

Research Results in the Context of Proxemics in the Implementation of the Government Program "Laboratories of the Future"

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Abstract

The purpose of the research included in the descriptions and presented below, in each area of application of the monograph, was information contained or related between entities in the school, specifically not the teacher and students, during the implementation of subjects from the element of the area of computer science, including information and communication technology, learning programming, elements of robotics, related and active (interactive) boards, as well as laboratories of the future in school education. Particular emphasis after complexity on context, which is the proxemics occurring during the implementation of particular categories.

Keywords: computer science, proxemics, relationships, teacher, student, distance, zone, government program-project "Laboratories of the Future"

1. Introduction to the Research Results

The aim of the research, which formed the basis for writing and publishing this monograph, was to obtain information on the relationships between school education actors, specifically teachers and students, during classes using computer science elements, including information and communication technology, programming, robotics, digital literacy, and active (interactive) whiteboards, as well as future laboratories in school education. Particular emphasis was placed on the context of proxemics, which concerns spatial relationships during classes on specific topics in various types of schools. As a result of the research, monographs with data and observations were published (Mikulski, 2014; Mikulski, 2017; Mikulski, 2018; Mikulski, & Królikowski, 2020; Mikulski, & Mikołajczyk, 2023; Mikulski, & Królikowski, 2025), as well as publications on the Internet (E. Baron-Polańczyk, 2018; Mikulski, 2018; Mikulski, 2018; Mikulski, 2022).

We addressed survey questions to schools, principals, and teachers implementing the government program "Laboratories of the Future" to gather information about the program's implementation in the context of proxemics. They were asked to complete an online questionnaire prepared in Forms Office Office (Note 1).

Implementing the "Laboratories of the Future" program was not only a challenge but also a factor enabling the improvement of the quality of education, particularly in primary schools, both public and private.

The data collected from participants participating in the government program allowed us to generate information that we now share with you, and we share our observations and conclusions. The study received positive approval from the Kujawsko-Pomorskie Education Superintendent.

2. General Information About the Survey Respondents

One of the questions concerned the gender of the program implementers. It turns out that 453 people completed the survey, including 343 women and 110 men.

Table 1. Responses to the question regarding the gender of the program implementer

Respondent's gender	Numerical indications	Numerical %
woman	343	76
man	110	24

Source: own study.

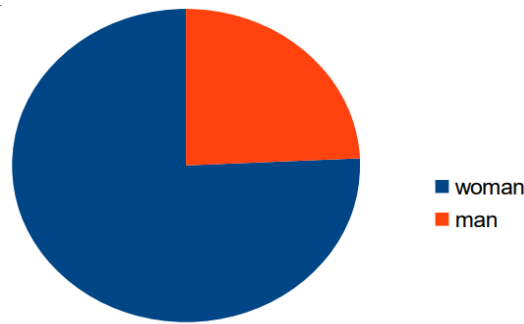


Figure 1. Graphical representation of the percentage of respondents by gender

Source: own study.

The data obtained allow us to conclude that in the primary schools surveyed, both public and private, women were significantly dominant teachers. They outnumbered men three times more among the survey participants.

In the next question, respondents were asked to indicate what type of school they worked in during the implementation of the "Laboratories of the Future" project.

Table 2. Respondents' answers informing about the type of school in which they worked

Type of school where respondents worked	Numerical indications	Indications %
public primary school	403	89
non-public primary school	50	11

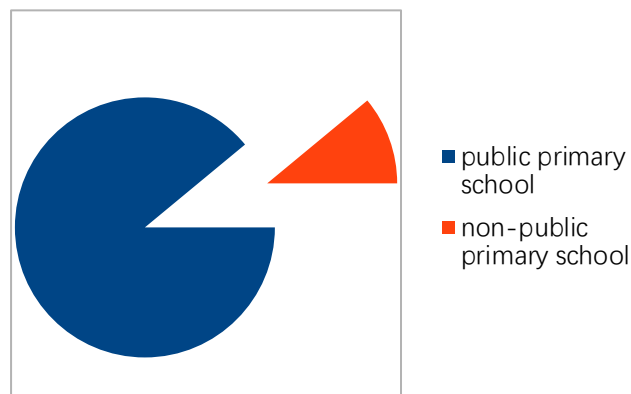


Figure 2. Graphical representation of the number of respondents indicating the type of school – public or private – they worked at

Source: prepared by the authors.

