Gabriela Budziszewska
ghabi@op.pl
Elementary School no. 3 in Wrocław

Ewa Musiał
ewa.musial@uwr.edu.pl
University of Wroclaw
ORCID iD: 0000-0001-7710-226

Supporting the development of computational thinking in children attending grades I–III of elementary school with the use of new technologies as part of multimedia workshops with the EMPIRIA tablets

A tablet is a contemporary pencil case.
J. Okuniewska (2017)

Introduction

Modern times are filled with rapid civilizational changes, the direction and intensity of which is determined, inter alia, by the fast development of information technology (Gańko-Karwowska, 2002, p. 5). Modern mass media, considered today as one of the main forces in shaping reality, providing information, entertainment and knowledge, create lifestyles and identities, shape opinions and attitudes based on which we take actions (Marciniak, 2018, p. 157).

Entanglement of the school in the technological revolution has made IT, as a branch of knowledge (computer science) along with technologies it

supports, integrating with almost all other fields, become their inseparable element. Since the end of the twentieth century, a lot of attention in education has been attached to developing the ability to use computer applications, network resources and communication, covering all students with education in the field of information and communication technology.

Nowadays, expected citizens' competencies in the field of digital technology go far beyond the traditionally understood computer literacy and proficiency in using technology. Of course, these skills are still needed, but they are not sufficient in the times when computer science is becoming a common language of almost every field of life and equips them with new tools.

The basic task of the school – literacy in the field of reading, writing and calculating – requires to be expanded by literacy in the field of computational thinking. This means that schooling needs to put more emphasis on developing skills in solving problems from various disciplines with conscious use of methods and tools stemming from computer science, as well as on the better understanding of the current capabilities of technology, computers and their practical application (https://men.gov.pl/wp-content/uploads/2016/11/podstawa-programowa-z-informatyki-szkola-podstawowa.pdf).

The ability to program is also becoming an element of general education. Programming is understood here much more broadly than just writing a program in a programming language. This is the entire process aiming to solve the problem, starting from the specification of the problem (specifying the data and results, and more generally – the objectives of solving the problem), through finding and developing a solution, to programming the solution and finally testing its correctness using a properly selected application or programming language (Regulation of the Polish Minister of National Education of February 14, 2017).

Empiria was established in 2011. It has been designed for children and educational institutions like kindergartens and schools wanting to experience more multimedia educational solutions than just traditional methods of teaching and learning. The company organizes specialized workshops with the use of modern technologies aimed at integrating and broadening the content of the core curriculum in the field of education primarily in IT, assuming that in the future children will become creators of digital culture, instead of being only its passive recipients. Practical training implemented through tablets is the most important part of the classes. All participants take part in meetings independently and actively, without focusing solely

on listening to the theory. Each workshop promotes the development of creativity. It is also important to make children aware that tablets can teach, develop talents and give the opportunity to express themselves. Unfortunately, most of them associate tablets with games (https://www.corobic.pl/atrakcje/Rozwoj-osobisty/inspiracje-multimedialne-zajecia-dla-uczniow-podstawowek-2859). The values that Empiria follows are: modern education (using mobile technologies), empirical cognition (continuous and practical activity), mobility (availability of the company's services throughout Poland), joy, inspiration and freedom (https://www.corobic.pl/biznes/empiria-1008). As part of multimedia workshops, substantively and methodically adapted to the age of participants, it supports, among others, development of children attending kindergarten and grades I–III of elementary school, combining learning and fun in the right proportions. Under the care of the trained and experienced animators, children learn to use modern technologies for individual learning, development of interests and teamwork. They get to know interesting applications that they can use at home. The educational offer of educational institutions is undoubtedly enriched with engaging and attractive activities that activate all students and evoke many positive emotions. Each meeting has a situation arrangement in which participants solve a didactic problem presented by the animator. Students develop their proposals based on multimedia applications dedicated to creating music, films, graphic designs, e-comics and educational games. Tablets, prepared applications and educational games are a tool that is used in a well-thought-out and methodically prepared class draft. The classes are conducted mainly in the Lower Silesia region. In Wroclaw, they are implemented as part of the project "Szkoła w mieście" (Eng. "School in the city"), organized by the Education Department of the City of Wroclaw (https://www.corobic.pl/atrakcje/Komputer/warsztaty-multimedialne-dla-dzieci-esztuka2861).

