

Małgorzata Cackowska
University of Gdansk

Possibilities of new technologies in education. A review of interactive apps with developmental potential

Introduction

In this text, I am going to focus on the educational content of apps for touch-screen devices (tablets, smartphones) available on the global market and designed for children in their family environment, i.e. for home-based socialisation. This topic, now undertaken mainly by the popular media (press and television, socio-political weeklies, social media, as well as internet newspapers and vortals or blogs related to child-rearing), is highly dominated by a common self-help book discourse, represented – not only in Poland – by the so-called technophobes, who scatter moral panic towards the new common enemy endangering the traditional values – as observed by David Buckingham – a scholar studying the reception of modern technologies in the field of education (Buckingham 2008: 133). A much smaller determinism marks the approaches of the so-called techno-enthusiasts, who try to show the importance of new, previously unimaginable opportunities for development, and for social education. For example – a series of studies carried out in the United States since the very beginning of the appearance of mobile touchscreen devices (mainly iPads) revealed that the parents of children regularly using the devices observed a considerable development of their cognitive processes such as memory and problem-solving, as well as a broader range of vocabulary, reading skills and mathematical thinking (Rideout 2014). Buckingham analyses the different approaches to technology and the emerging new cultural forms – indicating the differing ideologies and concepts of the child and childhood behind the slogans formulated by the opposing approaches as well as their politicisation. What both fractions have in common though is only their belief in the strong impact of modern technologies, especially digital ones, on children. There are many more arguments full of aspirations and concerns, hopes and fears: the supporters of new technologies can see their educational and developmental potential generating a change of the ways children learn, backed by the vision of the child as the demiurge, whose creativity and competences in the area of participation in culture may be developed in many fields, which may result in the (utopian) emancipation of children, whom Marc Prensky determined as “digital natives” (Prensky 2001: 1).

The opponents strongly, although – as Buckingham points out – with very limited amount of empirical evidence (Buckingham 2002), argue in favour of the existence of threats to children, who in this option are considered to be helpless, sometimes unreasonable, and vulnerable to the negative standards resulting from the digital technologies as an offer.

Buckingham's line of reasoning is very interesting, as it makes us look at the new phenomena as the birth of new cultural forms and the changing experience of the users of digital technologies. What is the matter of the digital culture is convergent and is embedded in the context of a huge power of commercialisation and claims of the global industry – mainly the entertainment industry. According to Buckingham, what is meaningful in this configuration is the control, the left and right anchoring of which is a symptom of "crisis about the changing relationships of power and authority between adults and children" (Buckingham 2008: 134). Similar concerns are expressed by Polish researchers (see Balicki 2005).

As the author of this article, I definitely belong to the techno-enthusiasts: I want to propose a reflection on this aspect of the world, life, and the ways in which children learn it, which changes in front of our very eyes; I attempt to show the developmental and educational potential of interactive apps for mobile touchscreen devices.

Starting my review of selected products from the market of apps designed for children, I need to remark that it is huge, global, and probably entirely free from social control. To a large extent, it resembles the Polish book market, which is marked by a clear qualitative difference between the most popular, mass products connected with economic capital and the products which originate from cultural capital and are produced with educational and social value in mind, particularly in terms of aesthetics. In the huge collection of the global production of apps for children – which can mainly be found in shops to do with devices with iOS or Android systems (several hundred thousand items)¹– it is difficult to find the items which really facilitate development and learning, and separate them from the quasi-educational mass of, in essence, kitsch productions full of advertisements. Although both the creators and the systems of shops assume categorisation in terms of substance (subject matter, content and goals) as well as the age of the target recipients of the produced and distributed apps, it is essentially impossible to identify the ones which facilitate the development of various competences and be sure of their quality, despite the fact that the apps obligatorily need to be described in terms of their content and include several screenshots. The price is one of the distinctions allowing one to relatively easily find the appropriate app which is searched for. A specific price should guarantee both the top quality of the substance of the app, and its technical convenience. Unfortunately, however, it is not always that a high price of the app is tantamount to its real educational and developmental value. Although not yet frequently, free apps existing and distributed owing to subsidies from various cultural institutions start to appear. For example, it was owing to the partial financing from The Britten-Pears Foundation that a technologically advanced iPad app entitled *The Young Person's Guide to the Orchestra* was developed (by AVCO Productions). It was inspired by Benjamin Britten's 1946 concept of mu-

