

# **Pedagogical Conditions for Digital Citizenship Formation among Primary School Pupils**

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**Abstract:** The digitalization of the world community implies the need for preparing the citizens for active activities in the virtual environment, critical evaluation of information content, and safe behavior on the internet. Additional importance, in this context, is to be attributed to the need for the formation of digital intelligence (DQ). The initial stage of DQ development is specifically important, as involves the development of digital citizenship.

The article presents the results of scientific theoretical and experimental research on the problem of primary school pupils' digital citizenship formation. The scientific novelty is that for the first time the concepts of "primary school pupils' digital citizenship" and "a digital citizen", as well as the criteria, indicators, and levels of its development, have been specified. In addition, the pedagogical conditions of digital citizenship formation have been defined as the project method implementation, based on digital citizenship content; the use of parental control applications; the use of didactic infographics in the informational and educational environment. The article presents the pedagogical model of school pupils' digital citizenship formation in the educational process. The study was conducted on the basis of the Poltava V. G. Korolenko National Pedagogical University (2018-2020).

**Keywords:** *digital intelligence, primary school, network project, didactic infographics, digital citizen.*

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## 1. Introduction

Within the framework of the discussed problematics, it is essential to note that the Master's degree program in Primary Education at Poltava V. G. Korolenko National Pedagogical University, in addition to the academic subjects and the pedagogical practice, involves the participation of students in scientific and academic research; such a practice advances the students' research skills, enables the training of initiative professionals, and develops scientific intuition and creative approach to the perception of knowledge and its further practical application for solving the problems (Gibalova & Protsai, 2018; Morse et al., 2017).

Therefore, the scientific work "Primary school pupils' digital citizenship formation" has become a valuable contribution within the framework of the primary school pupils' digital literacy formation. The research has been conducted at the Department of Primary Education, Natural and Mathematical Disciplines and Methods of Teaching, Poltava V. G. Korolenko National Pedagogical University (Fedyi & Fedyi, 2019); Gibalova, 2018; Protsai, 2018).

The purpose of the study is to present the conceptual framework and the results of scientific theoretical and experimental research of pedagogical conditions and models of primary school pupils' digital citizenship formation.

The relevance of the topic of scientific research is derived from the substitution of the information society by the digital one because digital technologies have become an integral part of human social life (Bykov et al., 2017; Fedyi, 2019). In addition among the core requirements toward the successful individual of the 21<sup>st</sup> century, should possess the following skills and competencies: strong knowledge (professional, IT, foreign language, mathematics), soft skills (communication skills, organization, teamwork, punctuality, critical thinking, creativity, flexibility, leadership qualities), and have emotional intelligence – as the combination of these talents determines the success of a person both in the professional area and within the agenda of one's daily activities (Mayer, 2005).

The corresponding literature review creates the background for defining the DQ (digital intelligence) through three following levels: digital citizenship, digital creativity, and digital entrepreneurship. According to the theory of generations, elaborated by American scientists William Strauss and Neil Howe (1991), children born at the turn of the 20th–21st centuries up to the present, are called centennials – the individuals, who do not imagine life without the Internet. However, according to the theory of generations,

completely different children will go to school in five years as the “digital” generation will be replaced by the ones, who are called “smartphone kids”, “Google babies”, “zen” o “alpha” generations. Therefore, the modernization of digital technologies is directly proportional to the change in generation and, consequently, to changes in trends in education.

Additional attention of the researchers within the framework of scientific and methodological literature and pedagogical practice is paid to digital creativity. Various programs of optional courses on computer literacy, programming, and robotics are being developed, while digital entrepreneurship is also actively promoted among pupils and students. However, there is a lack of evidence-based scholarship on the digital citizenship of centennial children at school and in a family; the importance of such studies may be supported with the following argumentation: digital citizenship shapes the basis of children’s safety and productive existence in the virtual world, and it is essential to start teaching children in this context as soon as they are provided with an have access to the first electronic device.

The problem of primary school pupils’ digital citizenship formation is partially-solved in the process of studying computer science in primary school. The Institute for the Modernization of the Content of Education of Ukraine has published an online version of a guide to digital citizenship and online security for primary school teachers, developed by Google in collaboration with the Internet User Protection Alliance (Google Ukraine, 2018). Besides, there is an On-Land Internet Security course created by Microsoft’s Partnership in learning program in Ukraine. A certification program “About the Internet” has been implemented into the practice with the assistance of Google and the Ministry of Education and Science of Ukraine in the educational process. It includes a manual and an online workshop for pupils and teachers.

