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Distance Between Teacher and Students During Class, Group and Individual Classes

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Abstract: The research related to the context of proxemics, carried out at the turn of 2013-2021, during teacher-student classes, during which information and communication technology (ICT) was used, was included in the following publications: "Digital school proxyemics", "Digital space teacher in the context of proxemics" and "Teaching programming in the context of proxemics" and "Robotics in education in the context of proxemics". Also in the context of proxemics, completed study "Digital competences in education in the context of proxemics". Research studies give delegations to undertake a comparison, at least only of selected issues, occurring during the research and included in the studies. It should be realized that presenting selected research results in one comparison, despite other subject areas, does not violate the very idea of comparison. It can be easily noticed that both ICT and learning programming as well as elements of robotics in education are issues in the field of computer science, and digital competences are a good complement to these issues. The issues raised in the research are one of the teaching priorities in Polish education. One of the many issues included in the above-mentioned studies is the distance between the teacher and students during classes with the class, group and individual work with selected people in the class. The research posed a problem: what is the most frequently adopted distance (and thus the sphere) during classes with students and does the distance change if the form of working with these students changes? The conducted survey conducted on the educational platform of the Kuyavian-Pomeranian Voivodeship (województwa kujawsko-pomorskiego) <edupolis.pl> and the collection of data from the above-mentioned studies indicate the dominant distance for the personal sphere in each case, with the simultaneous shift of results in the case of working with a group or individually. The reproducibility of the obtained results is noticeable, despite the variety of research areas. The latest survey, carried out during a remote (pandemic), slightly brings different information to comparison. The curves obtained on the basis of the obtained data have the general shape of Gaussian curves, which proves a well-chosen research sample, which consisted of teachers from several provinces, working in various educational institutions. The obtained results from the research will allow both teachers and producers of teaching aids to properly prepare and conduct classes with students at various levels of education.

Keywords: Teacher and Student, Distance, Relations, Zone, Proxemics, IT, Programming, Robotics, Digital Competences

1. Introduction

The interest in the elements of computer science, especially information and communication technology as well as learning programming and robotics, especially in the context of proxemics, as well as the implementation of digital competences in education, contributed to the research and its development in the form of a monograph.

In the years 2013-2021, teacher surveys were prepared: Proxemics of the digital school, (2014) [9]; Digital space teacher in the context of proxemics, (2017) [10]; Learning Programming in the Context of Proxemics, (2018) [11]; Robotics in Education in the Context of Proxemics (2019) [12] and Digital Competences in Education in the Context of Proxemics (2021).

The first of the above studies was created after the completion of the government program entitled "Digital School". Conclusions resulting from the performed quantitative analysis spoke for the need to deepen the research on the subject so far and to conduct a qualitative analysis.

The problem that needed to be considered concerned the distance between the teacher and students during classes with

the class, group and individually, during the above-mentioned classes in the field of computer science.

What is the most common distance between the teacher and students, and does the distance change in class, group or individual activities?

The problem was implemented in each study in the 2013-2021 period.

The definition of a variable serves to clarify the research problems and to express which of the properties of interest to us will be tested. Before I move on to the graphical presentation of variables, I would like to emphasize how scientists comment on it in the methodological literature. According to Z. Skorny, "a variable is a certain category of phenomena, the size, intensity and frequency of which may change depending on various circumstances."[2]

In explaining the meaning of a variable, the authors of various studies in the field of research methodology often refer to its understanding by J. Brzeziński, who claims that: "if a given property can be said to have different values, it is a variable." [3] In pedagogical research, the most common is the division of variables on the basis of the criterion of the relationship of the studied variable with other variables. They include: dependent variables, independent variables. J. Brzeziński in his study also writes that the variable that will become the subject of the study and whose relationships with other variables is defined in the study, is called the dependent variable, and the variables on which it belongs to are called independent variables. [4] It can also be stated that "[...] the dependent variables are a direct or at least indirect consequence of the independent variables." [5] Determining the variables does not end with specifying the research problems, and the next stage of the procedure is to define the indicators for the variables, without explaining them, the verification of research hypotheses would be difficult, and maybe even impossible. According to T. Pilch, indicators in the research are "an attempt to detail the main subject of the research - research problems that it intends to solve and working hypotheses that it wishes to confirm or reject. They are: basic features, symptoms, manifestations characteristic of the researched fact, phenomenon." [6]

The variables that are the subject of the research should be detailed and describe the purpose of the indicators. In pedagogy, the concept of an index is understood as certain properties that are connected by a constant relationship of a non-exceptional or statistical regularity with some other properties that are not directly observable and allow to determine the presence of some properties on the basis of the presence of others. Thus, an index is a property that tells us that the phenomenon under study has taken place[1]. It was assumed that a good independent variable would be the assumptions of proxemics, as indicators of which the manner of expression is not only the name proposed by E. T. Hall[2] [1] but also taking into account the distance in [cm] in the conducted research. On the other hand, the dependent variable is the number of completed - given responses of the respondents[3].

