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Nie tylko «najmłodsi programują!» = «Programming: not Only for Kids»

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NIE TYLKO *NAJMŁODSI PROGRAMUJĄ!*[1]

PROGRAMMING: NOT ONLY FOR KIDS!

Słowa kluczowe: programowanie, kodowanie, edukacja wczesnoszkolna.
Keywords: programming, coding, early childhood education.

Streszczenie

W artykule podjęto problematykę przygotowania studentów kierunku pedagogika przedszkolna i wczesnoszkolna do zagadnień związanych z programowaniem we wczesnej edukacji dziecka. W związku ze zmianami w zapisach podstawy programowej konieczne stało się merytoryczne i metodyczne doskonalenie w tym zakresie, zarówno przyszłych, jak i aktywnych już zawodowo nauczycieli.

Abstract

The paper discusses issues related to preparing students of pre-school and early school education to deal with issues related to programming in early childhood education. Due to recent changes in provisions of the core curriculum, it has become necessary for teachers, those already in the profession and those entering it, to develop their skills and competencies.

Introduction

Change is an inherent and permanent feature of man's life. It is people that confer meaning and sense, and exert influence on the course of the changes made. The last decades have been a time of dynamic development of technology, and the ever increasing rate of this progress necessitates changes also in edu-

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[1] The title of the article makes reference to the materials that were used during preparatory classes for future teachers of programming in years 1–3; http://superkoderzy.pl/scenariusze-lekcji/najmlodsi-programuja/ (Retrieved 03.12.2017).

cation. It should be stressed, however, after Waldemar Furmanek, that 'technology being the conscious result of man's effort is always man's technology. This means that it is man that is its creator. It is man that thanks to his own ingenuity, his own free will and his specific skills takes rational actions leading to the changes expected by him'[2].

The factor that determines a considerable share of educational changes is undoubtedly the development of information and communication technologies, which, in the opinion of Eunika Baron-Polańczyk, 'implies that present-day teachers are faced with ever-changing and higher demands focussed on continuous shaping and developing specific areas of information competencies and determining the trends of professional changes including the sphere of applying the new technological trends in the educational practice'[3].

In the context of the education reform carried out in 2017, a particularly interesting issue seems to be implementing contents related to programming already at the stage of early childhood education. These issues has been so far dealt with mainly within the framework of additional extracurricular activities; now it is to become part of the core curriculum for primary school pupils in years 1–3.

Maciej Sysło[4] has presented the challenges that Polish schools are faced with in connection with the introduction of programming to the teaching syllabus for years 1–3. The author emphasises that in the new core curriculum, contents concerning IT education are described in five main paragraphs; however, programming is first listed in the second paragraph. According to M. Sysło, it is necessary to prepare pupils for this kind of classes earlier because the skill of using a computer and taking advantage of its capabilities in solving various problems requires logical thinking, creativity, collaboration, using already available strategies or own solutions created in advance. As the author stresses, before the pupil 'sits down and does some programming – has a *conversation* with the computer', they have to go through a lot of stages[5].

The statements quoted above constitute grounds for the numerous self-education initiatives undertaken by teachers and students of education in this respect. The paper presents the author's experience related to preparing students of pre-school and early school education at the Pedagogical University of Krakow for teaching programming to primary school pupils in years 1–3.

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[2] W. Furmanek, *Technika czynnikiem sprawczym przemian cywilizacyjnych,* „Edukacja – Technika – Informatyka" 2017, No. 2/20, p. 74.

[3] E. Baron-Polańczyk, *Powody niestosowania ICT w praktyce zawodowej – w opinii nauczycieli,* „Problemy Profesjologii" 2015, No. 1, p. 103, http://bazhum.muzhp.pl/media//files/Problemy_Profesjologii/Problemy_Profesjologii-r2015-t-n1/Problemy_Profesjologii-r2015-t-n1-s103-113/Problemy_Profesjologii-r2015-t-n1-s103-113.pdf (Retrieved: 3.12.2017).

[4] *Dzieci są dobre... w programowaniu – wywiad z prof. Maciejem Sysło,* http://innpoland.pl/124517,dzieci-sa-dobre-w-programowaniu-wywiad-z-prof-maciejem-syslo

[5] Tamże.

Future teachers' substantive and methodological preparation as a key to educational success

The changes made to the provisions of the core curriculum concerning IT education for early school-age children have necessitated the need for providing appropriate preparation to students in faculties educating future teachers. The content taught in subject-specific courses have become insufficient with regard to the newly introduced issues. The competencies that were previously imparted did not involve such skills as programming or coding. It should be emphasised that the pace of work on the changes in the core curriculum document prevented any possibility to properly prepare the future teachers for these issues.

Students of pre-school and early school education at the Pedagogical University of Krakow were prepared in terms of the substantive and methodological aspects concerning programming in the early childhood education within the framework of the course *Computer games and fun activities in child technical education.* In compliance with the recommendations of the core curriculum and using materials made available by the authors of the project *Masters of Coding*[6], students first learned different methods and forms of supporting logical thinking in pupils and modelling the problem solving skills. They also had an opportunity to utilise them during apprenticeships in preschools and years 1–3 at primary schools. Due to time constraint, it was decided, in the course of the above mentioned course, to concentrate on presenting and developing teaching resources, interactive board games and fun activities that had not been previously known to the particular group of students. Taking advantage of the tips stemming from the experience of the authors of the project *Masters of Coding*, students produced their own mini version of the *Masters of Coding Mat* in collaboration with the course instructor. This teaching resource was the basis for the first stage of programming classes. Thanks to this fun learning activity, the students familiarised themselves with *14 Maths Games* by Mirosław Dąbrowski[7] adapted for the *Masters of Coding Mat*.

