toy assessment framework (Gummer & Taylor, 2020):

- Characteristics of a 'good toy'
- Prime STEAM attributes
- Specific STEM categories

Report details

Name of toy or game

Pixicade Quest

Company name

BitOGenius, Inc.

Target age

8+ with guidance, 10+ independent

Reviewer name

Antonia Llull, MOT, OTR/L – Director of Toy Reviews, USA

Date of the review

October 17, 2022

Report overview

This section summarizes the criteria ratings for the different areas of the STEAM framework awarded to your toy or game. If your product has passed the requirements, it also details what accreditation(s) you may be able to use on packaging, websites, printed material and throughout all digital and traditional marketing platforms to add credibility to your campaigns.

Please refer to Appendices A, B, and C for detailed descriptions of the criteria used for the evaluation detailed in this report.

II Report overview

Pixicade Quest has passed the requirements for all aspects of a good toy (Section III), has the criteria for all six (6 of 6) of the prime STEAM attributes (Section IV), and meets the multi-disciplinary criteria required for the specific STEM categories (Section V). Therefore, your toy or game meets the requirements to be categorized as a STEAM toy, according to The Toy Association™'s definition.

This means that you will receive The Toy Association™'s official STEAM Stamp of Approval and the official Good Toy Guide stamp of Approval to use on packaging, websites, printed material, and throughout all digital and traditional marketing platforms to add credibility to your campaigns. Furthermore, you can enjoy the benefits of extensive marketing and promotional campaigns delivered by Dr Gummer's Good Play Guide™.

We hope you find this report useful and informative. If you have any questions, please do not hesitate to contact us.

Report overview

Rating summary tables

Characteristics of a 'good toy'

Characteristic	Rating		
	Poor	**Good**	**Excellent**
Fun & engaging		**Excellent**	
Easy to use		**Excellent**	
Skill development		**Excellent**	
Inclusive		**Excellent**	

Prime STEAM attributes

Attribute	Rating		
	Poor	**Good**	**Excellent**
Real world relevance		**Excellent**	
Active involvement		**Excellent**	
Arts		**Excellent**	
Logical thinking		**Excellent**	
Free exploration		**Excellent**	
Step-by-step learning		**Excellent**	

Specific STEM categories

Category	Rating			
	None	**Minor**	**Moderate**	**High**
Science			**Moderate**	
Technology				**High**
Engineering			**Moderate**	
Mathematics		**Minor**		
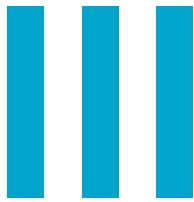
Characteristics of a 'good toy'

This section summarizes the feedback from independent playtesting of your toy or game. This includes:

- Fun & engagement
- Ease of use
- Skill development
- Inclusivity

Section overview

Your product has been rated 'Good' or 'Excellent' for all four characteristics of a 'good toy'. This means that the toy is fun to play with, is accessible to most children, and has good play value. Children are likely to choose to play with the toy and be able to use it as intended, so they can benefit from the educational value of the toy.

Product Description

PIxicade Quest is a video game creation kit that enables children to create all the elements of a game quest (such as an avatar, game goals, and hazards) on paper, then bring the game to life in the Pixicade Quest mobile app. Quests can include multiple levels and increase in difficulty.

Our testers loved learning the art of creating their unique Pixicade game-quests. The mobile app uses their hand-drawn environments, characters, goals, hazards, and moving objects to generate an interactive game. They were enthusiastic through the tutorial, design, creation, editing, and play stages. The children wanted to share their games with friends and family, design games in teams, and then elevate the goals and perils with each new adventure quest. Children have complete creative control to imagine, design, edit, and play their quests. This amazing STEAM product combines technology with arts in a truly unique and exciting way. Pixicade Quest develops design and technology skills; logic, strategy, and problem solving; and creativity.

III

Characteristics of a 'good toy'

The purpose of this section was to understand whether the toy or game is fun to play with, is accessible to most children, and has good play value. For children to benefit from the educational value of the toy or game, it needs to be something they will choose to play with and be able to use as intended.

The toy or game was tested with a number of children on multiple occasions by trained Dr Gummer's Good Play Guide™ observers. This helps to provide reliable, honest feedback. Children were of approximately the target age described in Section I. To encourage natural behavior, testing was carried out in familiar play settings, such as an after school club.