¹ The Windows Phone shop is incomparably poorer in valuable educational apps.

sical education; it was graphically designed by the famous illustrator Sara Faneli. It is a fantastic music lesson containing a score (Britten's original manuscript) synchronised with a filmed orchestra performance, a lot of information about the history of the work, instruments, musicians, etc. as well as elements of exceptionally creative play activities in music composing, and games, and quizzes, between which the user may move freely.

As for the Polish context of the promotion of apps for children, the parents or educators looking for a piece of advice concerning the selection of the best apps often use portals devoted to the introduction to the use of the latest technology (<http://wcosiebawic.pl/> [accessed on: 16.01.2014]; <http://www.appsmarts.pl/> [accessed on: 16.01.2014]). However, they are mainly addressed to consumers, and they are sponsored, which means that they often promote selected products of specific producers (developers). Poland definitely lacks such initiatives as the portals *Dust or Magic* or *Children's Technology Review* run by Warren Buckleitner, who aims at a broadly understood promotion of the educational use of the potential of new technologies.

Below, under individual categories, I will review selected apps for children available for devices with various operating systems (although mostly those designed for devices with iOS), developed by various companies. The choice is subjective, oriented towards the promotion of the educational and developmental potential, the degree of technological advancement and the experience of interactivity, and is largely based on aesthetics.

Apps for babies and preschoolers

Shops with applications offer thousands of multimedia apps for very small children. They seem to be the developers' favourite type of production and ideally fit tools with a touchscreen. They resemble the first picturebooks: ones owing to which children as young as babies learn colours, shapes, names of objects (types of vehicles, fruits, toys, animals, household appliances), notions (opposites, sizes, weighs, numbers, letters, sounds, as well as, for example, expressions of emotions), and activities (names of plays, professions and activities related to the simplest medical aid or the hygiene of physiological needs). The interactivity of touchscreen devices facilitates great results in the area of experiencing the said notions and cognitive effects. The possibility of making sounds (sometimes also releasing smells) during the presentation of an object, the free repetition of activities giving the child the sense of agency, the selection of preferred views (pages), the causing of various reactions, the activation of associations – all this enhances the child's perception, the creation of notions in the children's minds, remembering, cause and effect reasoning, and other cognitive processes which are important at the given moment. Therefore, it is important to provide a small child with apps which will be as beneficial as possible. Offers for very small children include the *Owlie Boo* series (developed by Matias Gravano): owing to a very simple navigation created on the page-turning principle, they provide children with an opportunity to become familiar with simplified but aesthetic visual representations and sounds of animal species living in various environments. The series of apps developed by

the *Sago Sago* company also provide a huge amount of educational foundations for small children combined with creative fun. For example *Sago Mini Sound Box* is a fantastic play in the learning and identifying of sounds, *Sago Mini Space Explorer* makes the child able to go on a (simplified) cosmic trip, while *Sago Mini Bug Builder* facilitates the independent composition of the look of small bugs. What the best developers in the industry find the most important are the elegant, simple stylistics and form as well as intuitive operation. All this combined gives the child the desired cognitive and developmental effect.