The next stage of the series of classes was work closely related to the issue of programming with application of digital devices. The students were made familiar with the possibilities of introducing this subject matter with the use of robots and also such software environment as *Scratch Junior* and *Scratch*. A decision was made to focus on work with the *Scratch* software in order to present the widest range of possible applications of this programming language. As a matter of fact, it can be a tool used in work with children and in preparation

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[6] http://wiki.mistrzowiekodowania.pl/index.php?title=Strona_g%C5%82%C3%B3wna (Retrieved: 3.12.2017).

[7] https://drive.google.com/file/d/0B95hdgu-Ao6GRFVaNUQ1UUItTms/view (Retrieved: 3.12.2017).

of the teacher as well as a resource for developing games and other teaching materials necessary for conducting classes. Another argument for introducing the *Scratch* programming language was its unrestricted availability. There were justifiable grounds for believing that it was tools of this kind, commonly available, that would be practically applicable in teaching programming to pupils with in the framework of formal education in schools where the base of technical teaching resources is limited to stationary computers with Internet access. At this stage, the students used lesson plans for primary school pupils in years 4–6 proposed in materials developed to be used with the *Masters of Coding* programme. While working with them in the classes, they learned issues related to both the technical use of the programming language and the methodological approach to presenting this content.

As a summary of the course the students developed their own teaching games that can be applied in work with preschool- and early school-age children. The students used their own ideas to create simple animations and computer games that were designed in such manner that they might support accomplishment of selected goals within the individual areas of education. These students did not have an opportunity to verify their newly acquired knowledge and skills in practice still in the course of studies under an academic teacher's guidance.

Programming in primary school year 3

In the next academic year a new group of students had an opportunity to familiarise themselves with contents related to programming in early childhood education. As part of a practical training during computer classes in year 3 of a primary school, third year students introduced the pupils to the *Scratch* environment using materials recommended by the Ministry of National Education in the project *Szkoła w pilotażu Programowania* (*School in programming experiment*)[8]. The recommended teaching resources include contest entries in the Polish version of the Lithuanian international information and communication technology contest called *Bebras* (*Beaver*); lesson plans and materials for pupils and teacher developed by Grażyna Koba; the aforementioned information resources gathered within the framework of the *Masters of Coding* programme; puzzles and tasks prepared at the initiative of the organisers of the *Hour of Code*; *Handbook of programming for primary school classes 1–3* by Tadeusz Sołtys and Bohumír Soukup as well as lesson plans pulled together by the *Fundacja Ora-nge – Najmłodsi programują* (*Orange Foundation – Programming for Kids*). As part of preparing students for introducing contents regarding programming in the course of computer classes with children, a decision was made to focus on

[8] https://programowanie.men.gov.pl/materialy/ (Retrieved: 3.12.2017).

the last of the above mentioned items proposed by the Ministry of National Education. Students improved their skills and extended their relevant knowledge primarily through self-education efforts and using the recommended materials.

The resources that were made available helped students to show children the possibilities of working with the *Scratch* program in a clear and legible manner. The suggested lesson plans constituted substantive and methodical support. Thanks to them, class instructors were able to prepare themselves with regard to the relevant content beforehand so as to be able to adapt it to suit computer classes in year 3. The activities were so effective that after the completed series of classes those pupils were able to take up the teacher's role and acquaint another group of students with the *Scratch* program environment. Thus, children assumed the role of the master while the students remained students.

Summary

In summary of the above considerations, it should be emphasised that the character of the classes and the methodical suggestions are still being evaluated. Programming in primary school years 1–3 is a new topic for many schools and teachers. It is worthwhile, however, to observe, after Aleksander Piecuch, that 'in the relatively long history of teaching computer skills we already dealt with teaching programming languages. Those were e.g. *Basic, Logo or Pascal*. The very idea of teaching algorithmics and programming, regardless of how we look back on it, was right. The features that should be attributed to it do not only form reference to the subjects of computer education but are of excellent importance in learning and teaching other general education subjects'[9]. In the author's opinion, these might include the skills of noticing and formulating problems, analysing, synthesising, logical thinking, planning, concluding and evaluating[10]. These processes are crucial in the development of early school-age children. Programming as part of integrated education is in line with the above assumptions and creates additional chances to stimulate these skills that are indispensable for the child's further education.

It is going to take some time before it is possible to verify the educational goals set in this area. The next year may fail to bring answers to the many questions that puzzle educators. Undoubtedly, an added value of this change is the fact that nowadays it is not just programmers and pupils who do programming but also students and teachers.

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[9] A. Piecuch, *Programowanie może być interesujące – platforma Arduino,* „Dydaktyka Informatyki" 2017, No. 12, p. 156.

[10] Tamże, p. 156.

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