Toys or games must be rated 'Good' or 'Excellent' for all four (4) characteristics of 'good toys' to pass this section.

Characteristics of a 'good toy' rating scale:	Poor	Good	Excellent

III   Characteristics of a 'good toy'

Fun & engagement

The fun and engagement rating refers to the extent that children enjoy playing with the toy or game, the frequency, and the length of play.

	Excellent
An excellent rating for fun and engagement means that many children of the target age enjoyed playing with the toy or game, some for prolonged periods of time. Some children remained keen to play regularly and it may have been very engaging for specific groups of children. **This rating was given for the following reasons:** Children were thrilled at the idea of making their own video game and immediately wanted to get started. The scaffolded instruction booklets helped provide creative inspiration and build a foundational understanding. From the onset, they especially enjoyed drawing their own unique avatars. Once they understood how each color relates to function in the video game, they made quick work of drawing their game environments, goals, challenges, and avatars in order to test and play their games. Once they had a game 'just right" they loved challenging their friends and family to play. Some started with very simple drawings just to get to the game play more quickly and test *"does it really work!?"*, while others wanted to make a richer game experience that was not so easily won. The children were highly motivated to design, create, improve, and fine-tune their games. **What the testers said…** *"Look, that's me in the game! I'm going to collect all the stars!"*, an 8-year-old girl. *"Let's make the walls higher, with a fire pit on the other side."*, a 10-year-old boy playing with his 8-year-old brother. *"Man, I drew the monster too big and the path too small - good thing I can edit - here we go."* 10-year-old girl. *"Whoa, ok, I just learned how to make him jump."* 9-year-old boy. *"Do you dare to play 'Tank Attack'!?!"* 10-year-old boy. *"Cool, we can add 'fireworks' to the last flag to capture!"* an 11-year-old girl.	**Excellent**

III Characteristics of a 'good toy'

Ease of use

The ease of use rating refers to the extent that most children in the target age group can use the toy or game as intended.

An excellent rating for ease of use means that children of the target age were able to use the toy or game to its full capacity with minimal third-party help. **This rating was given for the following reasons:** Older children (10+ years old) were independent with this product quickly, while younger children (8-to-9-years-old) needed some assistance to get started. In both age groups, the instruction booklets were very helpful, and the children enjoyed referencing them to further their projects. All age groups were quickly comfortable with the concepts of how to draw the game scenes, creating and editing the games, and playing them with family and friends. **Note:** there was an issue with the markers bleeding through to the next page - consider thicker paper or advising the children regarding this potential problem via the instruction booklet. This did impact their subsequent drawings and game play - they did require some guidance to use the edit feature to remove the unwanted markings. The children and adults did problem solve by placing a thicker piece of paper under the sheet they were drawing on or working outside of the booklet. **What the testers said…** *"Let's make the treasure in blue so we can collect it all."*, a 9-year-old girl. *"I'm going to make a game with ladders to climb up to the top level."*, a 10-year-old boy. *"Boom! Just like that! The trick door worked!"* an 11-year-old girl.	**Excellent**

III

Characteristics of a 'good toy'

Skill development

The skill development rating refers to the extent that the toy or game helps children develop age-appropriate soft and hard skills.

	Excellent
An excellent rating for skill development means that the toy or game actively encourages age-appropriate development across three or more skills (e.g. cognitive, language, or creative skills) or is particularly good at developing one or more core skills (e.g. literacy or numeracy) for children of the target age. **Primary skills that this toy helps to develop** 1. Design and Technology 2. Logic, Strategy, and Problem solving 3. Creativity	

Inclusivity

The inclusivity rating refers to the extent that the toy or game is designed for and marketed to children of different genders, backgrounds, and abilities.

	Excellent
An excellent rating for inclusivity means that the toy or game appears to be designed to be proactively inclusive, helping remove barriers for children who are likely to play with it. Product packaging and marketing may positively represent diverse groups. **This rating was given for the following reasons:** The materials included consistently encourage creating Avatars that can be anything the children wished them to be. This messaging resulted in children feeling free to create and design for avatars and characters that demonstrate inclusivity across genders and physical attributes. Examples given in the instruction guides, combined with the encouragement to imagine the shape, form, and characteristics of their avatar, enables children to imagine an avatar that reflects themselves without bias or barrier.	