There is a pool of studies on digital citizenship in foreign scholarship; for instance, Carmi Lim, who is a Deputy Chairman of the Singapore Media Literacy Council, has developed a handbook for pupils “Cliques Click. Bringing up Children in the Digital Age”. Foreign scientists such as D. Belshaw (2016), G. Creeber & R. Martin, L. (2008), Manovich (2001; 2013), and others, and Ukrainian scientists such as V. Bykov et al. (2017), Gibalova, N. (2018), Kocharian, M. & Hushchyna, A. (2011), Bykov et al 2018, V . Logvinenko (2018), N. Morze (2017), O. Ovcharuk (2020), L. Protsai (2018), and others, have rendered the concepts of digital literacy, digital competence, digital culture, and determined their structures and specific features.

However, the use of the above-mentioned materials and methods, which are necessary for teaching the basics of Internet security, is not sufficient for the formation of the all-encompassing primary school pupils' digital citizenship. In addition, the above-mentioned pedagogical problem has not been fully-developed by scientific and pedagogical experts in the educational process of primary school. These factors have shaped the choice of the topic of the current investigation, namely: "Pedagogical conditions for digital citizenship formation among primary school pupils".

## 2. Methodology

The research methods are theoretical and methodological analysis of psychological, pedagogical, scientific, educational, and methodical literature on the investigation problem; scholarship, generalization, and systematization of modern pedagogical experience of children-centennials' digital citizenship formation; empirical methods (observation, interviewing, questioning, testing (The Child Online Safety Index (COSI)), practical exercises, project method); praxeometric method (analysis of pupils' activities); pedagogical experiment, methods of mathematical and descriptive statistics by Kolmogorov-Smirnov and Pearson.

The conceptual framework of research work has been defined; the purpose of the research is seen in theoretical substantiation and experimentally testing of the pedagogical conditions and model of primary school pupils' digital citizenship formation. The objectives are the following: clarification of the essence of the concept "primary school pupils' digital citizenship", and determining the features of education and upbringing centennials; defining the pedagogical conditions for primary school pupils' digital citizenship formation; issuing the theoretical prove and experimental testing the effectiveness of pedagogical conditions and the model of primary school pupils' digital citizenship formation; development of the means of visualization of digital citizenship formation.

The object of the study is an educational process in primary school; the subject of the study is the pedagogical conditions of primary school pupils' digital citizenship formation.

The hypothesis is that the level of primary school pupils' digital citizenship will increase significantly under certain pedagogical conditions. These conditions are the following: implementation of the project method based on digital citizenship content; the use of parental control applications; the use of didactic infographics in the educational and information environment.

The scientific novelty of the study is seen in the fact the authors offer the unique specification of such concepts as “primary school pupils’ digital citizenship” and “a digital citizen”, as well as criteria, indicators, and levels of its formation; also, the pedagogical conditions of digital citizenship formation are defined; organizational and pedagogical model of primary school pupils’ digital citizenship formation is theoretically substantiated and implemented in the educational process.

Practical significance pertains to the fact of elaboration of a system of diagnostic activities by the researchers for determining the level of digital citizenship, as well as development and practical implementation of the set of didactic infographics, step-by-step instructions for using on-line parental control applications, and interactive thematic test on the Learning Apps e-platform.

The experimental bases of the research were 52 primary schools of Ukraine (Krementchuk Secondary School of the I-III Grades № 20, Municipal Institution “Poltava Comprehensive School of the I-III Grades № 19 of Poltava city Council of Poltava region” and others).

### 3. Results

#### ***3.1. Theoretical foundations of digital citizenship formation in primary school students***

Primary school pupils’ digital citizenship may be interpreted as their ability to act safely and successfully in the digital environment, to be responsible, alert, careful, responsive, and able for critical assessment and evaluation of the available information.

While following the generally-recognized components of digital citizenship (digital civic identity, screen time management, online bullying prevention, organization of cybersecurity, privacy management, critical thinking, digital footprint, digital empathy, (DQ Institute, 2007), the criteria and indicators of digital citizenship have been identified (as represented in table 1)

*Table 1. The criteria and indicators of digital citizenship*

<b>Code</b>	<b>Criteria</b>	<b>Indicators</b>
<b>C-1</b>	<b>Digital civic identity</b>	The ability to create and maintain healthy personality online and offline.
<b>C-2</b>	<b>Screen time</b>	The ability to control, distribute and