Spatial relationships included in Proxemics provide information about interaction partners based on the spatial distance between them. In the spatial behaviors given by E. T. Hall, four zones are distinguished that we use unconsciously during contacts and interactions between us and other people in social contacts. These are: the intimate zone (15-45 cm), the personal zone (45-120 cm), the social zone (1.2-3.6 m), the public zone (3.6-6 m). Spatial closeness is an indicator of liking and liking. The smaller the distance, the closer the relationship. Therefore, Garska proposes to take into account the <subsphere> as the first distance in the range (0-15cm). [7] Observing the scope of application and implementation of tasks related not only to information and communication technology, but also to IT in the non-school environment, it is possible to take into account the out-of-class range (outside the studio and outside the school facility), a global zone was proposed. [8] The aim of the previous research was to obtain information about the relationship between the teacher and students during the implementation of computer science classes. Currently, the study has been extended to include digital competences.

The "Digital School" program

The government program for the development of students 'and teachers' competences in the use of information and communication technologies, called briefly "Digital school", was implemented from April 4, 2012 to August 31, 2013. The purpose of the program was to check the effectiveness of using modern technologies in the education of young people[4]. All activities in this topic were initiated by the Regulation of the Council of Ministers of April 3, 2012 on the conditions, forms and procedures for the implementation of the project concerning the development of students 'and teachers' competences in the use of information and communication technologies. The Digital School project consisted of four complementary components: e-school, e-learner, e-teacher, e-educational resources, including e-textbook.[5] The "Digital School" was a pilot project preceding the planned long-term program of developing students 'and teachers' competences in the use of information and communication technologies (ICT) in education. It was based on two assumptions: developing students' competences that prepare them for life in the modern information society, where the use of modern technologies is a basic skill. The development of students' competences should take place through the actions of competent teachers, aware of the educational benefits of using ICT. The short-term goal of the project (2-3 years) was to increase the knowledge of teachers and students on the use of ICT in education and to create an e-textbook (textbooks) within 2 years. The best-known components were: e-school and e-learner, under which the authorities running the schools selected for the pilot

[1] http://www.przygonska.arg.pl/zmienne_wskazniki.htm

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[4] https://www.spdulowa.one.pl/programy-i-projekty/projekt-pilotazowy-cyfrowa-szkola/

[5] http://www.etwinning.pl/cyfrowa-szkola-program-men/

project will receive targeted subsidies for the purchase of modern teaching aids (e-school) and computers to be used by students during lessons (e-learner). Equipping schools with modern equipment is only half the way to modernizing education and developing the competences of students and teachers. The aim of the "Digital School" program was to introduce to Polish schools not only modern equipment, but most of all innovative methods of learning with its use.

The e-teacher and e-textbooks project were implemented by the agency of the Ministry of National Education - Center for Education Development. [6]

The questionnaires in the study were sent directly to each teacher participating in the meetings of the Pedagogical Council of their school, and then sent for elaboration. Preliminary analysis of the questionnaires obtained from 25 schools in the Kujawsko-Pomorskie voivodship allowed for the empirical analysis of 333 questionnaires.

The second study included in the comparison was 'Digital space teacher in the context of proxemics'. The survey covered over 500 teachers from the Kuyavian-Pomeranian Voivodeship, from various types of schools, not only primary, but then junior high and high school. The study was carried out in connection with the new provisions on computer science education. Already on December 17, 2015, the Council for Informatization of Education at the Ministry of National Education proposed a change in the current core curriculum for IT subjects.[7]

The proposed modification and extension of the provisions in the current core curriculum concerned the general objectives of education and computer classes. The new name is IT. Education in the field of computer science, including programming and robotics, is to be consistent at all educational stages and addressed to all students.

The Ministry of National Education informed that by September 15, 2016, 1,592 school institutions from all over Poland reported willingness to participate in the pilot implementation of programming learning in formal education, based on pedagogical innovations in schools.

The regulation signed on January 30, 2018 by the Minister of National Education on <New core curriculum for general education for four-year general secondary school, five-year technical secondary school and two-year second-cycle industry school, signed>[8], contains a provision reflecting the key objectives and assumptions of the education reform, including the development of among students of entrepreneurship and creativity as well as shaping the skills of efficient use of information and communication technologies not only in the education process, but also in everyday life. The justification to the above regulation includes: the core curriculum takes into account the postulates of the educational community regarding the shape and content of this document, which were submitted in the course of debates and discussions held at the Ministry of National Education in February-June 2016, devoted to a detailed review and analysis of the current core curriculum pre-school and general education, such as (inter alia): greater inclusion in the core curriculum of individual subjects of information and communication technologies (ICT), which will enable the education of students' digital competences and skills also in other subjects.[9]

The initial proposal for changes to the core curriculum became the basis for a pilot program, implemented from September 1, 2016, aimed at increasing the effects of education in computer science.