The assumptions of the core curriculum in the field of IT education

The objectives of IT education in relation to general requirements – are the same for all educational stages and for all types of schools[1]. They are as follows:

---

[1]   Their interpretation for specific stages of education is presented in detailed requirements.

1. Understanding, analyzing and solving problems on a base of logical, abstract and algorithmic thinking and ways to represent information.
2. Programming and solving problems with the use of computer and other digital devices: designing and programming algorithms, organizing, searching and sharing information, using computer applications.
3. Using a computer, digital devices and computer networks, including knowledge of the principles of operation of digital devices and computer networks, as well as making calculations and programs.
4. Developing social competences, such as communication and cooperation in the group including in virtual environments, participation in team projects and project organization and management.
5. Compliance with the law and safety rules. Respecting the privacy of information and data protection, intellectual property rights, communication etiquette and social intercourse standards, assessment of threats related to technology and their inclusion for the safety of oneself and others (https://men.gov.pl/wp-content/uploads/2016/11/podstawa-programowa-z-informatyki-szkola-podstawowa.pdf).

At the first stage of education, as part of the IT education classes, students learn the basic meaning of selected concepts related to computer science, actively participating in activities that are to stimulate them to act creatively and seek solutions to their tasks, often in the form of the game. These concepts include: linear order (sequence of events, the logical order of events, activities and volumes), instruction (command), algorithm (action plan). This is the beginning of algorithmic thinking, assisted by visualization or simulation of algorithmic actions – this is how students take their very first steps in programming. They also use computers to help them learn how to read, write, count and present ideas. Moreover, they also use the indicated applications and resources available on the Internet. They work with the help of a teacher, supporting each other and implementing their ideas and projects together (https://men.gov.pl/wp-content/uploads/2016/11/podstawa-programowa-z-informatyki szkola-podstawowa.pdf). The key competence taught during IT classes in grades I–III is the ability to creatively solve problems in various fields and to prepare for undertaking and implementing innovations with the conscious use of methods and tools derived from computer science. An important task of the elementary school is to initiate the preparation of students for living in a developing, knowledge-based society. Teachers should create conditions for students to acquire knowledge and skills needed to solve problems

using IT methods, searching and using information from various sources, and applying these skills during other subjects classes. They should also prepare them to make informed and responsible choices while using resources available on the Internet (https://men.gov.pl/wp-content/uploads/2016/11/podstawa-programowa-z-informatyki szkola-podstawowa.pdf).

Computational thinking as an expression of students' IT competences

In 2006, Wing used the term "computational thinking" to define useful attitudes and skills that everyone, not just an IT specialist, should try to develop and use. It is a natural extension of basic school competences (reading, writing, counting) by the ability to use methods from computer science to solve problems, within the so-called computer literacy. As Sysło writes:

> the broadest meaning of the term computing may be found in the Computing Curricula document. This term covers five areas of study: Computer Engineering, Computer Science, Information Systems, Information Technology, and Software Engineering. Computing has been understood as any intentional activity that requires using a computer, benefits from the use of computers or leads to the creation of computers, and includes: designing and building computer systems (hardware) and software systems for a wide range of purposes; processing, arranging and management of various types of information; conducting scientific research using computers; making computer systems behave intelligently; creation and use of communication and entertainment media; searching and gathering information related to any purpose and so on. The list of areas in which computing appears is constantly growing and the potential of this discipline is almost unlimited. (Sysło, 2014, p. 16)

It is important, therefore, that the contact of students with modern technologies in their early childhood enables them to make a series of attempts involving: discussing the problem situation; formulating the specification of a problem situation, as well as designing a solution, implementing a solution on a computer (tablet) using application software or programming language; testing the received solution, evaluating its properties, including efficiency of operations, etc.