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	<b>management</b>	limit time spent online.
<b>C-3</b>	<b>Online bullying prevention</b>	The ability to identify and manage situations related to cyber-bullying wisely.
<b>C-4</b>	<b>Organization of cyber security</b>	The ability to protect personal data by creating strong passwords and counteracting cyber-attacks.
<b>C-5</b>	<b>Privacy management</b>	The ability to process all the personal data available on the internet and maintain the privacy of personal information.
<b>C-6</b>	<b>Critical thinking</b>	The ability to distinguish between true and false information, its useful and harmful content, as well as identification reliable and questionable links on the Internet.
<b>C-7</b>	<b>Digital footprint</b>	The ability to understand what a digital footprint is, its consequences in real life, and responsibly manage it.
<b>C-8</b>	<b>Digital empathy</b>	The ability to show compassion for oneself and others online.

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Source: Authors' own conception

### ***3.2. Pedagogical conditions of primary school pupils' digital citizenship formation***

The pedagogical conditions for the formation of the digital citizenship among the primary school pupils may be represented in the following manner: implementation of the project method, based on digital citizenship content (Morse et al., 2014); the use of parental control applications (Kocharian & Hushchyna, 2011); the use of didactic infographics in the informational and educational environment (Logvinenko, 2018). Therefore, the next issue to be discussed is the representation of the major traits of these pedagogical conditions:

### ***Implementation of the project method, based on digital citizenship content***

It has been found out that pupils' project activity efficiently influences the learning of digital citizenship material, encourages the advancement of their independence, activity, and leadership traits. An indicative step-by-step plan for the project work "Digital Citizenship Infographics" has been developed.

#### ***The use of parental control applications***

An important component of the digital citizenship formation among children is seen by the experts in the participation of parents, because the first acquaintance of the centenary with the gadget takes its place from the adults' initiative and therefore, under their direct control. Consequently, parents are fully responsible for the organization of the child's digital leisure, proper orientation of the child's attention and curiosity, and the formation of adequate and consistent perception of the world.

There is a possibility for the practical implementation of the control (both online and offline) with the help of special programs that can be both self-sufficient IT solutions and part of anti-virus programs. Such applications are generically called "Parental Control". In the area of computer science, this term is applied to a group of programs that restrict access to the use of content that adversely affects a child.

The possibilities of parental control programs include setting up blocking of Internet resources with dubious or unwanted content, namely: social networks, pornographic sites, dating sites, gambling, online trading platforms, etc. Proper use of applications makes it possible to direct the natural interest of a child in the correct way of development and formation of one's personality.

The most common and easy-to-use tools for child safety on the Internet are the following: Adult Blocker, Glubble for Families, Child Web Guardian Pro, Mipko Personal Monitor, Teentor Kids Control 1.6, Kinder Gate Parental Control, Time Boss, Kiddle, Safe Search Kids, Google Family Link, Kids Place, Family Time. Teachers should systematically consult and instruct the parents on the use of these parental control software tools.

#### ***The use of didactic infographics in the informational and educational environment***

The modern children of generation Z are characterized by the fact that they communicate in the digital world, not by text messages, but by graphic images, emoticons, so-called "emoji" (Bryukhanova, 2016).

Therefore, this style of communication may be referred to as an effective toolkit in the learning process. With the help of infographics, there is a possibility for educating children in the information space and the advancement of their professional competence in this area.

The main purpose of using infographics is to inform; its objects complement the textual information, which covers the topic completely, and contain some visual explanations/clarifications (or vice versa). The capability of infographics to systematize and structure information is directly related to informing the child about the meaning, connection, trends, etc., determining the communication functions of infographics. As it is stated by the experts, simple and original visualization is much clearer and better learned (Solso, 2006).

Currently, there is enough quantity of online resources for creating infographics: Piktochart, Visual.ly, Easel.ly, Dipity,... Infogr.am, Canva. Students should be involved in creating infographics, it will improve the perception and study of educational material. The development of visual thinking of primary school students by means of infographics allows primary school teachers to carry out the educational process in accordance with the requirements of modern visual and communication space.

It has been revealed that an infographic is an effective means of presenting digital citizenship material to primary school pupils. The infographic helps to promote it, train visual memory, and develop imagination and thinking. It helps a teacher to present a considerable amount of information while using visual aids and to review and summarize key course concepts. A set of didactic infographics for digital citizenship has been developed and implemented.

### ***3.3. The pedagogical experiment***

The central research hypothesis is that the level of primary school pupils' digital citizenship will increase significantly under certain pedagogical conditions. The hypothesis has been tested experimentally. The pedagogical conditions in the scope of the study, are the following: implementation of the project method, based on digital citizenship content; the use of parental control applications; the use of didactic infographics in the educational and information environment. The pedagogical experiment has been conducted in three stages: ascertaining, forming, and control.