Complementary to the introduction

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The variables that are the subject of the research should be detailed and describe the purpose of the indicators. In pedagogy, the concept of an index is understood as certain properties that are connected by a constant relationship of a non-exceptional or statistical regularity with some other properties that are not directly observable and allow to determine the presence of some properties on the basis of the presence of others. Thus, an index is a property that tells us that the phenomenon under study has taken place[10]. It was assumed that a good independent variable would be the assumptions of proxemics, as indicators of which

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[8] https://men.gov.pl/ministerstwo/informacje/nowa-podstawa-programowa-dla-liceum-technikum-i-branzowej-szkoly-ii-stopnia-podpisana.html

[9] https://men.gov.pl/wp-content/uploads/2018/01/uzasadnienie.pdf

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The problem that needed to be considered concerned the distance between the teacher and students during classes with the class, group and individually, during the above-mentioned classes in the field of computer science.

What is the most common distance between the teacher and students, and does the distance change in class, group or individual activities?

The problem was implemented in each study in the 2013-2021 period.

2. Results of the Distance Research Between the Teacher and Students During the Class

One of the issues in the research concerned the distance (occupied zone) between the teacher and students during classes (lessons) with a class, group or individually.

The collected data in the 1st, 2nd, 3rd, 4th and 5th studies were discussed. The main question that was tried to answer was:

What is the most common distance between a teacher and a student in class, group and individual activities?

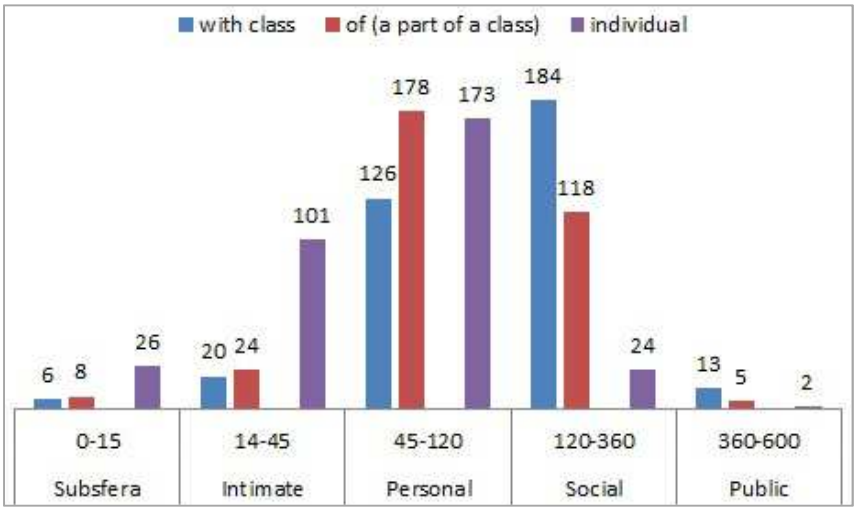
I will remind you. In literature, there are zones that we use unconsciously when interacting with other people. These are: subsfera (0 - 15 [cm]), intimate zone (14-45 [cm]), personal zone (45-120 [cm]), social zone (120-360 [cm]), public zone (360 -600 [cm]) and the global zone (over 600 [cm] including Internt).

2.1. The First Study Generated Data

The distances between the teacher and the student during classes with the whole class, group and individual work with the student, in the respondents' answers, in the first survey are as follows:

The most common distance.

The answers provided allow to indicate the <personal> zone as the most frequent one during the teacher's work with students - with <group> and <individually>. On the other hand, the <social> zone significantly dominates the work of respondents with charges while working with <class>. The result indicated by the respondents concerning individual work is noticeable. In this case, it occurs in a dominant form in the <intimate> zone, i.e. at a distance much shorter than the above-mentioned zones. During this work, there are also relations in the <subsfera> zone, which indicates the nature of the didactic tasks. To the same extent, this indicator also occurs in the <social> zone, i.e. the teacher is not constantly in the vicinity of the student.