Computational thinking, which helps determine what kinds of problems can be solved with the help of IT methods and computers, and which problems cannot be solved is extremely helpful here. It represents the spectrum of information modeling method and solving problems, such as: abstraction

enabling modeling problems, reducing and decomposing a complex problem, in order to solve it effectively, approximation, when the exact solution is even out of the reach of computers, recursion as a method of inductive think-ing and concise, computer implementation of solutions, modeling selected aspects of complex problems and finding solutions using heuristic methods (Walat, 2007, p. 124).

In addition, "the use of computational thinking develops: trust and confi-dence in dealing with complex problems; tenacity in working with difficult problems; tolerance for ambiguity and vagueness; the ability to work with open problems for which there are no solutions; the ability to cooperate to achieve a common goal" (Sysło, 2014, p. 22).

Empiria – Modern Education – leading information

Computers (tablets) in grades I–III of elementary school are used as devices that enrich the process of teaching and learning about texts, drawings and animations created by students, shape their activity (games and plays), con-solidate skills (educational programs available on discs and in the network), develop interests, etc. The content of the traditional (specified by the Regu-lation) school offer is significantly enriched by Empiria workshops focused on the implementation of four main thematic areas, i.e.: "Multimedia Inspi-rations", "Animated Movie Workshops", "Robot Programming" and "Movie Workshops" (http://eduempiria.pl/regulamin/).

"Multimedia Inspiration" is an original series of 45-minute multimedia workshops with the use of tablets, dedicated to pre-school and elementary school children. Thanks to the creation of various works – animated mov-ies, electronic music, e-comics, artistic graphics, toy design – students learn about completely new applications of tablets and create unique works. Each participant works on their own tablet, thanks to which everyone is constantly involved in the task. Usually, classes in the group begin with a short multi-media didactic story specially prepared for one of 40 topics. The educational problem of the main characters is outlined in an interesting for children way. At the same time, the animator presents a didactic multimedia application, by means of which he or she illustrates the problem of the story characters. Knowing the problem that must be solved and having the ability to use the application, students start creating solutions according to their own original ideas. When participants (independently, in pairs, or in larger groups) work

on solutions, the animator inspires and coordinates the selection of the most effective one. The end of the class is a summary of the meeting – a presentation of the best works and systematization of knowledge. After classes each work is sent to the website www.pan-tablet.pl, thanks to which the teacher and workshop participants may come back to these works and children may show their work to their parents. After the meeting, the teacher receives various tasks for the participants that allow them to develop the topic in class without using tablets. Below we present a few examples of workshop topics with their brief content profile.

Subject: *Enchanted memories.* We create a cartoon animated movie. Storyline: A year has passed since Mateusz saw his best friend for the last time. He looked at drawings showing them spending time together hung on the walls of his room. Mateusz noticed that a lot of dust appeared on the pictures' frames, so he decided to wipe it away. When he did it, something interesting happened. He saw a Genie from the magic frame. Mateusz tells the Genie that he has not seen his friend for a long time and he misses him very much. He would give anything to revive the drawings at least for a moment and thus to preserve the memories. The Genie takes Mateusz into the world of the animated movie. Our hero learns about the short history of animation and also learns how to create it. Mateusz also wants to revive memories captured on his drawings. Then Mr. Tablet comes to help him, and he asks students to create cartoons. Thanks to them, Mateusz will be able to preserve the memory of his friend. Main goal: to inspire students to create short animated movies. Specific goals: Participants know what an animated movie, frame and stop motion technique are; they also learn about the history of animated movies, know titles of the world's first cartoons and the dates of their premiere, an unusual form of animation – a flipbook, and know how to create it; understand the terms: stroke, tool, frame, duplicate, add, back, forward, edit; can: recognize and specify animated movies, present in their everyday movie experience (http://eduempiria.pl/warsztaty/inspiracje-multimedialne/#wybierz-tematy). Subject: *We are detectives, we create a composite of our faces.* Storyline: Story focuses on the adventures of Inspector Gadget, who is on the trail of four dangerous criminals. In the hospital, there was a person injured by a villain, who saw his face. However, unfortunately, the witness is in a deep coma and is unable to quickly recreate the description of the perpetrator. Then there comes Mr. Tablet and asks students to create the most likely composite of the possible criminals. Main goal: Teaching how