At the ascertaining stage of the experiment, the online questionnaire survey of primary school teachers and parents of primary school pupils has been utilized. It has revealed the relevance and insufficiency of solving the problem of primary school pupils' digital citizenship formation. Separate

profiles for teachers and parents have been developed and distributed through social networks Facebook and Viber. The sample of teachers was 68 persons (1st grade – 12.2%, 2nd grade – 24.5%, 3rd grade – 30.6%, 4th grade – 32.7%), the sample of parents was 142 persons. The survey covered 49 schools. They are 24 schools in Poltava and Poltava region, 11 schools in Kharkiv and Kharkiv region, 2 schools in Lutsk, 1 school in Mykolaiv, 11 schools in Kyiv and Kyiv region.

Descriptive statistics of teacher surveys have shown the following results. Answering the question “Do you know about a child’s digital citizenship, its components and levels?”, 57.4% of teachers have answered that they slightly know about that, 38.2% of teachers answered “yes”, the rest – “no”. Answering the question “At what age should anyone start a child’s digital citizenship formation?”, 51.5% of respondents chose the answer “primary school age”, 35.3% – “preschool age”, 13.2% – “from 11 years”, and there was an answer that digital citizenship does not need to be formed. Answering the question “Who should form digital citizenship?” only 1.5% of respondents answered “parents, teachers, and educators”; among the most popular forms of digital citizenship formation, respondents identified the ICT lesson (64.7%). It has also been found out that almost half of the teachers (47.1%) often talk to parents about the risks of children staying online, the rest of teachers only sometimes talk to parents; 57.4% of teachers often discuss the topic of online safety with their pupils, and 1.5% – never do that; 29.4% of teachers often discuss online content with pupils.

Descriptive statistics of primary school pupils' parent's surveys have shown the following results. Answering the question “Do you agree that digital citizenship formation starts with the first “touch” of a child to a digital device (smartphone, tablet or PC)?”, 82.1% of parents answered “yes”, 16.4% – said “no”, the rest of the respondents have said that when a child actively uses devices for learning and when actively works with them. Answering the question “How often do you show interest in what your child does online?” 44.4% of respondents answered “always”, 28.9% – “often”, 25.4% – “sometimes”, 1.4% – “never”. Answering the question “Does your child ask you if they are surprised or shocked by something on the Internet?” 33.8% of parents answered “sometimes, 29.6% – “often”, 27.5% – “always”; 9.2% of children do not ask their parents questions at all. 34.5% of respondents sometimes allow their child to use any digital device in the bedroom, 25.4% of respondents often allow their child to use any digital device in the bedroom. It has been found out that 70.9% of parents do not use apps on their smartphones or PC that automatically control their child’s online time and online content safety. The ascertaining stage of the

experiment included diagnosing the level of primary school pupils' digital citizenship in Poltava and Poltava region.

Within the framework of forming the sample, the random group selection was used: first, schools were randomly selected, and afterward, one class was selected from each school. All participants agreed to participate in the experiment. The ethics of the participants in the experiment was followed. The experiment was conducted in accordance with the decision of the meeting educational and scientific laboratory "Innovative educational solutions" of the department of primary education, natural and mathematical disciplines and methods of their teaching PNPu named after V.G. Korolenko, protocol № 1, dated January 10, 2019.

The total number of pupils is 181: 40 - second-grade pupils, 44 third-grade pupils, and 97 fourth-grade pupils.

All students (n=181) selected for the pedagogical experiment form one general experimental group, as the experiment covers work with their parents and teachers. Therefore, the pre-experimental design that does not include a control group was used in the scope of the study.

The experimental data is quantitative, its quantity is sufficient and the deviation from the central value depends on random factors. Using the SPSS program, the data were checked for normality, while applying to the practice the one-sample Kolmogorov-Smirnov test (which has enabled to ensure the normal distribution of the sample)

For diagnostics of the level of digital citizenship of junior pupils at the ascertainment and control stages of the experiment, the Child Online Safety Index (COSI) presented on the DQ Institute platform [<https://www.dqinstitute.org>] and test exercises from the DQWORLDWorkbook, specially adapted to Ukrainian students, were utilized.

The levels of primary school pupils' digital citizenship (Table 2) are characterized according to the defined criteria; the authors of the study have developed the activities and organized them into a handbook, and a test that contained the components of digital citizenship.

