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School Skills of *Digital Natives* in the Context of Functional Illiteracy

Contemporary discussion on health, and intellectual and social condition of the human in the 21st century, often concerns the issues of using, or even abusing, modern technologies. The authors of the article refer to the concept of illiteracy, and describe its current contexts. The authors' own research results picture the present-day linguistic competence of primary school students. Lichtańska and Cygan attempt to present characteristics of the current stage of linguistic evolution, which – in the light of experts' opinions – is reflecting cultural changes.

Keywords: illiteracy, communication, high technologies, child development

Umiejętności szkolne cyfrowych tubylców w kontekście analfabetyzmu funkcjonalnego

Współczesne rozważania na temat kondycji zdrowotnej, intelektualnej i społecznej ucznia XXI wieku dotykają problematyki używania, a często nadużywania przez niego nowoczesnych technologii. W artykule autorki, odnosząc się do pojęcia analfabetyzmu i przedstawiając współczesne konteksty tego zaburzenia, prezentują wyniki badań własnych, obrazując współczesną kondycję rozwoju językowego uczniów szkoły podstawowej. Wnioski z badań oraz opinie naukowców pozwoliły autorkom na próbę scharakteryzowania stanu i kierunków językowej ewolucji będącej świadectwem kulturowych zmian.

Słowa kluczowe: analfabetyzm, komunikacja, nowoczesne technologie, rozwój dziecka

Introduction

To the experts who deal with *digital natives*[1] development, the influence media have on a child's growth is another etiological concept of specific learning difficulties, determined by background elements of the contemporary world. A small child's world, on the one hand lacking experience, activities and opportunities for a psychomotoric training, such important for children's development, on the other – offering a wide range of distracting visual stimuli, withholding linguistic development, and resulting in *cyberdiseases* which children are specifically exposed to (Spitzer, 2016). Experts warn against the danger following passive consumption of the products of technologically advanced transformations, namely: shows, programmes, and applications. As a result of their extensive use, more and more children experience distorted sensory faculties, concentration difficulties, problems with listening, feeling emotions, or even navigating in their environment (Patzlaff, 2008). Cyberdeseases, as mentioned above, include *digiilliteracy*, or linguistic difficulties of *digital natives*, which is one of the consequences of operating in a contemporary 'high-tech' wold.

The world of high technologies and the dynamics of changes in socialisation and education are strictly connected to linguistic revolution, influenced by the human functioning in a digital world. The issue is being discussed more and more widely. A number of research and observations (Patzlaff, 2008; Desmurget, 2012; Cieszyńska, 2013; Żylińska, 2013; Spitzer, 2016) confirm the hypothesis that media have negative impact on children's linguistic development. Wide range of shows dedicated to young audience, especially so called 'educational programmes', allows parents to think it is a valuable time. In fact, media are expected by producers and parents to stimulate cognitive skills – the mental processes that affect cognition, like: perception, awareness, memory, comprehension, inferring, linguistic abilities, problem solving, intelligence, communication processes, and cognitive representations. However, a decline in those abilities has been observed, especially among children and adolescents. What is particularly disturbing, scientists have noticed a deterioration in verbal efficiency and reading ability, mostly in reading comprehension (Patzlaff, 2008, p. 57). Michel Desmurget

[1] The terms *digital natives* and *digital immigrants* were created by Mark Prensky. In his article (*Digital Natives, Digital Imigrants*, 2001), Prensky argues that we are witnessing the new division of the world – contemporary children, affected by constant access to technology, develop neural networks that fundamentally differ from the ones possessed by previous generations.

(2012, pp. 33–34) explains that in case of small children the consequences of spending a lot of time in front of a screen can be critical –

> being exposed to television programmes without age limits for two hours a day, in case of children between 15. and 48. month of life, triples the risk of delays in their linguistic development. The risk multipleis six times if a child experiences the first contact with a screen being under the age of 1 year[2].

For children and adolescents between the age 8. and 16. – each hour of daily educational shows impoverishes vocabulary by about 10%.