The craziness of the parents prioritizing the possibly early school readiness of their children, i.e. their learning to read and count as early as possible, is expressed in many different ways. This is answered by the publishers of books for children racing to publish books teaching children letters, numbers and many other concepts (*concept books*), and by app developers. The tablet seems to be the ideal present day substitute for the stone tablet, which was used primarily for the basic teaching of letters. This is because the former makes it possible to draw on the screen with one's finger, for example shapes which resemble letters and digits, and to transform, with the touch of one's finger, a concretely presented number, for example two blocks, into its symbolic form – in this case: 2. This action can be repeated endlessly, developing the appropriate connections in the developing child's brain. Additionally, the device makes the user apply gentle hand gestures, which is particularly important when children suffering from considerable muscle tension undertake for example their first writing attempts. In the situation when the child has a great motivation to reach the desired effect, he/she has to relax his/her hand. This is most often so in the case of hyperactive children and children suffering from cerebral palsy (which I will discuss further on). Examples of Polish apps include the production of the WSiP publishing house entitled *Litery i cyfry* [*Letters and Digits*]: on an imitation of a typical green school board the user draws popular patterns with chalk to smear letters and digits: first in print and then in cursive handwriting with their fingers. Another interesting proposal, more aesthetically extended, is the *Telewizyjne Abecadło* produced by TVP S.A. What I personally like most are the apps which are carefully developed in terms of their aesthetics and which are very interactive, which make one learn while having great humorous fun, such as *Endless Alphabet* and *Endless Numbers* developed by Originator Inc., unfortunately without a Polish version.

The immensely popular (although currently temporarily unavailable) totally Polish app *Mózg elektroniczny* [*Electronic Brains*] (produced by M-Concepts Sp. z o.o.) is great in all respects. The game is a digital version of my favourite childhood game testing one's knowledge from various areas, and requiring the player to connect objects with their appropriate names, activities, etc. with the help of electric cables causing a bulb to shine when the task is successfully completed. It contains a lot of exercises (in decent graphic design) with gradual difficulty, connected with various fields of knowledge, facilitating the development of observation skills, associations, memorization etc., which can be used by children as young as two or three years old, but also older ones.

Apps fostering creativity

In Poland, we have a considerable, varied and continually growing offer of books (activity books) inspiring the readers to engage in creative activities (the original Polish ones include the *Wytwórnik* [Workbook] series, and *Typobazgroł* [Typodoodle]). At the same time, developers are racing to produce apps with twin, albeit interactive, content. The Swedish company Toca Boca is the unquestioned global leader providing model proposals (practically every subsequent creator follows its steps) marked by top technological and graphic levels of advancement. Year after year, their app offer becomes increasingly rich and varied. For example, their *Hair Salon* app is an invitation to play being a hair salon in which the same nice customer is stylized in many different ways. In *Hair Salon Me* it is even more fun to create one's own often dreamt-of image (for example in long curly violet-pink hair) owing to the animation of one's own photographic portrait, while in *Toca Mini* even very small children can easily stylize a slightly slimy human figure. In the apps *Toca Monsters* and *Toca Kitchen*, meals are prepared for different, sometimes whimsical protagonists. In *Birthday Party*, it is possible to arrange a party in various conventions for selected guests. In *Toca Cars* and *Toca Train*, one participates in races or a train trip rich in adventures. *Toca Robot Lab* and *Toca Builders* require the user to experiment and create many bizarre objects. *Toca Nature*, one of the last productions of the company – which gets better and better with each product launched – is a real masterpiece. It is a premediated play as the creator of the world, and its authors with true ecological zest show the immediate consequences of the human impact on nature. The app creates the space of a virtual world, makes it possible to turn it, and slightly resembles the extremely popular *Minecraft* with its objects used for creation. However, its graphic design is much gentler (non-pixel), softer, and imitates the three-dimensional reality. And there are no frightening zombies or creepers one has to kill in the survival option in *Minecraft*. This is because this app is focused on creativity.

The apps of Polish developers which develop the imagination and creativity also enjoy great popularity. They include the JumpApp company (belonging to Luiza and Sebastian Bachórzewski, which offers great, attentively developed apps making it possible for the users to create – for example in a Puppet Workshop – monsters from socks, gloves, buttons, pieces of materials, string, etc. Plasticine beings can be created using the same principle in the *Imagination Box* app. Owing to it, small children, including those who suffer from disabilities, who do not have sufficiently developed praxis or manual and motoric skills, are able to obtain the result of a configured desired figurine by selecting elements with one finger. The playing time is even nicer owing to the calm, relaxing melody in the background. This developer's apps are very highly valued by global therapists of disabled children. *Cute Food* is a similar app, which additionally promotes healthy eating habits. It makes it possible to compose meals – mostly from pieces of colourful vegetables cut out from photographs.

