CHILDREN AND SMART TOYS
IN MODERN LEARNING ENVIRONMENT

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Abstract: In the era of dynamic development of new technologies, the real space and virtual space interpenetrate. The boundaries between them are blurring. This experience already affects very young children, for whom both environments seem to be a natural place of growing up. The progressive computerization of the play space contributes to the integration of the physical and digital world. Toys and their abilities are changing, they are more smart and interconnected. The way children play with them also changes. The aim of the study is to show the challenges parents and teachers face in creating and controlling the digital playing environment that would provide the child a full security and educational values.

Keywords: smart toy, children, digital technologies, learning environment, learning through play

INTRODUCTION

One of the basic forms of human activity is play, and it concerns not only children but also teenagers of all ages. It is prevalent in the beginning stages of human development, however as time goes by, play is being perceived as spontaneous and selfless in adults - it transforms into actions that are more direct and takes shape as a form of entertainment or recreation.

1. THE ROLE OF PLAY IN THE GROWTH PROCESS OF THE MODERN CHILD

Play has many functions. Thanks to play, children better understand the surrounding world and its rules. Through experimentation they experience the physical reality, through observation and mimicking norms and rules of society, and they are prepared to play different roles in families, at schools or at work.

While playing, children learn logical thinking, train perceptiveness and visual-motor coordination (Brzezinska, Batkowski, Kaczmarsk, Włodarczyk, Zamecka, 2011).

Currently, many scientific studies emphasize the natural aptitude for learning of a young child through various forms of play. Neuroscientists emphasize that children have an enormous potential after they are born and they should get all the help they can get to reach their full potential. Those innate skills of learning are a reference point for shaping features such as curiosity, engagement, creativity, etc. Nurturing these skills is closely tied to the need of lifelong learning.

The word "play" itself has extensive meanings and can relate to many different situations experienced by a child. Play can thus have a casual nature of exploring the surroundings or can be completely channelled into organizational forms or ramifications. It can also impact the environment and surroundings (for example home, school, backyard).

In the report "What we mean by: Learning through play" prepared by the The LEGO Foundation, based on talks with experts, five features have been determined that describe learning by play. The first basic feature is being joyful and the pleasure that is generated by play, the next one is finding meaning in what they do, full engagement, shaping iterative thinking, formulating problems, experimentation, making hypotheses, etc.) as well as social interactions during play (*What we mean by: Learning through play*, 2017).

If children treat their actions as play they are more likely to engage in them and can develop certain skills faster as well as achieve success. By participating in group play they learn social behaviours, coworking with others and reaching mutual goals. Exploring the environment – copying and repeating actions by children, results in the expansion of their knowledge of the world and getting vital experience. Iterative play, however, contributes to shaping creative attitudes, innovative ways of thinking focused on problem solving. This happens because children are more prone to experiment with objects in their immediate environment, finding new, unheard functions. Unleashing creativity and openness is becoming one of the main goals of contemporary education (Whitebread, Neale, Jensen, Liu, Solis, Hopkins, Hirsh-Pasek, Zosh, 2017).

2.   NEW TRENDS IN THE DEVELOPMENT OF TOYS

Toys understood as props used for play have accompanied humans since the dawn of time and undergo further transformations with technological advancements made in various areas of life. Today, with the abundance of advanced electronic devices and digital gadgets, these transformations take on a specific nature coming from the permeation of two worlds: digital and analog.

Modern toys have simultaneously become material artefacts and online media. There has also emerged a term "connected play" which points to the trans-medial and multi-modal nature of modern toys. In modern toys the line between what is online and offline has become blurred (Mascheroni, Holloway, 2017).

Dynamically evolving the Internet of Things enters the toy market intensively. The majority of so called "intelligent toys" are products of hybrid nature - they connect the physical object with a specially designed software and an entire virtual environment. To use these toys it is essential to exchange data between a child and a server or an internet platform (Chaudron, Di Gioia, Gemo, Holloway, Marsh, Mascheroni, Peter, Yamada-Rice, 2017).

Advanced electronic toys currently support Internet connection (for example WI-FI, bluetooth), they can also be equipped with various sensors that collect different kinds of data and explore their surroundings. More and more toys are also now "smart" because they allow to start a dialog with a child. New technologies also allow for an exchange of information with other toys. The term "intelligent toy" is understood as a toy equipped with electronic elements consisting of processors that run dedicated software that allow for the interaction with the user. Modern toys based on new digital technologies can also react to the young user's actions, identify verbal messages and respond to them. They can also be remotely controlled by a network infrastructure, for example smartphones or tablets equipped with dedicated software (Chaudron, Di Gioia, Gemo, Holloway, Marsh, Mascheroni, Peter, Yamada-Rice, 2017).