Source: own research

Figure 1. *Graphical representation of the most common distance between the teacher and the student while working with the class, group and individually - data provided by the respondents in the first survey.*

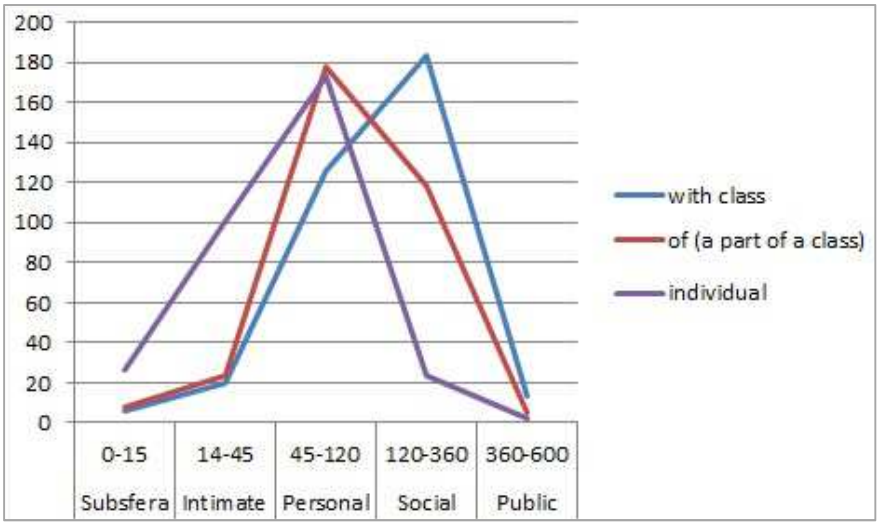
Table 1. *The most common distance between a teacher and a student when working with the class, group and individual classes - answers provided by the respondents in the first survey.*

zone	Subsfera	Intimate	Personal	Social	Public
distance [cm]	0-15	14-45	45-120	120-360	360-600
with class	6	20	126	184	13
of (a part of a class)	8	24	178	118	5
individual	26	101	173	24	2

Source: own research.

Below is a graphical comparison of the most common zones when working with the classroom, with the group and individually. The maximum shift for each of these forms of work is visible. The figure below clearly shows the shift of the maximums for individual forms of work. We can notice that:

1. when working with the dominant class, the zone is <social>;
2. in working with a group, the dominant form is <personal>;
3. however, in individual work the dominant forms are <personal> and <intymna>.



Source: Prepared on the basis of own research

Figure 2. *Graphical representation of the most common distance between the teacher and the student when working with the class, group and individually - data provided by the respondents in the first survey.*

2.2. The Second Study Obtained Data

In the second study, table 2 shows the most common distance between the teacher and the student during work with the class, group and individual classes - answers provided by the respondents.

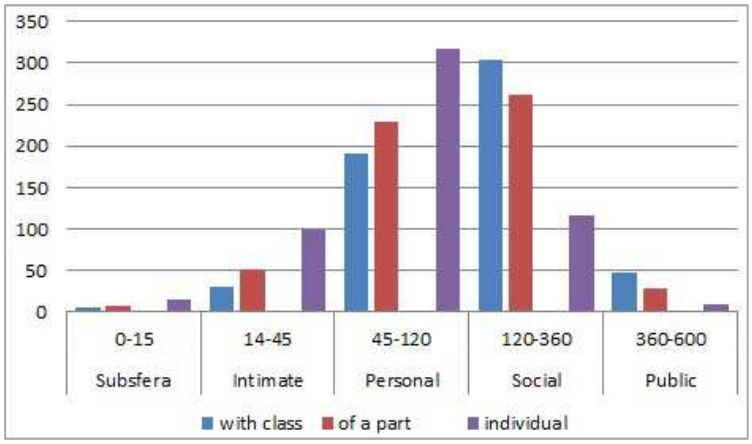
Table 2. *The most common distance between a teacher and a student when working with the class, group and individual classes - answers provided by respondents Source: Own research.*

zone	Subsfera	Intimate	Personal	Social	Public
distance [cm]	0-15	14-45	45-120	120-360	360-600
with class	5	30	190	304	47
of a part	7	51	230	262	28
individual	15	99	317	117	9

The answers provided allow to indicate the <personal> zone as the most frequent during the teacher's work with students - both individually and partially with a group. On the other hand, the <social> zone significantly dominates the work of respondents with pupils while working with the class, but also the visible maximum and with a group.

The result indicated by the respondents concerning individual work is noticeable. In this case, it occurs in the <intimate> zone, i.e. at a distance much shorter than the distance in the above-mentioned zones. During educational work, there are also relations in the <subsfera> zone, which indicates the nature of the didactic tasks.

This indicator also occurs in the social zone, i.e. the teacher, similarly to the first study, is not constantly around the student.