IV

Prime STEAM attributes

This section summarizes the feedback from independent expert review of your toy or game. This includes:

- Real world relevance
- Active involvement
- Arts
- Logical thinking
- Free exploration
- Step-by-step learning

Section overview

Your toy has been rated 'Good' or 'Excellent' for all six (6) of the prime STEAM attributes. This means that it encourages the hands-on, logical, and creative experience that should be at the core of a STEAM toy, at an age-appropriate level.

IV

Prime STEAM attributes

The purpose of this section of the report was to understand whether the toy or game affords all of the attributes that should underlie a STEAM toy. This means that the toy or game encourages children to be active participants in their learning, promotes left and right-brain thinking, and has clear links to the real world to help children understand the purpose of what they are learning. It also encourages children out of their comfort zone to allow the gradual progression of knowledge and skills.

The product was assessed with a combination of expert review and the product testing described in Section III.

Toys or games must be rated 'Good' or 'Excellent' for all six (6) prime STEAM attributes to pass this section.

Prime STEAM attributes rating scale:	Poor	Good	Excellent

IV

Prime STEAM attributes

Real world relevance

The real-world relevance rating refers to the extent that the toy or game relates to and/or represents real-world applications.

An excellent rating for real-world relevance means that the toy or game has clear relevance and application to the real world. The toy or game allows hands-on observation and use. **This rating was given for the following reasons:** Pixicade Quest teaches children about game development and software applications to design, create, improve, and use their live games. Within the game design, children must think about conflict resolution, cause-effect, and risk-reward scenarios. All of these critical thinking skills have real world applications. Children can also mimic real-world objects and situations into their games. **What the testers said…** *"This 'preview your photo' really helps.", an 11-year-old girl.* *"Oh no, we forgot about gravity! We need ground under him! Hand me the black please.", a 10-year-old boy working with his father.* *"This makes me feel like I could really be a game developer." a 12-year-old girl.*	**Excellent**

IV Prime STEAM attributes

Active involvement

The active involvement rating refers to the extent that the toy or game allows physical, hands-on involvement.

	Excellent
An excellent rating for active involvement means that children of the target age can be actively and independently involved in the learning experience. They can look at and physically manipulate materials to further their understanding and/or solve problems. **This rating was given for the following reasons:** All children observed were dynamically involved through the game creation and game play phases. The children were very excited to see how their games worked once they finished the drawings. They loved seeing how the avatars maneuvered through the scenes, and they quickly thought of improvements or enhancements when the interaction wasn't quite what they wanted for the gameplay or when it became too easy after multiple wins. **What the testers said…** *"I want to add power-ups!", a 10-year-old girl.* *"I introduce to you 'Joe's Lunch', collect all the lunch items and win!" a 10-year-old boy.*	Excellent

IV Prime STEAM attributes

Arts

The arts rating refers to the extent that the toy or game encourages children to use both the left (logical) and right (creative) sides of their brain. For example, expressing themselves through the arts such as design, drama (including pretend play), dance, music, history, or language.

	Excellent
An excellent rating for arts means that the toy or game actively encourages children to tap into their creative and imaginative skills to support divergent thinking. Children have the chance to use both the left (logical) and right (creative) sides of their brain. **This rating was given for the following reasons:** Pixicade Quest really taps into children's creativity. The types of games they can develop are as varied as the child's imagination. Once the initial game is captured, the children can further expand their creative ideas by editing the game to include components like "skins" to disguise their hazards and goals, gravitational elements, and unexpected moving walls and floors for the element of surprise and giggles. Children created comical games with mixed-matched concepts and "opposite" day themes. For example, flying crabs and under-water swimming squirrels. **What the testers said…** *"Skins? We can disguise objects! What!? Gotta try this"*, a 9-year-old girl. *"What is the goal?"* asked a parent. *"I want to collect hot dogs!"*, an 8-year-old boy responded excitedly. *"Do you like my under the sea environment? It's for my mermaid avatar, she's collecting the trash and cleaning the ocean."* an 11-yearold girl talking to her 9-year-old sister. *"Oh cool, you can add nets to be hazards."* responded her sister. *"The fire breathing dragon got my dog! Let's power-up this puppy! Laughing - get it, puppy."* 12-year-old boy.	

IV

Prime STEAM attributes

Logical thinking

The logical thinking rating refers to the extent that the toy or game requires logic, such as trial and error or problem-solving.