In the report Internet of Toys: A report on media and social discourses around young children and IoToys. The authors outlined three main types of toys equipped with dedicated software. The first group are toys that connect to the Internet. The second group consists of toys that simulate human interaction, for example dolls controlled by voice recognition tools. The third group - the most advanced one, includes toys, which can be programmed by the user, for example, they can complete actions not predefined by the manufacturer. For example, certain robots which can be controlled by children using certain applications, while writing their own programs (Mascheroni, Holloway, 2017).

It should also be noted that the outlined areas in this practice often permeate and supplement each other and in many cases it is hard to draw a clear line between them. The outlined groups, however, illustrate the observed trends in the domain of toy development very well.

For the past few years robot toys have become quite widespread. LEGO MINDSTORMS is one of the most popular toy series. Lego sets along with sensors and dedicated software allow the child to build their own robot and individually program it. On the other hand, Dash & Dot robots from Wonder Workshop go a step further. Thanks to built-in sensors they can react with voice, find objects, dance and sign. They can also be coded with graphical, intuitive applications suited

for younger children on smartphones and tablets. (http://www.wonderpolska.pl/product-pol-6-DASH.html).

Children usually like to collect action figures, especially their favourite heroes from popular cartoons and animated movies. The traditional form of toy takes on a new shape thanks to modern solutions. An example of this would be one of the characters from Star Wars - Droid BB − 8, which, using the Internet and a dedicated application that responds to voice commands, can move, execute pre-preprogrammed actions, play games, play recordings that resemble holograms, and even explore its surroundings and learn its topography (https://www.sphero.com/starwars/bb8).

Robots can also take shape in the form of supercars (http://www.anki.com/en-us/overdrive which can be built, programmed, and equipped to fight others.

More often you can see toys based on Artificial Intelligence which are designed to engage in a dialog with a child. The Hello Barbie doll from Mattel can for example talk with a child in real time. It uses the Internet. After activating the system - pressing a specific button - it connects to the wireless home network, records the child's speech and sends it to the server. There, it is processed and analysed and then the system provides an answer which is sent back to the doll. The dedicated smartphone application allows the parents to constantly monitor the conversations between the Hello Barbie doll and their child, and the crucial data is stored on the phone that is used to connect with.

A specific type of toys which has great potential are 3D printers. They are already available for sale for the youngest users. Children take on the role of creators and inventors, wanting to materialize their ideas in practice. Using special applications they design objects and subsequently print them and check if they work. For example the da Vinci miniMaker printer is marketed as a STEAM toy, which not only boosts the development of the child's competences in the field of science, maths and arts but also can accompany the child for many years at later stages of education (https://www.xyzprinting.com/en-US/product/da-vinci-minimaker).

Trend analysis of the development of modern toys illustrates that one should not discount new digital forms of books for children. The digital revolution had a major impact on the diversification of the form of the modern book. Tablets, smartphones or ebook readers are becoming physical data carriers for electronic publishers. They allow for the selection of any form of book. Apart from physical publishing houses, we also have e-books and audiobooks. However, even traditional books may contain additional elements: QR codes or links that allow access to additional multimedia web resources. Specifically, Augmented Reality technologies have special features. It is a technology that allows to add a layer of digital information on top of a physical reality seen through a screen or a device. Interaction with objects in augmented reality takes place with different mobile devices, however they all require a physical object to present the information. Through 3D projections taking shape as virtual objects, that can additionally be

supplemented with animation and sound, there emerges a new quality of experience - ability to consume a book through different means. For example in Alive! by Carlton Dinosaurs from the award-winning series Bring to Life, after scanning selected illustrations with a tablet or smartphone, children can see the described dinosaur models from different angles (https://www.carltonbooks.co.uk/series/digital-magic-books).

Summarizing the debates concerning the new trends in the development of toys which can be now observed, it is worth to mention the new phenomenon of permeation of the real and artificial artefacts with the digital space, services, applications and internet resources. In modern toys these technologies are often their integral part and create a media platform that is part of a promotion of a product.

3. DIGITAL TOYS AS ELEMENTS OF THE MODERN EDUCATIONAL ENVIRONMENT

Simple, classic toys such as rattles, blocks, puzzles, which have been dominating children's bedrooms, allowed the children to become creators - subjects that control the course of the play. Today, however, the children are equipped with toys that repeatedly direct their way of play. They suggest, and often impose what and how they should play. They simultaneously determine the method of using a given toy. It can also be assumed that in some cases they program the behaviour and children's methods of play. They do not inspire, instead they limit the development of imagination in a child. Moreover, modern electronic toys draw the attention of children and parents with attractive look, movement, lights and sound. Often they are heavily advertised in mass media. Traditional toys that are not promoted like that can be perceived as dull and uninteresting. Specialists warn that in the long term, this problem may have a major impact on the methods of play as well as the way the children learn. Certain criticisms point to the fact that it may also lead to negative consequences for the entire learning process (Levin, Rosenquest, 2001).