**Table 2** *The levels of primary school pupils' digital citizenship*

Levels	Characteristics
High	C-1. The pupil distinguishes between virtual and real environment, understands the concept of individual profile, which recognizes ones identity, critically evaluates the characteristics of the profile of

other Internet users, and maintains a healthy personality on the Internet and offline.

C-2. The pupil knows the rules of organization of screen time, independently controls the time of work with the gadget, distributes and limits the time spent online.

C-3. The pupil is able to detect (independently) the messages related to harassment on the Internet, and follows the rules of combating cyber-bullying.

C-4. The pupil knows and understands the core postulates of the personal data protection on the Internet, the principles of creating strong passwords, and the ways of combatting fishing.

C-5. The pupil is able to manage private information and take care of its confidentiality, knows about copyright and its protection.

C-6. The pupil is able to distinguish between true and false information, distinguishes between the information for children and adults information, its useful and harmful content, as well as reliable and questionable links on the Internet.

P-7 The pupil understands the concept of a digital footprint is, its consequences in real life, and manages the digital footprint responsibly.

C-8. The pupil feels an emotional response to the experience, shows empathy and compassion in relation to other people in the online world.

Medium

C-1. The pupil has an idea of the virtual and real environment, the user profile, partially (not always) evaluates the accuracy of the profile information of other Internet users.

C-2. The pupil knows the rules of screen time organization, but does not always follow them and controls the time of work with the gadget.

C-3. The pupil identifies messages related to online bullying and understands the importance of reporting them to adults.

C-4. The pupil has an idea of personal data protection on the Internet, the principles of creating strong passwords, and the ways of combat 'fishing'.

C-5. The pupil understands the importance of confidentiality of private information, has an idea of copyright.

C-6. The pupil is partially able to distinguish between true and false

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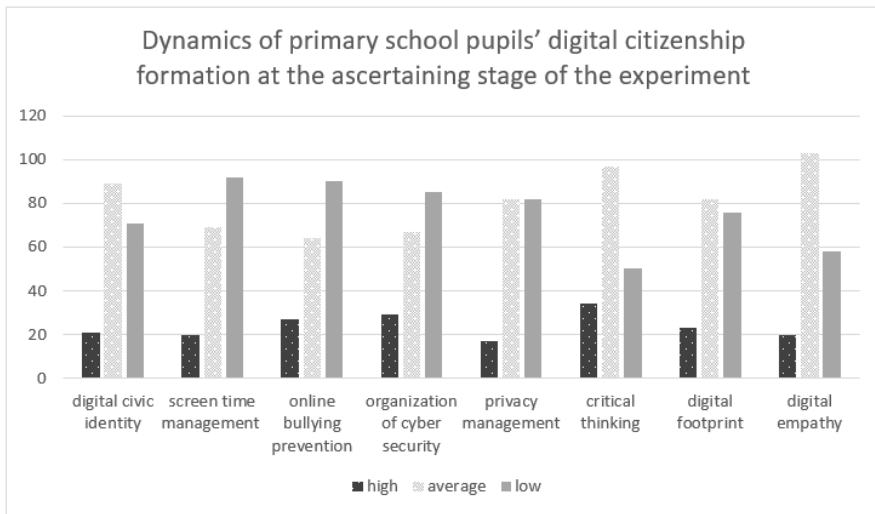
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	<p>information, has an idea of children's information and information for adults, its useful and harmful content.</p> <p>C-7 The pupil has an idea of the digital footprint, its consequences in real life, and does not always responsibly manage the digital footprint.</p> <p>C-8. The pupil controls the feelings, thoughts, emotions, but is not always able to share emotional experiences in the online environment.</p>
Low	<p>C-1. The pupil does not split the environment (world) into virtual and real, has no idea about the identification of a person on the Internet, does not adequately assess the accuracy of the profile information of other Internet users.</p> <p>C-2. The pupil knows about the rules of organization of screen time, but does not follow them.</p> <p>C-3. The pupil is not able to counteract cyber-bullying.</p> <p>C-4. The pupil has no idea about the protection of personal data on the Internet, the principles of creating strong passwords, and the ways of combatting 'fishing'.</p> <p>C-5. The pupil does not understand the importance of confidentiality of private information, has an idea of copyright.</p> <p>C-6. The pupil is not able to distinguish between true and false information, does not differentiate children's information and information for adults, as well as recognize its useful and harmful content.</p> <p>C-7. The pupil has no idea about the digital footprint, its consequences in real life.</p> <p>C-8. The pupil has difficulty in online communication, cannot empathize, respond emotionally to feelings.</p>

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Source: Authors' own conception

Diagnostic results at the ascertaining stage of the experiment are shown in graph 1.