Source: Prepared on the basis of own research

Figure 3. *Graphical representation of the most common distance between the teacher and the student when working with the class, group and individually - data provided by the respondents in the second survey.*

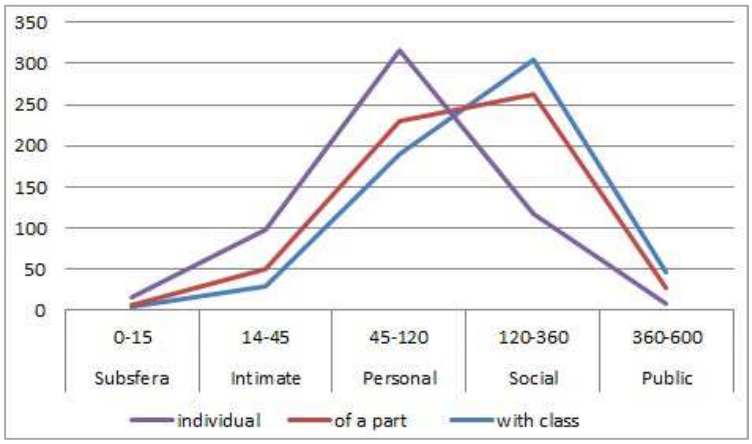
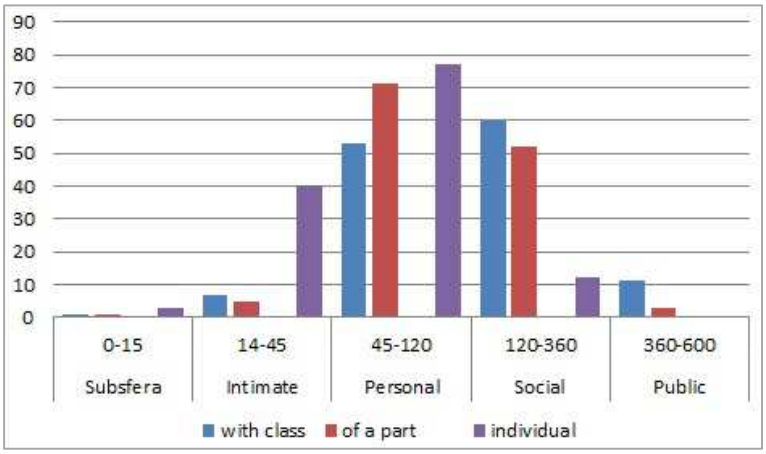


Figure 4. *Graphical representation of the most common distance between the teacher and the student while working with the class, group and individually - data provided by respondents Source: Prepared on the basis of own research.*

2.3. The Third Study Obtained Data

In the study of study III, table 3 presents the distance and the zone most often occurring between the teacher and the student during work with the class, group and individual classes - answers provided by the respondents, during the implementation of learning programming. [20]

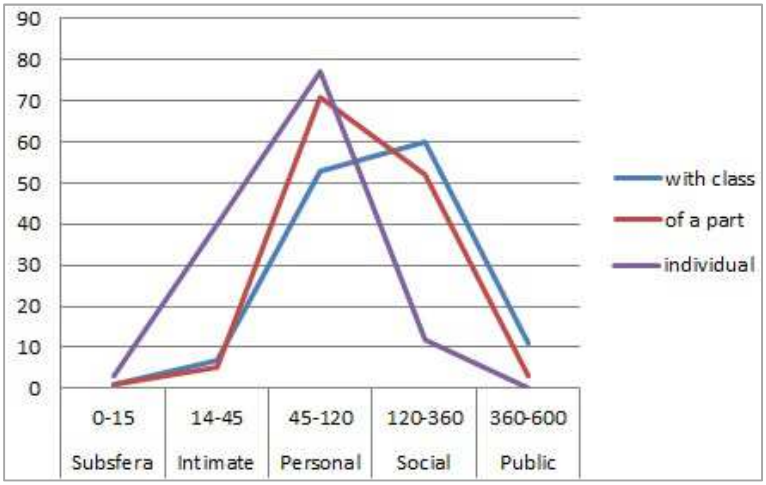


Source: Own research

Figure 5. *Bar chart showing the most frequently occupied by teachers distance [zone] during classes in the form of INDIVUDUAL work - WITH A GROUP - WITH A CLASS, during the implementation of learning programming.*

Table 3. *Figures informing about the most frequently occupied zone during specific classes while learning programming Source: own research.*

zone	Subsfera	Intimate	Personal	Social	Public
distance [cm]	0-15	14-45	45-120	120-360	360-600
with class	1	7	53	60	11
of a part	1	5	71	52	3
individual	3	40	77	12	0



Source: Own research

Figure 6. *Bar chart showing the most frequently occupied by teachers distance [zone] during classes in the form of INDIVUDUAL work - WITH A GROUP - WITH A CLASS, during the implementation of learning programming.*

The results included in the third study also show a visible shift of the maximum depending on the form of work with students.

2.4. Results in the Fourth Study

Below is a comparison of the results for the above-described situations depending on the form of work with students - individual, group and with the class, during the implementation of robotics in education.