to create a face description using a chosen application Specific objectives: Participants know what a composite (identikit) is, and in what situations it is used; can: connect elements of the human face – eyes, nose, mouth, hair, chin, etc., using the application to reduce, increase, rotate and move graphic elements, create a virtual image of their own and other participants' faces (http://eduempiria.com/workshop/inspiration-media/#-selecttopics). Subject: *Just like in the movie. We create special effects.* Storyline: the story concentrates on a group of friends who have the opportunity to observe the work on the film set. The most interesting are the special effects used during filmmaking. They can see how the characters suddenly disappear, and the items come back to their place. One day, friends are already in school, they start to play their own scenes. However, they do not know how to perform various effects in their etudes themselves. Mr. Tablet comes to their help, and he asks the participant to create special effects using the available applications. Main goal: to learn to use the application to record short movie scenes, using the special effects method. Specific goals: Participant know what special effects are and how the simplest special effects are created; know the classification of special effects into digital and analogue special effects: film from the back, effective disappearance, effects from action movies, can give examples of application of special effects in movies; with the help of the application, participants create simple scenes, using the potential of special effects (http://eduempiria. pl/warsztaty/inspiracje-multimedialne/wybierz-tematy). Subject: *Discoverers of infinity. Games in education.* Storyline: A boy and a girl play together very often without worrying about anything. They spend their summer holidays at the farm with their aunt and uncle, they only play with each other. They do not help on the farm, they do not help anyone. Duties related to maintaining a farm are completely irrelevant to them. One day they went to the lake to fish, there they met another boy, they did not want to play with him. They were unpleasant to him, they told him to go back to the village. They laughed at him, the boy escaped crying. He returned to his grandmother, and the boy's grandmother was a rural soothsayer. She brewed a Potion of Courtesy, found unpleasant children and cast a spell on the girl. Since she does not care about anything, she does not care about other people's feelings or duties, with sunset she will turn into a stone, just like her heart. The only way to save her is to do as many good deeds as possible. The boy must help her. Help them to do as many good deeds as possible before the girl turns into stone. To do this, we need to find out some important things about growing

plants. Plants bloom so that some of them may have fruits that we eat. Let's help save Agata by doing good deeds using the app. We must make it before she turns into a stone. Main goal: using the application participants learn about the importance of various duties connected with breeding animals or growing vegetables. Specific goals: Participants learn about the basic elements of flower construction, from which fruit arises, understand how much work is needed to grow vegetables and fruit; can creatively solve problems in various fields with the conscious use of nature-related knowledge (http://eduempiria.pl/warsztaty/inspiracje-multimedialne/wybierz-tematy).

"Animated movie workshops" – are organized for schools whose students want to start a great adventure with art and film. The meetings last 4 hours and during this time the whole process of film making takes place: children learn the rules of creating animations, learn to use applications, how do create scenography, script, create story characters, record everything, montage and publish on YouTube.Lesson 1: *Introduction* – students learn the technique of stop-motion animation and basic concepts related to an animated movie. The animator creates a demonstration animated movie, presenting artistic and technical capabilities of the application. Lesson 2: *Artistic work* – students in groups of 2–4 children start work on the set design, script and characters of their films with the use of art materials. Lesson 3: *Animating* – students animate their characters – using the application, under the supervision of the animator, they independently implement the previously prepared idea. Lesson 4: *Montage and the premiere of the movie* – editing, the students arrange the order of the whole movie, add music and sounds. Classes end with a joint projection of all the films completed during the workshops. It is here that the strongest emotions of students are mixed up – pride, uncertainty, joy of results, admiration for others. The movie can be made using LEGO bricks, Plasticine or cutouts. Thanks to the fact that the classes are completely practical, children learn a lot in a very short time and will have the opportunity to meet new colleagues – children work in small, 2–3-person groups. In this way, about 10 video productions are made during one workshop (http://eduempiria.pl/warsztaty/warsztaty-filmu-animowanego/)

"EMPIRIA robot programming" is a series of 3 meetings dedicated to programming for children from III grade of elementary school and higher, where students are inspired by a combination of art and coding. An innovative combination of robot programming with storytelling, film editing and traditional art techniques impresses students and allow them to create original works.