An excellent rating for logical thinking means that the toy or game allows children to identify and apply solutions to problems independently. The toy or game promotes learning through trial and error and/or investigative learning and encourages children to explore logic principles. **This rating was given for the following reasons:** Pixicade Quest requires logical thinking to create a game that "works", where the avatar can navigate the scene, collect the goals, and avoid the hazards. Children have to think through the gameplay and how all of the on-screen elements interact with each other. The product helps develop several types of problem-solving skills. **What the testers said…** *"So the dog has to avoid the lava-cracks while trying to climb up to get his food, but he can't through this path, see…his tail is being blocked…oh, wait, we can shrink him!", a 10-year-old girl talking to her 9-year-old friend.* *"How did they make the moving hazards? We gotta figure this out.", a 10-year-old boy with his 8-year-old sister.* *"Ok, if we want to have a flying avatar, we have to turn off the gravity on the avatar or it will just crash." 11-year-boy talking to his 10-year-old cousin (girl).* *"I should've gotten the big pizza slice last; now I can't get the big milkshake." 11-year-old boy.*	**Excellent**

IV

Prime STEAM attributes

Free exploration

The free exploration rating refers to the extent that children can explore the toy or game on more than one occasion, thereby reinforcing their learning and promoting curiosity.

An excellent rating for free exploration means that the toy or game gives children the freedom to repeatedly explore their own ideas. **This rating was given for the following reasons:** Pixicade Quest provides open-ended free exploration as children can create a game, edit it, enhance it, and then start over with a completely different concept. The app lets them store all of their games in an arcade where they can go back to play or continue editing to enhance their collection of games. The instructions provide great inspiration, while still encouraging the children to explore their own ideas. The editing features allow children to explore their ideas on how to best combine them to achieve their objectives. **What the testers said…** *"The 'Adventure' games are cool and give me great ideas! I will make a flock of seagulls stealing fish from a boat. How many will survive!?! Dun-dun-duuuuuun!" an 11-year-old boy.* *"Ok, so I could make this line break to release the swarm of dots, it doesn't have to be just one big avatar.", a 10-year-old girl.*	**Excellent**

IV Prime STEAM attributes

Step-by-step learning

The step-by-step learning rating refers to the extent that the toy or game gradually builds confidence through guidance, parent support, and/or increasing levels of challenge.

	Excellent
An excellent rating for step-by-step learning means that the toy or game includes additional guidance for adults, that can help them support the child's learning to extend their knowledge past their comfort zone. Activities included with the toy or game offer different levels of challenge appropriate for children of the target age, gradually increasing in difficulty, that may help children grow their confidence. **This rating was given for the following reasons:** The instruction materials and in-app features that are included in this set provide children and adults a complete introduction on how to design, create, capture, improve, and play their games. The four booklets start with basic game design and progress to more advanced topics. **What the testers said…** *"Now that I know how to use them, these 'powerups' are awesome."* *10-year-old boy.* *"Check out what I can do now with the 'physics' options."* *12-year-old boy.* *"Success! My guy got through everything without falling through space or getting stuck!"* *8-year-old boy.* *"I am ready to level up!"* *10-year-old girl.*	Excellent

V

Specific STEM categories

This section summarizes the feedback from independent expert review of your toy or game. This includes:

- Science
- Technology
- Engineering
- Mathematics

Section overview

Your toy has been rated 'Minor', 'Moderate', or 'High' for two (2) or more of the specific STEM categories. This means that it provides age-appropriate learning opportunities across multiple disciplines, as required by the STEAM approach.

V Specific STEM categories

About the specific STEM category review

This section of the evaluation identifies the learning goals the toy or game has the potential to support. To be a STEAM toy, a toy or game must help children's learning within two or more of the STEAM subjects. This means that it supports the multidisciplinary approach that is core to STEAM.

To assess this, the toy or game was reviewed against learning goals adapted from a collection of US learning standards. The target age in Section I was used to identify the age-appropriate criteria. This assumes that children outside of the target age group will not be able to play with the toy or game due to usability, will not enjoy it because it is too easy or challenging for them, or it will not find it appealing due to their current interests.

Toys or games must be rated 'Minor', 'Moderate', or 'High' for at least two STEM categories to pass this section.

