Product design of a toy that teaches children how to program in a playful manner

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Nowadays the world is becoming more digital and with this, programming skills are becoming increasingly important. Consequently, parents want their kids to be futureproof by teaching them STEM (Science, Technology, Engineering & Mathematical) skills. Knowing how to program results in great STEM skills, but currently there is no matching educational environment for this. There are initiatives that use Educational Technology (EdTech) toys to teach children programming, but having fun is lacking within these programs. The company LoCoMoGo wants to solve this problem and is therefore developing a physical toy train which teaches young kids how to program in a playful manner. However, the fact that the toy should have the form of a train is not definite. LoCoMoGo would benefit from a research into what possible other shape(s) and functionalities their product could have in the future. Investigating what makes learning how to program fun for all children will be relevant during this research. That is why the main question of this thesis is: **What is the best product design of a modular and tangible toy which teaches children from 4 to 12 years old how to program in a playful manner?**

Both a literature research and a competitors analysis was done. One of the results was that the appearance of the toy should encourage a child to keep on playing and show its functionality (Smirnova, 2011). Furthermore, it should have a shape that is in between familiar and abstract. This will stimulate younger children to play and gives older children the possibility to be creative up (Burns-Nader, Scofield, & Jones, 2019). Next to that, the appearance should be interesting for both genders and the whole age range. Research showed that having multiple play options and making the toy to grow along with the learning capabilities of a child can support this (Futschek & Moschitz, 2011).

Considering these results and while brainstorming in parallel resulted in three ideas, of which one has been developed into a concept. This concept uses hand gestures as a coding language and will teach children how to program in an intuitive and active way (See Figure 1 and 2). The toy consists of a front part and four additional parts that each provide new functions. This secures that the learning approach fits with the age and capabilities of a child, and that the difficulty level increases along with this. The modularity of the toy provides the possibility to change the play options along with the preferences of a child. The overall look of the toy represents an animal, but what kind is free for a child to interpret. The first two extra parts of the toy, the movement and light part, are screen-free and offer free-play, which is suitable for younger children. By providing play-sheets that visualize the functionality of the toy, a child will learn the hand gestures. Next to that, activity cards will provide challenges that teach more coding skills. The other additional parts, the sound and drawing part, are compatible with a tablet and offer games and challenges at different difficulty levels. They allow children to be creative by making use of sound, music and drawing. Concluding, the expandability of the toy should motivate a child to keep on playing with the toy for many years.

Further recommendations can be given and alterations can be done to improve the concept and develop a strategy for life cycle management. Firstly, the appearance of the toy currently needs extra materials to show its functionalities. This need could be solved by using audio or lights as hints or instructions. Though, keeping in mind the importance of the child is learning by exploring, instructions should only be used as a guideline while playing. Additionally, it is not confirmed yet that the toy will be visually and functionally attractive for all genders and ages. Therefore the concept should be tested with boys and girls from 4-12 years old. Lastly, according to research children learn best when they collaborate (Papavlasopoulou, Giannakos, & Jaccheri, 2019), which has not been implemented in this concept yet. This can be realised by for example combining teaching programming with outdoor play. From the literature research, the brainstorming and the ideation, a idea was conceived and developed into a first concept suited for further evaluation.

Pictures:

Figure 1 Foam model of the toy

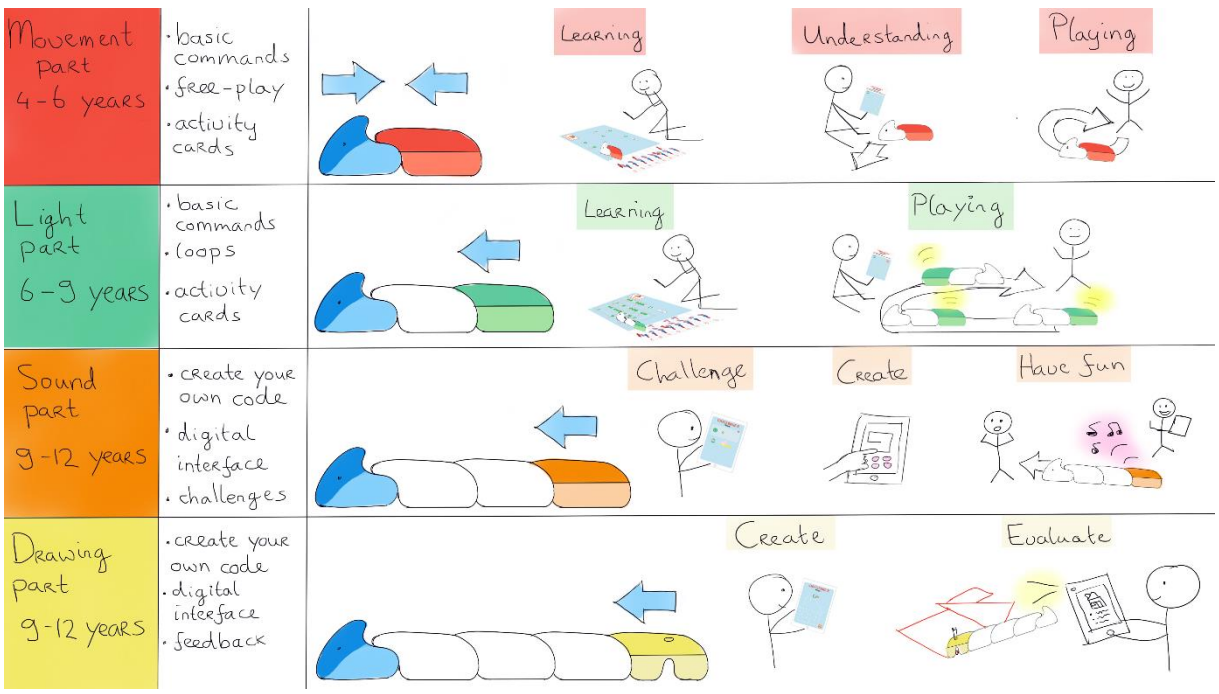

Figure 2 Explanation of the toy's functionality

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