Source: Authors' own conception

**Graph 1 Dynamics of primary school pupils' digital citizenship formation at the ascertaining stage of the experiment**

Consequently, the results of the study indicate the low level of primary school pupils' digital citizenship at the ascertaining stage of the experiment.

The formative stage of the experiment was aimed at providing the pedagogical conditions we have defined.

The model of formation of digital citizenship of an elementary school student is represented on fig. 2.1.

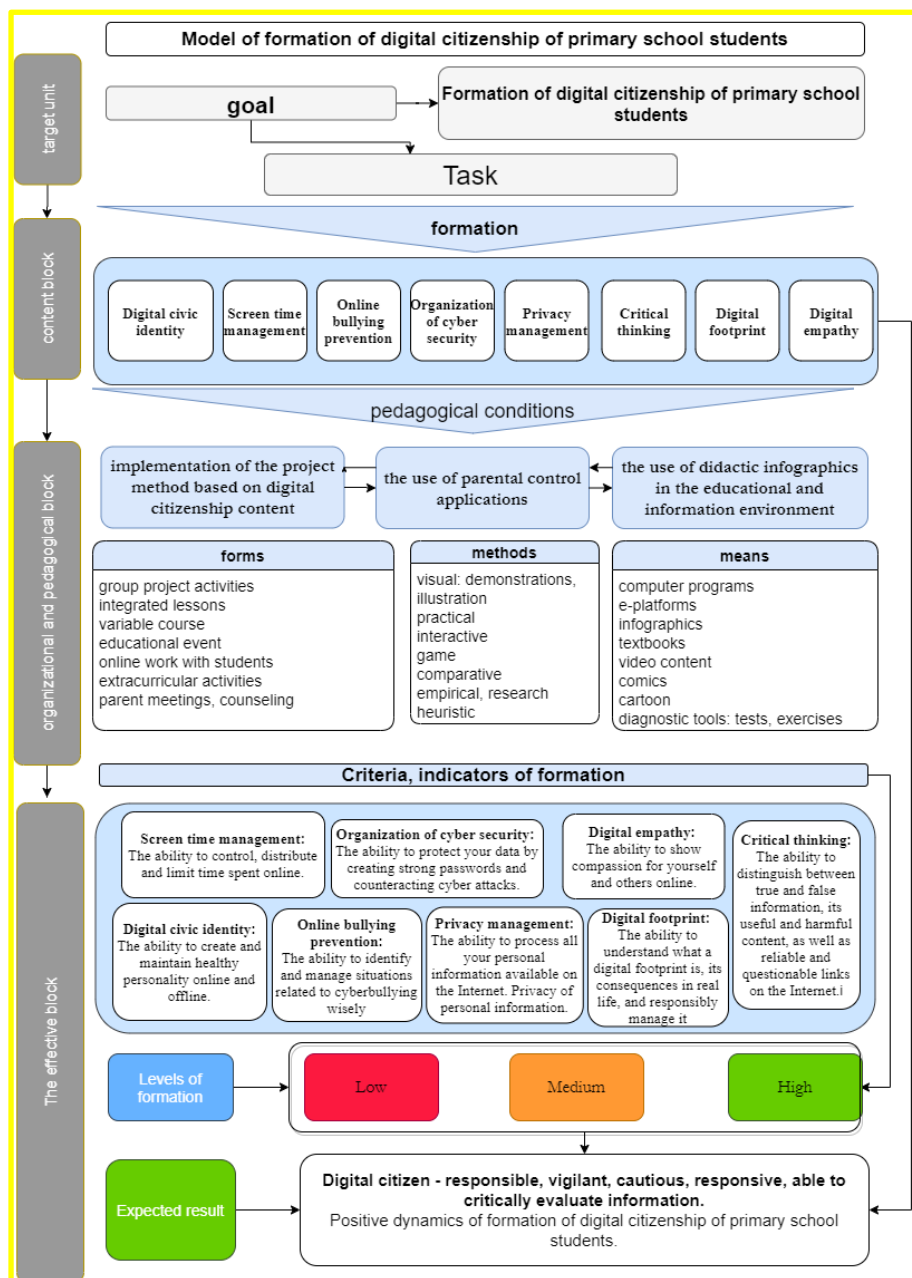


Fig. 2.1. Model of formation of digital citizenship of primary school students

Source: Authors' own conception

The model of digital citizenship formation among the primary school students includes target, content, organizational and pedagogical, effect blocks.