Contemporary trends in research on children's language skills

Studies show a strong relation between language difficulties among children and their early contact with smartphones, computer games, or even the television being on in the background during daily activities. The Association for Academic Psychiatry – AAP (retrieved from: http://www.psychiatria-dziecieca.pl/blog/tablet-i-telewizja-dla-dziecka-nowe-wytyczne [accessed 3 Jun 2019]) informs how electronic media influence young children's development. The AAP report focuses mostly on the ability to acquire language, and the process of communication with surrounding environment. It was noticed that parents spend less and less time with their children, which leads to poorer vocabulary among the young ones. According to the AAP, an increase in infants' vocabulary is directly related to frequent interactions between a parent and a baby. Another observation is related to children's health: for three-year-olds and younger watching television is connected to sleep disorders, which in the end may influence a child's mood, behaviour, concentration, as well as its contact with environment. The AAP points out that the most important consequence of an extensive exposition to 'screen time' is delayed speech development. Results of the research are unambiguous: the children who started to watch television before the age of 12 months, and those who were watching television for longer that 2 hours a day, were 6 times more liable to delay in speech development than those who began to watch television after they turned one or were watching it for less than 2 hours a day. The research also revealed that the performance of infants' between 8 and 16 months of age was worsening proportionally to the number of DVDs and films for children they had watched.

[2] All translations from non-English sources are ours.

When discussing trends in children's language abilities it is worth mentioning PISA – *The Programme for International Student Assessment* – the most significant international study evaluating students' knowledge and abilities. The first tests were conducted in 2000, and Poland has participated in them since the very beginning. Every three years PISA examines the abilities of fifteen-year-old students from various countries, focusing on reading, mathematical skills and sciences. The most important quality of this study is its deliberate detachment from school curriculums. The research is vast, and measures the practical ability to apply theoretical knowledge: reading comprehension, applying mathematics in problem-solving, and reasoning (Szczerbiński, 2011). One of the objectives is also gathering comparable data on fifteen-year-old students' skills in order to improve the quality of teaching and organisation of educational systems.

When it comes to Polish students, the reports published between 2000 and 2015 cannot be considered as satisfying. The first study revealed that 23% of eight-year common school students did not have an adequate ability to read and interpret. The research repeated in 2003 showed an improvement and a decrease in the percentage of the students with the lowest competence. The results of the reports in 2006 confirmed the stability of those results, however, besides reading comprehension and interpretation, no further improvement of school achievements was observed. In 2009, students educated in the new system (form the first year of primary school to the third year of middle school) were examined. As it was reported, the study reaffirmed the positive result of introducing common middle school and the system of internal exams. Back then, Polish students did well in reading comprehension, interpretation, and sciences – a significant improvement was observed here, as compared to 2000. In 2012, Poland was in the lead of EU countries. Unfortunately, the country has failed to meet the same standards in 2015, when a dramatic deterioration in students' performance was reported in each of the studied areas. As a result, Poland was ranked as the sixth in EU – behind Estonia, Holland, Denmark, Finland, and Slovenia (Kamińska, 2016)[3]. While discussing the data presented by PISA, it should be noted that except for the single improvement in 2012, the analysis revealed constancy in Polish adolescents' abilities during the studied periods, yet showed declining trends in 2015.

Observations on disturbingly extensive screen time among children and adolescents tend to repeat. The young ones are exposed to television, computers, smartphones and so on, which unfortunately links to limited physical activity and replacing athletics with a lying or sedentary position, finally causing health

[3] The results of 2018 PISA research have not been published yet.

and development difficulties. To address the problem, in April 2019 WHO issued a special guidance concerning limiting the use o media in case of children up to five years of age in favour of physical activity and proper amount of sleep. The experts strongly pointed out that the youngest should limit the use of digital technology to spend time playing actively, involving movement games that stimulate cognitive development, triggers social-emotional progress, and supports language acquisition.

It is essential information for the research, as both linguistic development and the process of language acquisition start in the very first months of a child's life, when it comes in contact with the surrounding people. Depriving children of this possibility, as well as replacing physical contact and experiencing the world (Cygan, 2011) with surrounding technology, leads to disorders in speech development, communication, comprehension, and results in school problems with writing, reading (including reading comprehension), and applying given information in practice.

The notion of illiteracy

Intensification of difficulties in language and communication is associated with the concept of illiteracy – up to now concerning the past (Skudrzyk, 2004). To discuss the topic of illiteracy, it is necessary to refer to the notion of *literacy* understood as the ability to read and write in one's native language. The Roman definition, slightly modified, was in use till 1950, when basic mathematical operations were added to the list thanks to the advocacy and efforts of UNESCO. It started the global discussion on what literacy means in contemporary world. Finally, in 2000, UNESCO proclaimed the new, updated definition: *Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying context* (retrieved from: http://gaml.uis.unesco.org/wp-content/uploads/sites/2/2018/12/4.6.1_07_4.6-defining-literacy.pdf [accessed 26 Jun 2019], compare: Rymszewicz, 2014).