Another Polish developer who has managed to win global recognition is Duckie Deck Development. The company offers – though in my opinion in less original aesthetics – apps for toddlers (starting perhaps with children as young as one year

old) working on a similar principle, such as the food-related *Duckie Deck Sandwich Chef* and many others referring to various areas of children's interests. Another Polish design studio – Pixle – managed to create a huge shop stand in the very engaging app called *Storest*. Owing to the app, the children's favourite play can take place in the situation in which elements of virtual and real space are combined (for example, some products offered for sale can be found in the virtual shop, while others can be printed out together with codes and scanned by the cash register on the screen).

The children's imagination is greatly stirred by apps which contain augmented reality (AR). They make one feel that borders between the digital and the reality were dissolved and that the digital permeates the reality. Such applications, in the previous category – for small children – include *AR Flashcards-Animal Alphabet* (Mitchelehan Media LLC). Owing to it, the child engaged in playing the three dimensions learns the names of animals starting with the subsequent letters of the alphabet.

Therapeutic apps

iPad, one of the very first mobile devices with a touchscreen used for the facilitation of the treatment of autistic children, was at some point called a miraculous tool. This is because apps can be used for the teaching of notions, categorisation, etc., which is effective when, for example, an autistic child especially dislikes communication with its environment (human being) even in a defined educational situation. It is then that the iPad (owing to the appropriate apps) takes over the role of the therapist and educator – it leads the child through the subsequent stages of learning, i.e. the acquisition and coding of knowledge on selected topics: colours, notions, activities, etc.. For this reason, the apps prepared for autistic children resemble the ones dedicated to the youngest recipients, as discussed above – only they are used to a broader extent. They include for example the apps from the *Autism iHelp* series (developed by John Talavera): *Food, Colours, First Words, Play, Sorting, Shapes, Emotions* and many more, which help children suffering from autism acquire very important competences. These apps are marked by their exceptionally simple graphic design, without any disturbing elements (they have clear figures against clear backgrounds). They also have very intuitive navigation, which helps those users suffering from manual difficulties. There are also some other, more advanced (and simultaneously appropriately more costly) apps facilitating augmentative and alternative communication (ACC), such as *Proloquo2Go* (developed by AssistiveWare). This app helps primarily those persons who are unable to talk independently, and makes it possible to communicate by touching symbols on the screen or entering words into the appropriate places which subsequently change into speech (a human voice). It can be used by people with various disabilities, including those suffering from cerebral palsy. Programs designed for tablets or smartphones are also greatly successful in the treatment of such persons – mainly because they do not involve the use of a mouse or a keyboard, which is difficult for them. The audiovisual effects and the instant feedback appearing even owing to an accidental touch of the screen motivate such persons

to continue exercises, and provide the sense to their own actions, in particular in the case of naturally inquisitive children. Therefore, it is not unimportant which apps are best for this kind of therapeutic work. They must be attractive enough to mobilise the user to use their disabled hand and thus develop the so-called fine motor control. Or they should aim at the facilitation of communication with the environment. The highest amount of information on the available apps with therapeutic potential can be found on websites in English (such as <http://www.appyautism.com/en> [accessed on: 16.01.2014]).

Apps for artists

The possibilities to learn animation (getting familiar with its principles), just like the possibilities to learn programming methods, have probably never been greater – and the very learning has never been as easy – than today, when we use programs designed for mobile devices. Owing to the app *Animation Creator HD* (mi-Soft) even children only a few years old can, initially with the help of an adult, and then independently, create their own original animation by drawing (with a finger or, more precisely, with a pen), adding drawings, and recording sounds. The interface and the navigation are so friendly and simple that children do not need special help from adults. *Daisy the Dinosaur* (Hopscotch Technologies) is a great, very simple app for the programming of the movement of characters. With the help of very clear commands (unfortunately, only in English), children can give various tasks to the dinosaur called Daisy, exercising cause-and-effect reasoning. They thus learn easily that they can themselves code, be game designers, that it depends on their ideas what and how the player for whom they prepared the play will do. A very modest and pretty graphic design adds additional points in the favour of this creative app.