Table 4. *Figures informing about the scale of individual, group or class classes depending on the occupied distance [zone] while learning elements of robotics in education.*

zone	Subsfera	Intimate	Personal	Social	Public
distance [cm]	0-15	14-45	45-120	120-360	360-600
with class	9	33	218	265	38
of a part	14	55	277	197	20
individual	14	107	331	100	11

Source: own research.

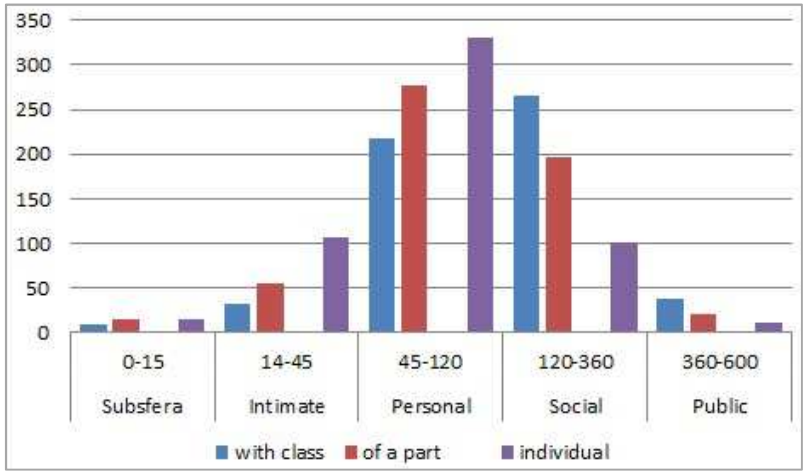


Figure 7. *The distance most frequently occupied by teachers [zone] during classes with INDIVIDUAL - GROUP - CLASS, during the implementation of learning elements of robotics in education Source: own research.*

The charts presented above inform about the shift of the maximum obtained data to the right. We can see that such a shift is caused by the increasing number of students - from individual contact, through group contact, to activities with the class, during the classroom, and thus it is more difficult to reach all students from a shorter distance - another zone.

2.5. Fifth Survey and Data Acquisition

"Digital competences in education in the context of proxemics" is a study carried out during the COVID-19 pandemic.

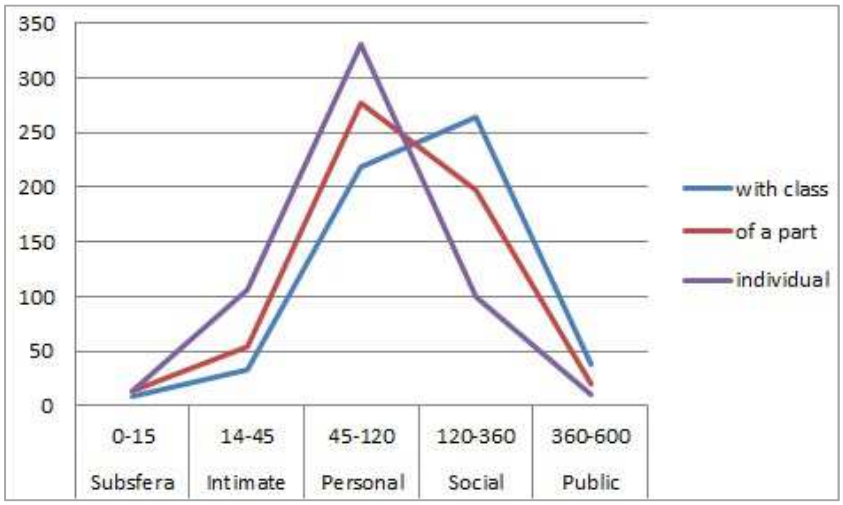


Figure 8. *The distance most often occupied by teachers [zone] during classes with INDIVIDUAL - GROUP - CLASS, during the implementation of learning elements of robotics in education Source: own research.*

Therefore, it can be presumed that not all interviewers completed the sheets at the same time, but also not all were convinced that teaching with the use of the Internet would take such a long time. Data from this fifth study are presented below:

Table 5. *Data obtained from the results of the survey on the distance occupied between the teacher-student entities while working with the CLASS during the implementation of digital competences.*

zone	Subsfera	Intimate	Personal	Social	Public	using the Internet	different number of students
distance [cm]	0-15	14-45	45-120	120-360	360-600	>10000	--------
with class	1	5	40	113	21	110	12
of a part	2	9	57	101	14	110	9
individual	3	13	78	77	8	118	7

Source: own study.

The data obtained from the CLASS indicator indicate a significant choice from the <social> zone - around 38%, despite the appearance of remote education, i.e. <Internet use> over 36%, the respondents indicate its domination. Of course, in the course of online learning, relationships are maintained with students in entire classes.

Once again, it can be presumed that not all the interviewers completed the sheets at the same time, but also not all were convinced that the use of <using the Internet> would function for such a long time.

We present a graphic image of the obtained data in charts 8, numerical data.