According to dictionaries, an *illiterate* person is unable to read and write, or shows lack of elementary knowledge/skill in a given discipline. Similarly, *illiteracy (nonliteracy)* is inability to read and write, showing lack of elementary knowledge or skills (in a given field) (Dunaj, 2003, p. 9). Several types of illiteracy may be distinguished: illiteracy, with the total lack of reading and writing skills; semi-illiteracy, when one is able to read, yet not to write; and functional illiteracy, which is the effect of losing the ability to read and write once acquired, for in-

stance as a result of lacking an opportunity to use them (Klus-Stańska, Nowicka, 2005; Skudrzyk, 2005).

Janusz Skwarek (2015) points out that functional illiteracy refers to the ability to use information and knowledge to analyse, argue, and communicate effectively in the process of creating, solving, and interpreting problems in various situations. The term concerns difficulties in understanding printed information and visual representations, like icons, graphs, and diagrams. It may also refer to inability to use the written word in practice. A functional illiterate person cannot understand the content of official documents, find the most important information in a given text. He or she does not understand information provided by media, including press, radio and television; cannot interpret tables, schemes, and diagrams (in: Klus-Stańska, Nowicka, 2005, p. 9).

According to Skwarek (2013), in contemporary, highly developed industrial societies, the compulsory education and accessibility of schooling made primary illiteracy practically marginal. However, the scale of functional illiteracy may be disturbing. Studies conducted in particular European countries show that people able to read and write, complying with the intellectual norms, do not understand messages and are not able to use them in practice[4]. Moreover, they fail to produce written utterances. It is, undoubtedly, correlated to the contemporary high-tech culture, where reading and writing skills are being replaced with a telephone call or communicating via messengers, often involving video streaming, when searching for information is accessible at a voice command.

Functional illiteracy may be related to civilizational illiteracy, where empirical indicators are as follows:

- comprehending functional texts (e.g. manuals, package leaflets, timetables),
- understanding basic notions, directives, commands,
- ability to use new technologies and information services, e.g. tax filling software, competence to independently calculate interest rate etc. (Furmanek, 2017, p. 18).

[4] After the study conducted in England in 2003, 16% out of 8730 respondents aged 16–65 were qualified as functional illiterate. According to this data, about 5.2m English people are functional illiterate, while 1m citizens of the country place on the lowest level of mathematical skills (Howard, 2007, p. 34). Another study carried out in 2011 did not reveal any significant change. The amount of functional illiterate dropped from 16% to 14.9%. The research conducted in France between 2004 and 2005 proved that 3.1m adult citizens of productive age (that is about 40m in total) can be qualified as functional illiterate, in compliance with the adopted scale of abilities. The number accounts for 9% of population of productive age. Only people who had attended schools in France were surveyed (Jeantheau, 2007, p. 56). In Germany, the national survey of reading and writing skills conducted in 2010 revealed 14% of functional illiterate people aged 18–64 (7.5m citizens) (Grotlüschen, Riekmann, 2012, p. 15–53).

Functional illiteracy concerns not only adults, but also senior students. Many of them face considerable problems with understanding a text, despite having prepared it at home and being able to read it out loud smoothly. Similar problems occur while reading a new piece of text (Klus-Stańska, Nowicka, 2005, p. 10).

Ewa Przybylska (2014) underlines that judging by the scale of functional illiteracy in contemporary knowledge societies, common schooling proves to be a vain hope. Every year young people graduate from school not having developed the ability to read and write – not on the level that would satisfy the requirements of either job market or other areas' of social activity.

Multiilliteracy – the process of acquiring language skills among contemporary students

High-tech culture has posed many new challenges to teachers and experts in supporting children's development (Thomas, Brown, 2011). The crisis in linguistic development demonstrates with various linguistic communication disorders, leading to a growing number of children diagnosed with delayed or not completed speech development, dyslexia, or general speech disorders, each requiring a speech therapist intervention. It seems we began to lose one of the most distinctive human abilities. Students fail to learn on their own, produce written and spoken utterances, deal with reading comprehension; many of them do not even like listening to stories for children. Being used to modern ways of communication, spending free time, working and learning, they find it difficult to develop reading and writing skills. Indeed, it involves several abilities whose acquisition has become more challenging in the world of digital technologies. To succeed in learning to read and write, a few elements must be fostered, e.g.: a harmonious development of visual and auditory analysis, the ability to focus, efficient memory, coordination, manual skills, and thinking (Huk, 2015, p. 118).