Paper app (FiftyThree) is actually a fully professional atelier, creating huge possibilities for artistic expression. Many different options of strokes of brush, ink pen, felt-tip pen, and pencil, the riot of colours, the magnifier (allowing one to elaborate the details of a selected drawing fragment) give both the little and the professional artist² creative freedom and as a result an immediate digital version of their work. *Garage Band* (Apple) is a similar app, albeit one aimed at the creation of music. This powerful music studio allows the users to compose and record works for various instruments (including a guitar, piano, strings, and percussion), and owing to an internet connection with other users of this app, even to establish a music group representing any genre of music.

A lot of visual pleasure and substantial effects of work can be enjoyed owing to the *Let's Create! Pottery HD* app (Infinite Dreams Inc.). It is a potter's studio in which anyone, even persons who have never had anything to do with a potter's wheel, can easily throw a vase or some other vessel and learn the operating principle of the device that allows to make these things.

² It was using this app that Józef Wilkoń created illustrations for the book app *The Elephant's Child* (Fundacja Festina Lente).

Apps facilitating the acquisition of subject-specific school competences

A comparison of a tablet to a stone tablet returns in connection with this category. App shops offer many applications facilitating linguistic education. For example, *Duolingo Learn Languages for Free* (Duolingo), downloaded millions of times in all systems, is a free app for the learning of foreign languages at many different levels. It diagnoses language proficiency and adequately generates tasks and exercises. The users learn by repeating, listening, writing, and reading at their own pace. Elements of play and games increase their motivation, necessary to complete the subsequent levels. This app can be used at all levels of education, starting with kindergarten. Similarly, many game and play elements are included in the apps which can be used in early education. At this level of the use of technology in education, we deal with applications which replace the conventional worksheets and workbooks, such as exercise books, for simple arithmetical calculations or spelling exercises, as well as calculators, abacuses, dice, etc. What makes the majority of such apps different to the traditional sets of exercises is the usual feedback concerning the correctness of the solution (which makes the parents'/guardians' checking whether the child has succeeded more efficient, actually taking a load off their shoulders).

It is a similar situation with mathematical apps selected from at least several hundred ones available, which cover the four elementary arithmetic operations: addition, subtraction, multiplication, and division. It is worth mentioning the original ones, in which the operations are weaved into a plot. They are *Mystery Math Museum* and *Mystery Math Town* (Artgig Studio), and owing to them the users, involved in great fun, experience events, familiarise themselves with exhibits from many different museums, and collect digits allowing them to go through doors and windows if they solve partially prepared mathematical puzzles from the numbers they have collected. This is not banal. Although it is not a timed game, it requires observation skills: the player needs to remember where numbers, operations, doors, and rooms are. The prize is the understanding of mathematics and becoming aware that the knowledge of mathematics is the only road to success. Slightly different, but guaranteeing equally good fun related to arithmetic exercises facilitating memorisation, is the *Sushi Monster* app (Scholastic Inc.): a hungry monster, indicating a result, demands that sushi rolls being the components of its addition or multiplication be served to it as soon as possible and is happy when the task is completed correctly. The app offers very many exercises with arithmetic operations in different configurations, sometimes more than a hundred in one round, but great fun does not make the user notice this multitude. The same number of exercises given to the child in a workbook would be an immense load.

There are many other, much simpler, although useful and frequently downloaded apps, which essentially generate easy arithmetic or algebraic exercises and require correct answers – such as *Math Practice* (TeachersParadise.com) or *Math Flash Cards* developed for Android – or which introduce elements of the so-called gamification (here: a play for two players at one device for the time during which they do basic arithmetic exercises), such as *Math Duel* (Ellie's Games LCC for iOS or PeakselGames for Android).