Lesson 1: Animator discusses the topic and the problem and presents the task to be solved. He practically explains how to realize one's own story with robots – make a model, program the way, test solutions and make a movie. Lesson 2 and 3: students prepare their mock-ups, draw coded paths, individualize robot costumes and devise robots' adventures. Lesson 4: students montage their videos in the editing program and present their work on the big screen to show off their work and be appreciated by the rest of the class. All the short movies will be published on YouTube, thanks to which children can show their work to parents and acquaintances (http:/eduempiria.pl/warsztaty/programowanie/). *"Movie Workshops"* is a set of two classes – creating a music video and a movie trailer. Your students will make their first action movies from scratch. Guided by an inspiring animator, they use multimedia equipment and knowledge in the form of film production techniques and tricks. Thanks to this, they will create original and creative videos. Classes fully activate students by combining new technologies with practical creative activity in small groups, where everyone is responsible for their role in the team. Classes allow students to discover their acting, dance, editing, directing, technical and many other skills and capabilities. The aim of the course is creation of about 8 videos, which will become a kind of a keepsake reminding of workshops that are a perfect combination of creative play and acquiring knowledge. *Creating a music video*: Lesson 1: The animator creates with your students a short music video, explaining all the tools necessary to create it – applications for editing and recording, multimedia equipment, materials and film techniques. Lessons 2: Students create their own concepts of interpretation of a musical piece – creating a script, planning the movement, the sequence of shots, frames and many more. Lessons 3: During this class students record and play roles – this is where the previously planned work is converted into ready-made videos. Lesson 4: Students sit in front of the screen and watch the videos they made. Everyone is interested in videos others have done and wants to do his best – that's why we guarantee that the emotions of the young creators will be strong. *Creating a movie trailer*: Lesson 1: The animator conducts the introduction, making a short movie trailer in cooperation with the students. The animator shows camera operator, montage and filmmaking techniques. After the introduction, students divided into small groups to finalize their own concepts of movie trailers. Lesson 2: Participants in groups montage the trailers they have created under the eye of the animator. Then students with the animator and teacher sit in front of the screen to watch

movies together, show off their works and gather applause. After each workshop, the teacher receives all the videos sent via e-mail, so that they become an unforgettable keepsake for the teacher, students and their parents (http://eduempiria.pl/warsztaty/programowanie/?PHPSESSID=ab8092f49774be514da09da02f3f36af).

Conclusion

In the contemporary knowledge society education is of key importance. However, in the 21st century, the basis for education is not only experience and memory, but also the possibility of acquiring content from various sources, many information channels and motivation, which is a factor inspiring students to take creative and innovative activity in a particular situation (Bednarek, 2006, p. 88). In addition, meeting the needs of the future in a world dominated by the new digital media raises the need for education of the young generation in the field of learning, wise use and critical reception of information and communication technologies (Pytel, 2012, p. 57). A tablet is an excellent answer to modern educational needs. Used as a didactic means, it triggers the comprehensive activity of students and stimulates their interests; it serves as a source of knowledge, all the more valuable if students use it to solve encountered problem situations. Tasks performed independently by students using various applications are used to consolidate previously learned information and skills, etc. (Hassa, 1998, p. 89). "Because of the opportunity of simultaneous impact on the variety of human senses in many channels, it facilitates the acquisition of knowledge and skills" (Bednarek, 2006, p. 88). Convergence (integration) of various educational applications has a positive effect on memorizing and recalling memorized content (Juszczyk-Rygałło, 2013, p. 80–81). Importantly, "almost every child has a need to learn expressed by striving to learn about and understand the world. In the middle childhood period, the activity itself aimed at obtaining further experiences, solving emerging problems, fulfilling the requirements and expectations set by the social environment gives the child satisfaction and sense of meaning" (Michalak, 2016, p. 82). The creators of the *Empiria – Modern Education* project are well aware of these qualities.

References

Bednarek, J. (2006). *Multimedia w kształceniu*. Warszawa: Wydawnictwo Naukowe PWN.