Contemporary literacy process – learning to write and read, is being intensively modified and influenced by high-tech culture. A new term replacing the traditional 'literacy' was proposed: *multiliteracy,* which expresses the tendency to use various channels of human communication, underlining the significance of using media, and considerable cultural and linguistic variety typical of different groups communicating globally. In the light of multiliteracy pedagogy, learning to write and read supports social, cognitive and cultural development of an individual, developing the skills necessary in a given environment (Przybylska, 2014). Modern text often involves multimedia: visual, vivid, artistic stimuli accompanied with a sound. Content and meaning, being produced by people who communicate with each other all over the world, require from contemporary students

the ability to navigate among the multitude of cultural and linguistic meanings (ibid., p. 38). Active participation in those versatile communication processes, as well as the ability to use different codes simultaneously, are a necessity that determines one's professional and social success (Hockley, 2011).

Nevertheless, this achievement strongly depends on a certain aspect of education: the ability to apply theory in practice, namely – using one's knowledge while solving real problems. Dysfunctions in those skills were observed back in 1994, when studies conducted in seven countries – USA, Canada, Holland, Germany, Sweden, Switzerland, and Poland, unambiguously proved that illiteracy in the 1990s was an actual issue, even in western societies. The survey in Poland was carried out among 16–65 year old men and women, and the research samples had been prepared by Ireneusz Białecki's team. The aim of the study was to test the following skills:

1) understanding written text and word problems,
2) filling out forms, surveys and documents; and understanding information included,
3) being able to perform very simple calculations.

From the research description (Białecki, 1996a; 1996b) it may be concluded that Polish people faced severe difficulties in text analysis and interpretation. For example, 75% of the respondents were unable to answer a question on the basis of a graph; 40% wrongly interpreted data from a weather chart, and gave wrong answers to the questions that followed; 75% could not read a timetable and answer the questions. The author of the survey referred to his research as 'alarming', and classified the language deficiencies as complying with the spectrum of functional illiteracy (Skudrzyk, 2004, pp. 11–13).

Own research methodology

Białecki's study inspires to conduct similar research on the condition of language and communication in contemporary primary school. Taking into consideration both functional illiteracy and the disturbing reports on school children's poor reading comprehension, the authors of the article decided to study understanding written information and the ability to use it in practice. The specific instructions were: to fill out a form (a sample was attached), to interpret some information presented on a map, a clock, and a thermometer, and finally, to perform simple calculations. The authors used a test method and applied quantitative data analysing their study. By definition, the test method is a particular attempt, identical for all the subjects tested, conducted intentionally in strictly

determined conditions, measuring the studied phenomenon accurately and objectively (Rubacha, 2008).

The sample group consisted of 74 students at the age of 11, including 33 girls and 41 boys. They attended four primary schools located in Silesia, Poland – two facilities in Jaworzno, two in Katowice. Students diagnosed with specific difficulties in reading and writing did not participate in the study.

Description and results of the research are presented in the following sections.

Reading comprehension

First, the students were asked to read in silence a short story – *Zosia's birthday* ("Urodziny Zosi"), and answer the questions that followed. The objective of the study was to diagnose the ability to comprehend the text and use inferred information in practice. The questions varied in terms of taxonomic categories and required applying different skills. There were four questions in each of the three parts: 1. searching for information, 2. inference, 3. solving a problem. Some questions required only finding answers in the text, e.g.: *Who did Zosta invite to her birthday party?, What dress did Hania bring?*. The second part (inferring) required students to interpret the story, e.g.: *Whose surprise was the biggest?, Why was Tomek sad?*. Replying for several other questions needed analysing the text and providing one's own, creative answer (problem): *What would you give to Zosia for her birthday?, How to help Tomek?*. All the questions were open (there were no multiple choices). Three correct answers were required to complete one part of the task. The table below presents the amount of correct answers.

Table 1
Task results: Reading comprehension – the number of pupils who answered correctly

Taxonomic category	Result
Searching for information	62
Inferring	51
Problem-solving	43

Source: own elaboration based on the empirical body of evidence

The best answers could be found in the tasks where students only searched for information while analysing the text, and then wrote the answers for the given

questions (61 students answered correctly). The worst performance was observed in situations when the pupils needed to use the information gathered from the text to solve a problem. Only 43 students proved to have the ability to analyse and interpret, the skills necessary to propose a solution.