Specific STEM categories rating scale:	None	Minor	Moderate	High

V

Specific STEM categories

Science

Depending on the target age of the toy or game, the Science learning goals may include learning to use scientific practices to carry out investigations as well as the study of biology (e.g. organisms, ecosystems, evolution, heredity, genetics), chemistry (e.g. matter), physics (e.g. forces, energy, waves), astronomy, and/or Earth science (e.g. Earth's systems). It does not include social sciences.

When the game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Science category.
 	
Forces
● **8- 9 Years**
    ○ Understanding the impact of balanced and unbalanced forces on the motion of an object within the context of their game design that included moving, balance, and unbalanced objects.
 	
● **10 - 12 Years**
    ○ Understanding that the gravitational force exerted by Earth on objects is directed down.
    ○ Exploring the concept of density and impact of equal and unequal weights.
	Moderate

V Specific STEM categories

Technology

Depending on the target age of the toy or game, the Technology learning goals may include developing digital literacy skills including using digital tools to create and innovate, gather information, and collaborate with others on a global scale; and/or using computational thinking, such as coding and programming, and/or digital citizenship (the responsible use of technology).

When the game is used as intended, with children of the target age, it has high potential to support children's learning within the Technology category. The learning goals that may be supported include:
 	
Digital Tools
    ● **8 -9 Years**
        ○ Using basic devices and software applications.
 	
    ● **10-12 Years**
        ○ Using basic devices and software applications.
 	
Innovation and Creation
    ● **8 - 9 Years**
        ○ Using a deliberate design process for generating ideas, testing theories, creating innovative artifacts (simulations, virtual representations, prototypes) or solving authentic problems using technology.
        ○ Developing, testing and refining prototypes as part of a cyclical design process.
 	
    ● **10-12 Years**
        ○ Using a deliberate design process for generating ideas, testing theories, creating innovative artifacts (simulations, virtual representations, prototypes) or solving authentic problems using technology.
        ○ Developing, testing and refining prototypes as part of a cyclical design process.
        ○ Identifying problems that can benefit from technology-assisted methods such as abstract models to find solutions.
	High

V Specific STEM categories

Engineering

Depending on the target age of the toy or game, the Engineering learning goals may include understanding how things work and applying this knowledge to design solutions to problems with set criteria and constraints; learning to design, construct, test, compare, and critically evaluate solutions; and/or designing solutions to science-based problems (such as preventing erosion).

When the game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Engineering category. The learning goals that may be supported include:
 	
The rating is moderate because the applicable engineering skills are being considered in a software development environment.
 	
<u>**General Engineering**</u>
● <u>**8-9 Years**</u>
    ○ Generating and comparing multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
    ○ Planning and carrying out fair tests to identify how a model or prototype can be improved.
 	
● <u>**10-12 Years**</u>
    ○ Generating and comparing multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem
    ○ Planning and carrying out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
	Moderate

V   Specific STEM categories

Mathematics

Depending on the target age of the toy or game, the Mathematics learning goals may include learning numbers and operations including number order, addition, subtraction, multiplying, dividing, and fractions; and/or learning the properties of shapes, how to use measurements (e.g. time, length, and volume), data analysis, and/or algebra.

When the toy or game is used as intended, with children of the target age, it has minor potential to support children's learning within the Mathematics category. The learning goals that may be supported include:
 	
Shapes and Measurements
    ● **8-9 Years**
        ○ Drawing 2D and 3D shapes.
	Minor

References

GUMMER, A., & TAYLOR, A. (2021). Science, Technology, Engineering, Arts, & Mathematics Toy Assessment Framework. The Toy Association™. Retrieved from "https://www.toyassociation.org/App_Themes/toyassociation_resp/downloads/research/reports/steam-ta-framework.pdf"

Front page photo by [Elisabeth Wales](#) / [Unsplash](#)

Appendix A - Characteristics of a 'good toy'

Fun & engagement

The fun and engagement rating refers to the extent that children enjoy playing with the toy or game, the frequency, and the length of play.

A poor rating for fun and engagement means that most children of the target age became bored quickly and were reluctant to play with the toy or game more than once.	**Poor**
A good rating for fun and engagement means that many children of the target age enjoyed playing with the toy or game, and some for prolonged periods of time. It was not a favorite but still provided engagement and entertainment.	**Good**
An excellent rating for fun and engagement means that many children of the target age enjoyed playing with the toy or game, some for prolonged periods of time. Some children remained keen to play regularly and it may have been very engaging for specific groups of children.	**Excellent**

Ease of use

The ease of use rating refers to the extent that most children in the target age group can use the toy or game as intended.