Gańko-Karwowska, M. (2002). *Efektywność wykorzystania narzędzi technologii informatycznej w szkołach podstawowych (w aspekcie kompetencji informatycznych nauczycieli)*. Szczecin: Wydawnictwo Hogben S.C.

Hassa, A. (1998). Komputer jako środek dydaktyczny w edukacji wczesnoszkolnej. *Komputer w Szkole*, *1*, 89.

http://eduempiria.pl/warsztaty/inspiracje-multimedialne/#wybierz-tematy [accessed: 20.04.2018].

http://eduempiria.pl/warsztaty/programowanie/?PHPSESSID=ab8092f49774be514d a09da02f3f36af). [accessed: 20.04.2018].

http://eduempiria.pl/warsztaty/warsztaty-filmu-animowanego/ [accessed: 20.04.2018].

http:/eduempiria.pl/warsztaty/programowanie/ [accessed: 20.04.2018].

https://men.gov.pl/wp-content/uploads/2016/11/podstawa-programowa-z-informatyki-szkola-podstawowa.pdf [accessed: 20.04.2018].

https://www.corobic.pl/atrakcje/Rozwoj-osobisty/inspiracje-multimedialne-zajecia-dla-uczniow-podstawowek-2859 [accessed: 20.04.2018].

https://www.corobic.pl/biznes/empiria-1008 [accessed: 23.04.2018].

Marciniak, M. (2018). Studenckie strategie korzystania z mediów – blokada osiągnięć akademickich. *Konteksty Pedagogiczne*, *1*(10), 157–167.

Michalak, R. (2016). Edukacja najmłodszych kontekstem kształtowania motywacji do uczenia się. Ogląd zjawiska w badaniach własnych. *Konteksty Pedagogiczne*, *2*(7), 81–95.

Myślenie komputacyjne w rozumieniu Centrum Edukacji Obywatelskiej, http://www.ceo. org.pl/sites/default/files/news-files/elementy_myslenia_komputacyjnego_wedlug_ ceo.pdf [accessed: 20.04.2018].

Wprowadzić dzieci w cyfrowy świat – wywiad z Jolantą Okuniewską, https://www. juniorowo.pl/wprowadzic-dzieci-w-cyfrowy-swiat-wywiad-z-jolanta-okuniewska/ [accessed: 24.04.2018].

Pytel, K. (2010). Technologia informacyjna w edukacji. *Edukacja – Technika – Informatyka*, *1*, 57–62.

Regulamin korzystania z usług Eduempiria, http://eduempiria.pl/regulamin/ [accessed: 20.04.2018].

Rozporządzenie Ministra Edukacji Narodowej z dnia 14 lutego 2017 r. w sprawie podstawy programowej wychowania przedszkolnego oraz podstawy programowej kształcenia ogólnego dla szkoły podstawowej, w tym dla uczniów z niepełnosprawnością intelektualną w stopniu umiarkowanym lub znacznym, kształcenia ogólnego dla branżowej szkoły I stopnia, kształcenia ogólnego dla szkoły specjalnej

przysposabiającej do pracy oraz kształcenia ogólnego dla szkoły policealnej. Dz.U. z 2017 r., poz. 356.

Sysło, M. (2014). Myślenie komutacyjne. Nowe spojrzenie na kompetencje informatyczne. In: A.B. Kwiatkowska & M. Sysło (eds.), *Informatyka w edukacji. Informatyka dla wszystkich od najmłodszych lat* (p. 15–32). Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.

Walat, A.(2007). *Zarys dydaktyki informatyki.* Warszawa: Ośrodek Edukacji Informatycznej i Zastosowań Komputerów.

Warsztaty multimedialne dla dzieci (e – sztuka), https://www.corobic.pl/atrakcje/Komputer/warsztaty-multimedialne-dla-dzieci-e-sztuka-2861 [accessed: 23.04.2018].