For working with a group (part of a class), the dominant zone is <social>, which was indicated by approximately 34% and a slightly smaller one, indicated by the respondents, because approximately 19% was <personal>.

Of course, during the pandemic, this issue is also dominated by <using the Internet> classes, and more than 36% of the surveyed teachers indicated here.

The first results already, to a certain extent, indicate a significant selection from the <personal> and <social> zones in the course of individual contacts with students. It is despite the emergence of remote education, i.e. the use of the Internet, that the respondents indicate it and this is the area that dominates.

Of course, in the course of online learning, individual learning classes with students who require it are preserved.

People indicating 36% of using the Internet during the implementation of digital competences working with the GROUP informed that 95% of them were in the zone called <using the Internet> during INDIVIDUAL classes (contacts) with students.

People indicating 36% of using the Internet during the implementation of digital competences working with the GROUP informed that 16% of them were in the area called <using the Internet> during classes (contacts) with the CLASSES with students.

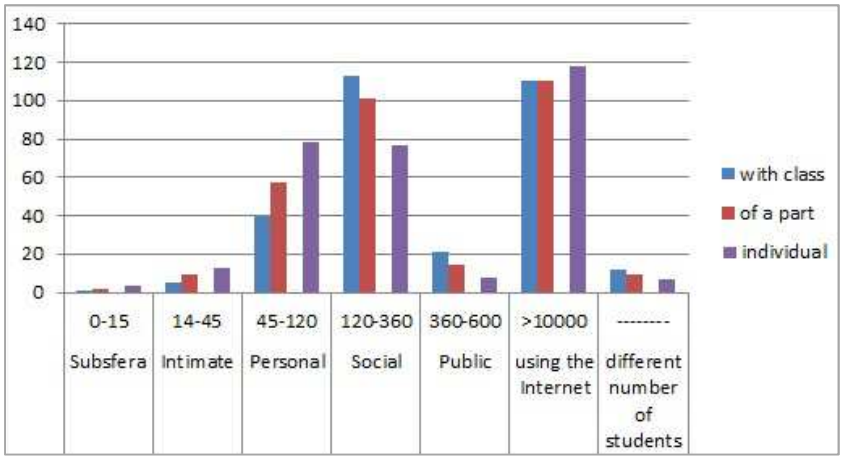
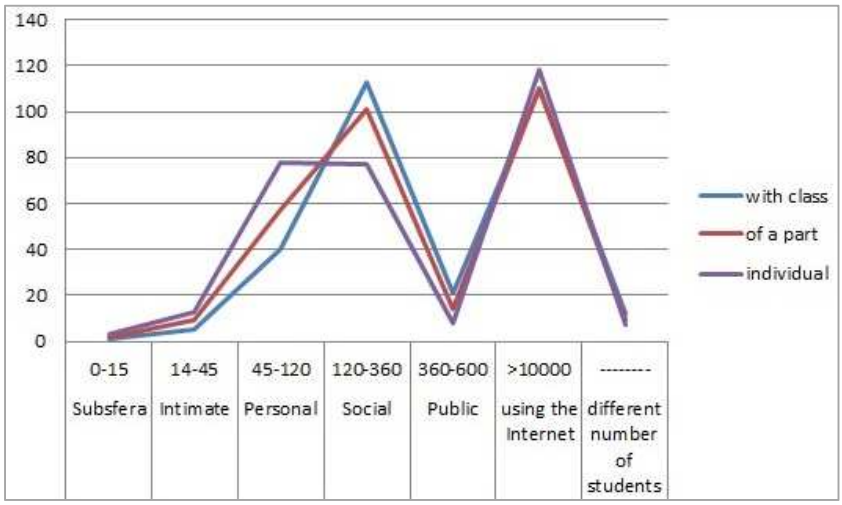


Figure 9. *Graphical presentation of the collected data from the study presented in table 5. According to the record, the data relate from <subzone> to <other...> for work with the entire CLASS in numerical terms and Source: own study.*



Source: own study

Figure 10. *Graphical presentation of the collected data from the study in Table 5. In terms of comparison with the graphs from previous studies.*

3. Summary

It is noticeable that the subject matter of the research issues is not decisive here, although they are from the same area - computer science, but the reasons can be found in the number of student teams participating in education.

A few remarks from the literature on the subject, resulting from work with student teams of various sizes in schools - classrooms, e.g. computer classrooms:

1. more people (students) in the team, it takes a larger area - space, territory; (there is a greater dispersion of the participants of the classes);
2. larger area - increasing the distance to reach a single team member with information;
3. more team members and a larger meeting area generate difficulties in interpersonal communication.

The observations from the research presented above may appear in the lesson process, while learning computer science. The visible dominance of one zone, called <personal>, despite the change in the course of learning with a different number of students, occurs during the implementation of other tasks listed in the text.