Target and content blocks provide a statement of purpose, take into account the position of personality-oriented, competency, multicultural, praxeologic, information and digital approaches; specific principles of democratic citizenship, interdisciplinary integration.

The organizational and pedagogical block of the model expresses its practical implementation of pedagogical conditions (introduction of the project method on the materials of digital citizenship, application of parental control tools, and use of didactic infographics in the informational and educational environment) through appropriate forms, methods and tools.

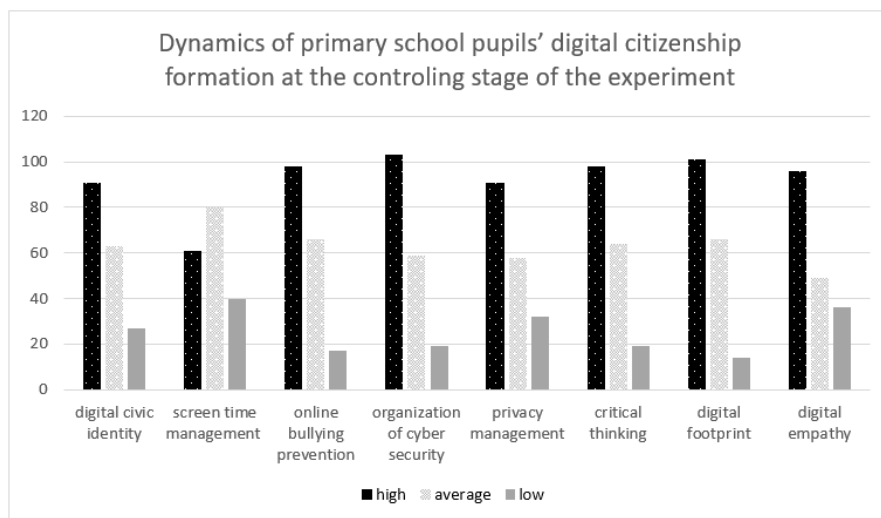
The effect block of diagnostic results of the model presents criteria and indicators for assessing of the state of formation of digital citizenship, and provides for the determination of low, medium and high levels of development on the basis of researchers' authorial methodologies.

While following the first condition "Implementation of the project method on digital citizenship materials", the authors have developed a step-by-step plan of organization project work on digital citizenship formation. They have offered the primary school teachers and trainees (students who tested the study process) to have an integrated lesson or an educational event to teach basic theoretical concepts in digital citizenship and form skills according to the defined indicators. A compulsory requirement was the use of the exercises from the handbook "Caution. Vigilance. Protection. Politeness. Courage".

To fulfill the second condition "Implementation of parental control applications online and offline", the participants of the experiment were offered to organize educational work among parents, the content of which would provide step-by-step instruction on the use of parental control applications. The form of work is a conversation or counseling at the parent meeting, as well as acquaintance with didactic materials online, provided the parent virtual community is available.

Following the third condition "use of didactic infographics in the information educational environment" a set of didactic infographics was provided for its use in the educational environment.

At the control stage of the experiment, pupils were asked to do the exercises and tests again. The results of the dynamics of the primary school pupils' digital citizenship formation at the control stage are shown in graph 2.



Source: Authors' own conception

**Graph 2. Dynamics of primary school pupils' digital citizenship formation at the controlling stage of the experiment**

For experimental confirmation of the scientific hypothesis, the null statistical hypothesis  $H_0$  was formulated – the difference between the results of the performed diagnostic methods (exercise, testing) at the ascertainment and control stages of the experiment is not statistically significant. Then the alternative hypothesis  $H_1$  will testify to the significance of this difference.

To test hypothesis, the statistical criterion  $\chi^2$ -Pearson was used, since it is based on the approximation of the frequency of display of the test trait in the sample, measured on a nominal scale, and is calculated by the formula:  $\chi^2 = \sum [(n_1 - n_2)^2 / (n_1 + n_2)]$ , where  $n_1$  and  $n_2$  are the frequency of the criteria indicators display at the ascertaining and control stages of the experiment, respectively.