Supporting the development of computational thinking in children attending grades I–III of elementary school with the use of new technologies as part of multimedia workshops with the EMPIRIA tablets

Summary: Nowadays, expected citizens' competencies in the field of digital technology go far beyond the traditionally understood computer literacy and proficiency in using technology. Of course, these skills are still needed, but they are not sufficient in the times when computer science is becoming a common language of almost every field of life and equips them with new tools. The basic task of the school – literacy in the field of reading, writing and calculating – requires to be expanded by the literacy in the field of computer programming skills, which is essentially a systematic problem solving consisting of four stages: decomposition, i.e. dividing a given problem into components; identification of occurring in it regularities, i.e. analysis, abstracting, i.e.; eliminating irrelevant elements and creating an algorithm, i.e. solving a given problem step-by-step problem. In computational thinking, the role of the computer is emphasized (then it is a kind of data arranging and formulating problems and solutions in such a way that they are understandable also for computers and adds stages related to translating a solution into a language intelligible for a computer – programming, including coding, and also finding other applications of a given algorithm solutions adapting to other contexts (http://www.ceo.org.pl/sites/default/files/newsfiles/elementy_myslenia_komputacyjny_wedlug_ceo.pdf). Empiria organizes specialized workshops with the use of modern technologies whose aim is to integrate and expand the content of the core curriculum in the field of education, primarily IT education, according

to the assumption that in the future children will become creators of digital culture, instead of being only its passive recipients. Practical training, which is carried out through tablets accessible to each participant, is the most important part of the classes. The values that Empiria follows are: modern education (using mobile technologies), empirical cognition (continuous and practical activity), mobility (availability of company services throughout Poland), joy, inspiration, freedom.

Keywords: computational thinking, IT education, multimedia workshops, pupil, student, Empiria

Wspieranie rozwoju myślenia komputacyjnego uczniów w klasach I–III za pomocą nowych technologii w ramach warsztatów multimedialnych z tabletami EMPIRIA

Streszczenie: Oczekiwane obecnie kompetencje obywateli w zakresie technologii cyfrowej wykraczają poza tradycyjnie rozumianą alfabetyzację komputerową i biegłość w zakresie korzystania z technologii. Owszem, te umiejętności są nadal potrzebne, ale nie są wystarczające w czasach, gdy informatyka staje się powszechnym językiem niemal każdej dziedziny i wyposaża je w nowe narzędzia. Podstawowe zadanie szkoły – alfabetyzacja w zakresie czytania, pisania i rachowania – wymaga poszerzenia o alfabetyzację w zakresie umiejętności programowania, które w gruncie rzeczy jest systemowym rozwiązywaniem problemów składającym się z czterech etapów: dekompozycji, tzn. rozkładu na składowe danego problemu, zidentyfikowania występujących w nim prawidłowości, czyli analizy, abstrahowania, tj. eliminowania nieistotnych elementów, i tworzenia algorytmu, a więc rozwiązania danego problemu krok po kroku. W myśleniu komputacyjnym podkreśla się rolę, jaką odgrywają komputery (wówczas jest ono rodzajem porządkowania danych i formułowania problemów oraz rozwiązań w taki sposób, by były zrozumiałe również dla komputerów), i dodaje etapy związane z tłumaczeniem rozwiązania na język zrozumiały dla komputera – programowanie, w tym kodowanie, a także znajdowanie innych zastosowań danego algorytmu/rozwiązania/adaptacja do innych kontekstów (http://www.ceo.org.pl/sites/default/files/newsfiles/elementy_myslenia_komputacyjnego_wedlug_ceo.pdf.) Empiria organizuje specjalistyczne zajęcia warsztatowe z wykorzystaniem nowoczesnych technologii, które mają na celu integrację i poszerzenie treści podstawy programowej w zakresie edukacji, przede wszystkim edukacji informatycznej, w myśl założenia, aby dzieci w przyszłości stały się twórcami kultury cyfrowej, nie tylko jej biernymi odbiorcami. Podczas zajęć najważniejsza jest praktyka, którą realizuje poprzez tablety każdy uczestnik.

Wartości, którymi kieruje się Empiria, to: nowoczesna edukacja (z wykorzy-staniem technologii mobilnych), poznanie empiryczne (ciągła i praktyczna ak-tywność), mobilność (dostępność usług firmy w całej Polsce), radość, inspiracja, wolność.

Słowa kluczowe: myślenie komputacyjne, edukacja informatyczna, warsztaty multimedialne, uczeń, Empiria