Taking distance in the relationship between direct actors in education allows us to see the following facts. The first results, to a certain extent, indicate a significant selection from the <personal> and <social> zones in the course of individual contacts with students, and the emergence of remote education, i.e. <use of the Internet>, the respondents indicate its dominance. On the other hand, in contacts with the class, the obtained data indicate a significant selection from <social> zones, and the fact that some respondents took into account remote education, i.e. <Internet use>, the data indicate its domination. Of course, in the course of online learning are kept with students of entire classes.

As indicated, the <global> zone is not the best one for shaping positive relations between N-U, even though some teachers also indicated it in their answers.

The researcher should take into account that not all classroom teachers clearly define the requirements, especially when teaching with the use of the Internet. Sometimes it happens that different, sometimes contradictory rules apply in

different lessons. And this should be examined under favorable circumstances.

It should also be borne in mind that Study 5 (the latter mentioned) was conducted during the pandemic, or distance learning, period. Some respondents, not knowing the duration of distance learning, responded in the first moments and some later. Of course, this influenced the data obtained in the study. Thus, in further investigation of the relationship between the teacher and students, all indicators should be taken in the context of proxemics.

4. Recommendations

An open issue is the problem of applying appropriate didactic measures to implement the science of computer science in formal education. Knowing the results of the research included in the indicated studies, one can consider the use of appropriate teaching aids, also assisted by techniques and computer technology, at every stage of education.

Each research, carrying specific data in the resources of results, for a specific group in a specific time, allows to build information that should be translated into learning outcomes. By reviewing the research results and taking into account the current and generated conditions, it is possible to influence the effectiveness of education, as well as the development of teaching of the next years of students at every stage of education.

Studies on the topics mentioned above are worth recommending. It is simply worth reading monographs [8-12], as well as the content of articles in literature [13-15]. The subject of proxemics itself has been extensively covered in the literature, which is also worth looking at [16-19, 21].

References

[1] E. T. Hall'a (The Hidden Dimension, 1969) Ukryty wymiar, Warszawa 1976, Wyd. PIW.

[2] Hall, E. (1987), The silent language, Warsaw: PWN.

[3] Skorny Z., Prace magisterskie z psychologii i pedagogiki, Warszawa 1984, s. 26.

[4] Brzeziński J., Elementy metodologii badań psychologicznych, Warszawa 1984, PWN, s. 22. ibidem s. 24.

[5] Łobocki M., Wprowadzenie do metodologii badań pedagogicznych, wyd. 5, Wydawnictwo „Impuls", Kraków 2006.

[6] Pilch T., Zasady badań pedagogicznych. Wrocław 1977, Zakład Narodowy im. Ossolińskich, s. 51.

[7] Garstka W., Komunikacja niewerbalna a terapeutyczna rola nauczyciela, [w] Życie Szkoły, Nr 7, 1999 r. s. 483.

[8] Mikulski K., Nauka programowania w kontekście proksemiki, Wyd A. Marszałek, Toruń 2018 r. s. 70.

[9] Mikulski K., Proksemika cyfrowej szkoły, Wyd A. Marszałek, Toruń 2014 r.

[10] Mikulski K., Nauczyciel cyfrowej przestrzeni w kontekście proksemiki, Wyd A. Marszałek, Toruń 2017 r.

[11] Mikulski K., Nauka programowania w kontekście proksemiki, Wyd A. Marszałek, Toruń 2018 r.

[12] Królikowski T., Mikulski K., Robotyka w edukacji w kontekście proksemiki, Wyd A. Marszałek, Toruń 2020 r.

[13] Mikulski K., Nauka programowania nowym wyzwaniem (zadaniem) edukacji, [w] A. Kozubska (red).

[14] R. Maciałek (red), P. Ziółkowski (red), Edukacja – Rodzina – Społeczeństwo 2/2017, Zeszyty Naukowe WSG w Bydgoszczy t. 29, s. 273-292.

[15] Mikulski K., Proxemics in the Context of the Digital School Cognitive Science – New Media –Education Vol. 4 No. 1 (2018) s. 93 -108.

[16] https://doi.org/10.12775/CSNME.2018.007 https://apcz.umk.pl/CSNME/article/view/CSNME.2018.007

[17] Mikulski K., The influence of the distance between the teacher and a student for school grades.

[18] Cognitive Science – New Media –Education Vol. 5 No. 2 (2018) s. 103 -119.

[19] https://doi.org/10.12775/CSNME.2018.015 https://apcz.umk.pl/CSNME/article/view/CSNME.2018.015Inography

[20] Pilotaż, serwis MEN, dostępny online: https://programowanie.men.gov.pl/

[21] Tokar R., Legal proxemics. The proposal of a new scientific discipline, http://www.romantokarczyk.pl/proksem/proks7.htm