A poor rating for ease of use means that children of the target age were unable to use the toy or game without constant third party help (e.g. an adult did everything for them).	**Poor**
A good rating for ease of use means that children of the target age were able to use the toy or game with third party support.	**Good**
An excellent rating for ease of use means that children of the target age were able to use the toy or game to its full capacity with minimal third-party help.	**Excellent**

Skill development

The skill development rating refers to the extent that the toy or game helps children develop age-appropriate soft and hard skills.

A poor rating for skill development means that there are no obvious age-appropriate skills for children of the target age supported by using the toy or game.	**Poor**
A good rating for skill development means that the toy or game has substantial benefit to a child's development in at least one age-appropriate skill area for children of the target age.	**Good**
An excellent rating for skill development means that the toy or game actively encourages age-appropriate development across three or more skills (e.g. cognitive, language, or creative skills) or is particularly good at developing one or more core skills (e.g. literacy or numeracy) for children of the target age.	**Excellent**

Inclusivity

The inclusivity rating refers to the extent that the toy or game is designed for and marketed to children of different genders, backgrounds, and abilities.

A poor rating for inclusivity means that the toy or game has barriers for children who are likely to play with it. Product packaging and marketing may have a negative representation of minority groups or overly stereotyped behavior.	**Poor**
A good rating for inclusivity means that the toy or game appears to be designed to be a gender-neutral product without any obvious barriers to children who are likely to play with it. Product packaging and marketing does not have a negative representation of minority groups or overly stereotyped behavior.	**Good**
An excellent rating for inclusivity means that the toy or game appears to be designed to be proactively inclusive, helping remove barriers for children who are likely to play with it. Product packaging and marketing may positively represent diverse groups.	**Excellent**

Appendix B - Prime STEAM attributes

Real world relevance

The real-world relevance rating refers to the extent that the toy or game relates to and/or represents real-world applications.

A poor rating for real-world relevance means that the toy or game has no relevance to the real world and no opportunity to practice applying knowledge.	**Poor**
A good rating for real-world relevance means that the toy or game allows hands-on observation and use, for example: seeing real working mechanics, using measurements, or using scientific tools. Relevance to the real world isn't clear.	**Good**
An excellent rating for real-world relevance means that the toy or game has clear relevance and application to the real world. The toy or game allows hands-on observation and use.	**Excellent**

Active involvement

The active involvement rating refers to the extent that the toy or game allows physical, hands-on involvement.

A poor rating for active involvement means that children of the target age cannot be actively involved in the learning experience through observation or hands-on play.	**Poor**
A good rating for active involvement means that children of the target age can be actively involved in the learning experience, but a large amount of support from an adult is required to do so.	**Good**
An excellent rating for active involvement means that children of the target age can be actively and independently involved in the learning experience. They can look at and physically manipulate materials to further their understanding and/or solve problems.	**Excellent**

Arts

The arts rating refers to the extent that the toy or game encourages children to use both the left (logical) and right (creative) sides of their brain. For example, expressing themselves through the arts such as design, drama (including pretend play), dance, music, history, or language.

A poor rating for arts means that the toy or game gives children no opportunities to tap into their creative and imaginative skills to support divergent thinking. Children have no requirement to use the right (creative) side of their brain.	**Poor**
A good rating for arts means that the toy or game gives children some opportunities to tap into their creative and imaginative skills to support divergent thinking. Children have some chances to use both the left (logical) and right (creative) sides of their brain, but this is limited.	**Good**
An excellent rating for arts means that the toy or game actively encourages children to tap into their creative and imaginative skills to support divergent thinking. Children have the chance to use both the left (logical) and right (creative) sides of their brain.	**Excellent**

Logical thinking

The logical thinking rating refers to the extent that the toy or game requires logic, such as trial and error or problem-solving.

A poor rating for logical thinking means that there is no need to use logical thinking when playing with the toy or game, for example: there are no opportunities to problem solve, no exploration or use of logic principles such as cause and effect.	**Poor**
A good rating for logical thinking means that the toy or game promotes learning through trial and error and/or investigative learning. The toy or game encourages children to explore logical concepts.	**Good**
An excellent rating for logical thinking means that the toy or game allows children to identify and apply solutions to problems independently. The toy or game promotes learning through trial and error and/or investigative learning and encourages children to explore logic principles.	**Excellent**

Free exploration

The free exploration rating refers to the extent that children can explore the toy or game on more than one occasion, thereby reinforcing their learning and promoting curiosity.