Analysing a document – filling out a form

Another task, *Going on holiday* ("Wyjazd na wakacje"), required the pupils to analyse the text and apply the information inferred to complete a form using the provided sample (a form filled out by 'a student's friend'). The sample form included notes and instructions, e.g.: *provide the rules that should be obeyed on holiday*. The questions were divided into two groups. The first part required analysis – the pupils were expected to use the given example (name, age, hobby, siblings), the other comprised with problems to solve applying the tips left by 'the student's friend'. The form was supposed to be completed with the pupils' own answers – grammatically adjusted to the form. All the students understood the task, yet only a little more than a half managed to complete it correctly (it was enough to get 7 points per 10). The children rewrote parts of information from the example, were unable to provide their own propositions, and experienced severe difficulties with the questions that required creative thinking. The table below presents the number of pupils who filled out the form correctly:

Table 2
Task results: Completing a form. Number of students who answered correctly

Taxonomic category	Result
Information analysis, using the example	57
Problem-solving, using prompts	46

Source: own elaboration based on the empirical body of evidence

All the students understood instructions, but only 57 of them gave the right answers when asked to analyse information presented in the text and use the given example to complete the form. The children often copied the example instead of adjusting it to the information provided in the text. The second part of the task was to use prompts to solve a problem. Only 46 pupils answered correctly. On the whole, pupils tended to fail to propose their own solutions, and found it difficult to come up with creative ideas.

Simple calculations and graphic information analysis

The students, provided with necessary pictures, were asked to analyse and interpret graphic data presented on a map, clock and thermometer. There were two kinds of questions: one requiring analysis, e.g.: *Which place was the hottest? What time did Olek leave for school? Where did Tomek go?* The other needed gathering information and solving a problem, e.g.: *Tell where Tomek went, knowing that there was not raining and the temperature was over 20°*. The last tasks required simple mathematical operations, like organising names of cities starting from the hottest ones, or calculating how much time a character spent at school. Each category comprised with four questions. The study revealed that children face the biggest difficulties when using given information to solve a problem – in the survey they failed to draw conclusions and apply several pieces of information at the same time. The table below presents the amount of correct answers found in all the three categories mentioned before:

Table 3
Task results: Simple calculations and graphic information analysis

Taxonomic category	Result
Information analysis	67
Drawing conclusions and solving problems	38
Performing calculations	48

Source: own elaboration based on the empirical body of evidence

The survey proved the children have poor ability to use information in problem-solving tasks, which involves applying a number of details inferred from the text. Only 38 students participating in the study managed to answer correctly. They achieved slightly better results in the tasks requiring performing simple calculations (48 pupils). They performed best when asked to analyse the text and provide the correct answer.

Summary of the study and practical implications

Difficulties with reading comprehension, drawing conclusions, interpreting, solving word problems, posing questions, giving titles, and thinking in terms of cause and effect account for the troubles that contemporary students face. As

scientific forecasts suggest, civilizational and technological transformations will lead to a total reorganisation of social life (Skudrzyk, 2004, p. 5). In fact, they have already contributed to linguistic communication disorders and numerous deficits in cognitive development, resulting in growing functional illiteracy. The outcome of the research reflect the forecasts, indicating that in spite of having no problems with learning to read and write, most of the surveyed students failed to complete the tasks. It turned out that interpreting and drawing conclusions are most challenging for the pupils. What is important, the study revealed that pupils have poor ability to use given information to solve problems, especially when data gathered from the text is supposed to be applied in an unusual situation, e.g. using details inferred from the previous sentence, comparing results, deduction, proposing one's own solutions.

The study proved that pupils are struggling with reading comprehension and practical application of written information, which may be classified as symptoms of functional illiteracy. Difficulties were observed in the following areas: solving problems that require analysing presented material in detail, drawing conclusions, deduction, providing one's own answers, and showing creativity.

The surveyed pupils' teachers also indicated a significant problem – students have no ability to compose an utterance. Children show little creativity, cannot give an opinion; fail to provide arguments, and usually build simple sentences. The reason might be the depriving lack of experience, namely – limited opportunities to practice speech, listen to utterances of others, and training communication (which was underlined by the AAP). Perhaps yet another factor is limiting school children's creative potential to the frameworks of tests and answer keys. The practical implication seems to be clear: the only solution for contemporary students' linguistic education is to create an opportunity to intensively train applying their knowledge in practice, for instance – in problem-solving tasks. Digital natives, supported by properly educated teachers, must find balance between mastering their digital and communication skills. To paraphrase Garry Small, in the future only those people will be able to succeed in their private, professional and public life (in: Iwaniuk, 2008).

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