Manufacturers of technologically advanced toys promote them in media as having a major learning potential. This way of presenting products make the parents decide, despite high price, to buy them eagerly. There arises a question whether educational values in toys full of technologies are that valuable. Or rather they limit the cognitive abilities of children, hinder their innate aptitude for active play and creative thinking, or even destroy imagination. Despite the long term research, these questions are still viable (Levin, Rosenquest, 2001). The capabilities of the toys themselves and the media connected to them change very dynamically.

One of the major issues concerning families is the situation where children more eagerly choose activities available through digital media rather than traditional forms of play. When a child is stimulated with different incentives from the media

they get used to that situation and treat it as typical. They also get used to the role of a passive consumer and expect to be entertained by the environment at all times. That is why it is so important to promote an active role, leaving a lot of flexibility in a child's play and allowing for spontaneous actions. The technology in the toy cannot overwhelm the child, rather it should expand its properties with additional features and, most importantly, allow to control the toy at all times.

 The educational value of toys, games and applications used by children is very important. They should be based on the idea of problem solving and ensuring the ability of development and discovery through personal choices and innate curiosity, which results in actions such as searching, projecting and building. It also worth noting that while a child is discovering the surrounding world, it also explores the media environment in which it functions, and it reaches for new digital media and treats them as objects of play. A few-year-old is already able to use mobile devices such as smartphones and tablets. This can also be a chance to inspire the child to undertake creative actions, experiment with media messages or create own images, photos or videos using the available software.

On the other hand, many toy manufacturers underline that their products enter the educational stream of interdisciplinary STEAM, supporting sciences and arts (STEAM - Science, Technology, Engineering, Arts, Math). In the same way they meet the social demands in shaping future specialists that are currently in high demand, including programmers and engineers.

One of the pioneers and proponents of introducing the children to the world of technology and artificial intelligence was Seymour Papert - the inventor of the LOGO language. His goal was a complete overhaul of the practice of learning and educating, a departure from the method of passing on knowledge and switching to actively creating it. Just in the 60s, of the past century, the children could easily use a computer, only if the learning process would take place in a natural manner, similarly to the way in which the child learns basic activities such as speech. Based on the ideas of constructivism, he created the rules of constructionism. He said that the if the child engages in the creation of specific artefacts, the accompanying learning process becomes more effective. Digital technologies and the ability of self-learning play a crucial role in this process. S. Papert also pointed to the importance of indirect teaching, which also occurs during other activities. One of these activities is the free play of the child (Walat, 2017).

One of the crucial aspects of media-based smart toys is the security of the child in the digital world. Internet communication carries certain dangers concerning confidentiality and availability of sensitive information, such as personal data. Moreover, there is always a chance that hackers might take control of the device which the child is using – such cases have already been reported.

There are also groups of electronic gadgets which, apart from their basic function - which is to entertain, also have a guardian function. For example, smart watches, apart from typical functions - such as built-in games and applications for children

and the ability to make calls with specific numbers, have extensive control options. A smartwatch can be equipped with GPS, a SOS signal button or alarm which turns on when a device is removed from the arm or when the device leaves a certain area. Based on the equivalents for adults it can also have additional features such as a torch, pedometer, or other advanced applications for monitoring sleep.

When using smart toys there are also certain legal regulations with new media. For example concerning unclear rules of possession. Similarly to solutions used in other fields, the owner of the software is usually the toy manufacturer, and the parents buying these toys are only licensees. Due to this fact, such software can be easily updated or modified by the manufacturer at any time, they can also change the conditions of use.

CONCLUSIONS

Evaluating the values of intelligent toys, it is worth mentioning the above contexts. Creating an environment that supports the development of a young child in the digital world is a challenge to the parents specifically. Kristy Goodwin, the author of the book *Raising your child in a digital world*, emphasizes on her blog that today children spend most of their time interacting with technology. They acquire digital competences much faster than motor skills, enabling them to effectively navigate the physical space and other basic literacies. That is why contact with new technologies did not replace hands-on experience. Introducing the child to the world of digital technologies is not an easy task, the parents do not have the necessary experience or elaborate norms of behaviour, especially where in many cases we encounter circulating opinions and myths which do not hold any substantiation in a wide range of scientific case studies.

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