A poor rating for free exploration means that children do not have opportunities to experiment repeatedly. They are unable to explore and find answers to a range of questions.	**Poor**
A good rating for free exploration means that opportunities to explore and experiment are available but limited.	**Good**
An excellent rating for free exploration means that the toy or game gives children the freedom to repeatedly explore their own ideas.	**Excellent**

Step-by-step learning

The step-by-step learning rating refers to the extent that the toy or game gradually builds confidence through guidance, parent support, and/or increasing levels of challenge.

A poor rating for step-by-step learning means that the toy or game has limited learning opportunities. It could either be too simple for the target age, thereby not helping them to grow their skills; or is too complex for the target age and tries to develop skills that are not yet achievable.	**Poor**
A good rating for step-by-step learning means that the toy or game allows children to continually extend and apply their knowledge, reinforcing learning within their comfort zone. Activities included with the toy or game offer different levels of challenge appropriate for children of the target age, gradually increasing in difficulty, to help children grow their confidence.	**Good**
An excellent rating for step-by-step learning means that the toy or game includes additional guidance for adults, that can help them support the child's learning to extend their knowledge past their comfort zone. Activities included with the toy or game offer different levels of challenge appropriate for children of the target age, gradually increasing in difficulty, that may help children grow their confidence.	**Excellent**

Appendix C - Specific STEM categories

Science

Depending on the target age of the toy or game, the Science learning goals may include learning to use scientific practices to carry out investigations as well as the study of biology (e.g. organisms, ecosystems, evolution, heredity, genetics), chemistry (e.g. matter), physics (e.g. forces, energy, waves), astronomy, and/or Earth science (e.g. Earth's systems). It does not include social sciences.

When the toy or game is used as intended, with children of the target age, it does not have potential to support any of the current Science learning goals in the STEAM framework.	**None**
When the toy or game is used as intended with children of the target age, it has minor potential to support children's learning within the Science category.	**Minor**
When the toy or game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Science category.	**Moderate**
When the toy or game is used as intended, with children of the target age, it has high potential to support children's learning within the Science category.	**High**

Technology

Depending on the target age of the toy or game, the Technology learning goals may include developing digital literacy skills including using digital tools to create and innovate, gather information, and collaborate with others on a global scale; and/or using computational thinking, such as coding and programming, and/or digital citizenship (the responsible use of technology).

When the toy or game is used as intended, with children of the target age, it does not have potential to support any of the current Technology learning goals in the STEAM framework.	**None**
When the toy or game is used as intended, with children of the target age, it has minor potential to support children's learning within the Technology category.	**Minor**
When the toy or game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Technology category.	**Moderate**
When the toy or game is used as intended, with children of the target age, it has high potential to support children's learning within the Technology category.	**High**

Engineering

Depending on the target age of the toy or game, the Engineering learning goals may include understanding how things work and applying this knowledge to design solutions to problems with set criteria and constraints; learning to design, construct, test, compare, and critically evaluate solutions; and/or designing solutions to science-based problems (such as preventing erosion).

When the toy or game is used as intended, with children of the target age, it does not have potential to support any of the current Engineering learning goals in the STEAM framework.	**None**
When the toy or game is used as intended, with children of the target age, it has minor potential to support children's learning within the Engineering category.	**Minor**
When the toy or game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Engineering category.	**Moderate**
When the toy or game is used as intended, with children of the target age, it has high potential to support children's learning within the Engineering category.	**High**

Mathematics

Depending on the target age of the toy or game, the Mathematics learning goals may include learning numbers and operations including number order, addition, subtraction, multiplying, dividing, and fractions; and/or learning the properties of shapes, how to use measurements (e.g. time, length, and volume), data analysis, and/or algebra.

When the toy or game is used as intended, with children of the target age, it does not have potential to support any of the current Mathematics learning goals in the STEAM framework.	**None**
When the toy or game is used as intended, with children of the target age, it has minor potential to support children's learning within the Mathematics category.	**Minor**
When the toy or game is used as intended, with children of the target age, it has moderate potential to support children's learning within the Mathematics category.	**Moderate**
When the toy or game is used as intended, with children of the target age, it has high potential to support children's learning within the Mathematics category.	**High**