The empirical values of  $\chi^2$ -Pearson by 8 criteria for hypothesis  $H_0$  are 67,95; 41,26; 90,16; 83,86; 76,73; 51,71; 93,94; 74,12. The critical values of the  $\chi^2$ -Pearson criterion are found by the table of critical points of the Pearson criterion at 0,05 and 0,01 levels of significance and the number of degrees of freedom  $k = s - 1 = 3 - 1 = 2$ , where  $s$  is the number of levels:  $\chi_{cr(0,05)} = 7,8$ ,  $\chi_{cr(0,01)} = 11,3$ . Since all empirical values are greater than critical, the hypothesis  $H_0$  is rejected, and the hypothesis  $H_1$  is accepted, i.e. the difference between the results of the study at the ascertaining and control stages of the experiment is statistically significant, which testifies to the

validity of the scientific hypothesis – the level of primary school pupils' digital citizenship significantly increases on the following conditions (implementation of the project method on digital citizenship materials; the use of parental control tools; the use of didactic infographics in the informational educational environment) and model efficiency. It is confirmed by the positive dynamics recorded by 8 criteria.

#### **4. Discussion**

The results of the experiment have confirmed the effectiveness of the model, proposed by the author, within the framework of the formation of digital citizenship among primary school children.

The model corresponds to the world practice of formation of digital citizenship as a component of digital intelligence of the person, according to the Recommendation CM/Rec (2018)7 to member States on children's rights in the digital environment (Council of Europe, 2018) and research program, DQEveryChild, elaborated by DQ Institute in collaboration with the World Economic Forum.

One of the differentiating features of the model from the analogs ones may be seen in its focusing on pedagogical conditions of digital citizenship formation via such means as the integration of digital citizenship components into the content of primary school education through project learning technologies, development and implementation of didactic visualization tools, the system of diagnostic exercises to determine digital citizenship level, didactic infographic set, step-by-step instructions to the use of online parental control applications, interactive thematic test on the e-platform LearningApps.

The model may be recommended for its practical implementation in the international practice of digital citizenship formation among different age categories of citizens: preschoolers, primary school children, adolescents. The model may be flexibly adapted at the national and organizational levels.

The prospects of the research are seen in the establishment of cooperation with Ukrainian and European higher education institutions.

The areas for further activity are stipulated by the participation in the Swiss-Ukrainian project "Development of Civic Competences in Ukraine – DOCCU" (which is aimed at the evolvement of the civil society through the dissemination of knowledge about the evolution of democratic citizenship and human rights education in Ukraine) and involvement into the international training seminar "Formation of civic competencies in future primary school teachers".

## 5. Conclusions

The investigation, undertaken within the framework of this study, may be summarized within the following conclusions:

1. The problem of the formation of digital citizenship of junior schoolchildren at the present stage of development of primary education and the importance of its solution has been actualized. The concepts of “digital citizenship of an elementary school student” and “digital citizen” have been clarified as the ability to act safely and successfully in the digital space, being responsible, vigilant, careful, responsive, and represent the ability to critical evaluation of the information. Criteria for determining the level of digital citizenship (which are also competencies of digital citizenship) are defined as the digital civic identity, organization of screen time, counteraction to online harassment, organization of cybersecurity, privacy management, critical thinking, digital footprint, and digital empathy. It was indicated that in the process of forming the digital citizenship of primary school pupils. It is essential to take into account the characteristics of education and upbringing of centennial children, i.e. those who live from birth without dividing the world into real and virtual.

2. The pedagogical conditions for the formation of digital citizenship of primary school students are determined in the following way: the introduction of the method of projects on the materials of digital citizenship; application of parental control tools; use of didactic infographics in the information educational environment. It was indicated that students’ project activities effectively influence the assimilation of educational material on digital citizenship, promote independence, activity, and initiative. An approximate step-by-step plan of project work of junior schoolchildren “Digital Citizenship Infographics” has been developed; the detailed instructions for using parental control software tools have been elaborated. The infographics were indicated as the effective means of representing digital citizenship materials for junior high school students, promoting their mastery, training the visual memory, development of the imagination and thinking; assisting the teacher in terms of visual representation of the large amounts of information; reviewing and summarizing the key concepts of the training material on the topic. A set of didactic infographics for the formation of digital citizenship has been developed and implemented into practice.

3. The primary school model of the formation of digital citizenship of students has been developed and implemented in the practice. It has provided the certain conditions for its effective implementation during the

formative stage of the experiment: the formation of student competencies of digital citizenship in the project work; introduction of didactic infographics into the educational process of the school of the first degree, aimed at the development of students' digital citizenship; organization of work with parents to ensure parental control offline and online. The results of the control phase of the experiment have represented the positive dynamics and effectiveness of the proposed model, which contributes to the formation of a digital citizen – responsible, vigilant, careful, creative, and able for critical evaluation of the available information.

The study does not cover all aspects of the discussed topic. The problem of the formation of digital creativity of schoolchildren in the course of studying of an initial course of computer science needs further researches and investigations.

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