The app *Splash Math* (StudyPad Inc.) is an example of an almost comprehensive elaboration of the mathematics curriculum at the early education and further levels. It has been downloaded by more than ten million users all over the world so far. It contains many operations in the area of arithmetic, geometry, algebra, data and time measurement, and characteristics of numbers. All the operations are carried out in compliance with the selected level of knowledge and abilities, and each of them is accompanied by an instruction and, obviously, feedback, and the accomplishment of the subsequent levels is connected with elements of fun – and prizes. Graphic design, sound and the animated, interactive images attract the users to playing with mathematics, making associations with it positive. In English-speaking countries, the app is used at different levels of education in schools.

Niche picturebook apps

I wrote about book apps and the artistic niche of this genre for the readers of the *Ryms* quarterly devoted to books for children and youth (Cackowska 2013). In Poland, the Fundacja Festina Lente company, which brings the more than half a century old books by Franciszka and Stefan Themerson to contemporary children, deserves particular attention. Owing to animations, games, and animated elements, as well as the excellent narrator – Piotr Fronczewski – the app created from the book *O stole, który uciekł do lasu* [*The table that ran away to the woods*] by the pair of artists brought it back to the cultural scene. It is also worth mentioning two apps which received the Bologna Ragazzi Digital Award. *David Wiesner's Spot* (Houghton Mifflin Harcourt), which seems to be the artist's dream come true, is entirely fascinating to me, although it only received the jury's special mention. Owing to the stretch gesture of our fingers, we gradually get inside the original image, feeling the illusion of infinity. Various adventures, which create an intriguing visual narration, await us during this fantastic journey. Wiesner also showed his masterly skills in a printed textless book *Flotsam*, but it is here that technology allowed him to let loose his crazy spirit to a much higher degree. The designer of a fun app with a 3D effect addressed to the younger children – *My Very Hungry Caterpillar* (StoryToys Entertainment Limited) based on Eric Carle's book – which is also familiar to Polish readers – was awarded with the BRDA award. Here, children look after a very gluttonous protagonist, collecting subsequently apples, pears, plums and many other products for her, until she truly miraculously transforms into a butterfly. Apart from the plot, this highly interactive and multimedia app contains a great many educational tasks encouraging the users to give things their names, count, categorise, arrange them, etc..

Among the continually growing number of book apps, there are also some controversial ones. One example is *Geoff and his Two Dads in... Tomato Trouble* (Wompi Studios Pty. Ltd.). The app was developed as the first one in the series of adventures of an authentic dog from Australia – a charming, very intelligent Jack Russell terrier called Geoff, who is disabled and moves owing to the wheels replacing his paralysed hind legs. His great dads, but also promoters making him famous³, are

³ Geoff and his fathers even have their own Facebook fanpage.

a homosexual couple. This digital book (with a relatively small number of interactive elements, but with a pretty painterly design) presents an amusing story of Geoff, who during his crazy play with a dog friend destroys his neighbour's bed of beloved tomatoes, while at the same time covering with mud the washing she had freshly hung out. Luckily, his friendly fathers find a positive solution to the problem.

Although they are not books, I also wish to mention a couple of fantastic, exceptionally narrative adventure apps by the Czech game developing studio Amanita Design – *Botanicula* and *Machinarium*, which are versions of their predecessors – computer games. There is some attracting force in them, owing to the thoroughly premeditated, wise plot that has to be played: in *Botanicula* the protagonists must save the last seed of the life-giving tree, while in *Machinarium* the protagonist fulfils his mission in the world of metal robots. Both the apps contain no speech at all, and are full of riddles to be solved, which teach the user the reasoning of the protagonists trying to reach their goals. Each of them has wonderful graphic design and music, which seem to be film effects.

A word of conclusion

This review of apps is a selection made from the perspective of an adult “expert”, although a large share of the products mentioned seem to be very popular among children all over the world (e.g. those made by TocaBoca studio). It may mean that we are witnessing the development of – according to the old model – children's plays, new interpretative communities, new common ranges of experience and practices. On the other hand, we should be aware that – quoting Buckingham – the social process is mediated by the market and commercialisation, which results in social distinctions and inequalities (Buckingham 2008: 136). For example, most of the apps that I have mentioned are not free. However, the prices are not very high – they normally range from 10 to 30 zloty for educationally valuable plays to which the child can go back over and over again. Even if not all of the desired apps can fit the device, which is not very capacious in terms of the number of gigabytes, once the iOS apps are purchased and removed, they may be installed again at any time – this time free of charge. The problem is that children have an excellent feel of market distinctions, and soon learn how good or bad quality a device they own, what they can do with it and what is above their reach. However, it turns out that the differences are not so much connected with economic shortages or the absence of access to technology, but above all, as strongly worded by Buckingham: they “[...] are also to do with access to the intellectual and cultural capital that is needed to use that technology in effective and creative ways” (Buckingham 2008: 133). In other words, it is much easier for the children of parents originating from, say, the middle class, to gain access and support directed at their development and education. For teachers, this may – or should – be tantamount to pondering on the conditions for the possibility or actually the necessity to shift and include the increasingly popular mobile technologies from the family towards institutional socialisation, in particular in the early education area.

Literature

- Balicki M., 2005, *Media a kompetencje kulturowe i społeczne dzieci [Media and children's cultural and social competences]* [in:] *Dziecko i media elektroniczne. Nowy wymiar dzieciństwa, t. 1: Telewizja i inne mass media w życiu dziecka – wyzwaniem dla edukacji medialnej [The child and electronic media. A new childhood dimension, vol. 1: Television and other mass media in the child's life – a challenge to media education]*, J. Izdebska, T. Sosnowski [eds.], Białystok: Wydawnictwo Trans Humana.
- Buckingham D., 2002, *The Electronic Generation? Children and New Media* [in:] *Handbook of New Media*, L. Lievrouw, S. Livingstone [eds.], London: Sage.
- Buckingham D., 2009, sec. ed., *New media, new childhoods? Children's changing cultural environment in the age of digital technology* [in:] *An introduction to childhood studies*, M.J. Kehily [ed.], Maidenhead, Berkshire: McGraw Hill/Open University Press.
- Cackowska M., 2013, *Co ma książka obrazkowa do interaktywnej aplikacji książkowej? [What does a picturebook have to do with an interactive book app?]*, "Ryms" No. 20.
- Prensky M., 2001, *Digital Natives, Digital Immigrants*, "On the Horizon" Vol. 9, No. 5.
- Rideout V.J., 2014, *Learning at home: Families' educational media use in America. A report of the Families and Media Project*, New York: The Joan Ganz Cooney Center at Sesame Workshop.

Summary

Possibilities of New Technologies in Education. Overview of the Developmental Potential of Interactive Apps

The aim of the article is to highlight the educational and developmental role of apps for children. The text discusses the usefulness of apps and the role of interactivity in children's development, both in family and school contexts. Apps are explored and described in different objective categories: creativity, special needs, maths, first concepts for toddlers and apps for preschoolers, app books. The article aims at turning the readers' attention to the educational potential of the apps' content.

Keywords

children, apps, tablet, iPad, games

English translation: Anna Moroz-Darska

Tłumaczenie sfinansowano ze środków Ministerstwa Nauki i Szkolnictwa Wyższego na podstawie umowy nr 661/P-DUN/2018 z dnia 13 lipca 2018 roku w ramach realizacji zadania 1 – stworzenie anglojęzycznych wersji wydawanych publikacji w 2018 roku.

The translation was financed with funds made available by the Ministry of Finance and Higher Education under contract No. 661/P-DUN/2018 of 13 July 2018 as a part of the execution of task 1: the creation of English-language versions of the issued publications in 2018.