The data obtained clearly indicate, in the majority, work in public primary schools (89% of respondents' responses). Non-public primary schools were indicated by 11% of surveyed teachers. It is worth considering that there are fewer non-public primary schools in Poland than public institutions at this level of education.

In the next question, respondents were asked to indicate their age (years of life) by selecting the appropriate time period.

Table 3. Respondents' answers indicating their years of life

Age range of respondents	Numerical indications	Indications %
From 21 to 30	2	0,4
From 31 to 40	66	14,6
From 41 to 50	173	38,2
From 51 to 60	169	37,3
From 60 and more	43	9,5

Source: own study.

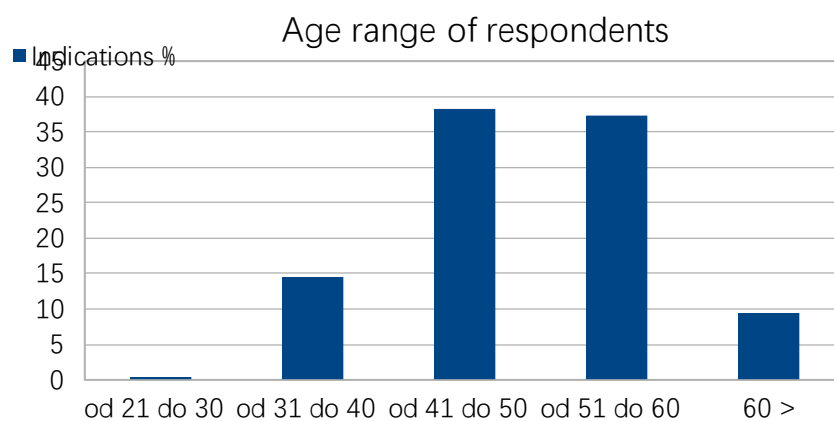


Figure 3. Graphical representation of the percentage of respondents indicating age groups in the survey.

Source: prepared by the authors

The dominant age ranges of teachers participating in the study were "41 to 50" and "51 to 60." This is not the youngest generation working, but it is certainly experienced and capable of implementing innovative teaching programs, including using equipment from the "Laboratories of the Future."

Respondents were also asked to indicate the size of the town where their school was located. Respondents did so by selecting the appropriate numerical range (based on the number of residents).

Table 4. Respondents' answers informing about the size of the town where the school operates

Size of the town where the school operates [number of inhabitants]	Numerical indications	Indications %
village	242	53
city to 20 thousand	66	15
city from 21 to 50 thousand	12	3
city from 51 to 100 thousand	49	11
city from 101 to 500 thousand	78	17
the city above 500 thousand	6	1

Source: own study.

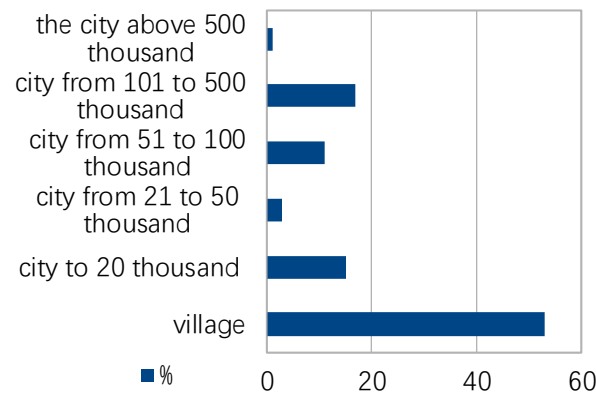


Figure 4. Graphical representation of the percentage of respondents reporting the size of the town where the school operates

Source: prepared by the authors.

The data obtained indicate that 53% of people whose schools are located in rural areas participated in the program (and survey). 17% of respondents selected "City with a population of 101,000 to 500,000" as their place of work. 15% of respondents indicated "City with a population of up to 20,000." The percentage for the "City with a population of 51,000 to 100,000" bracket was 11%. The remaining percentages are insignificant, amounting to 3% for the "City with a population of 21,000 to 50,000" bracket and 1% for the "City with a population of over 500,000."

The survey also included a question about satisfaction with participation in the "Laboratories of the Future" program.

Table 5. Respondents' responses indicating their satisfaction with participation in the "Laboratories of the Future" program

Satisfaction with participation in the program	Numerical indications	Indications %
Yes	388	86
No	12	3
I have no opinion	28	6
It's hard to answer today	25	

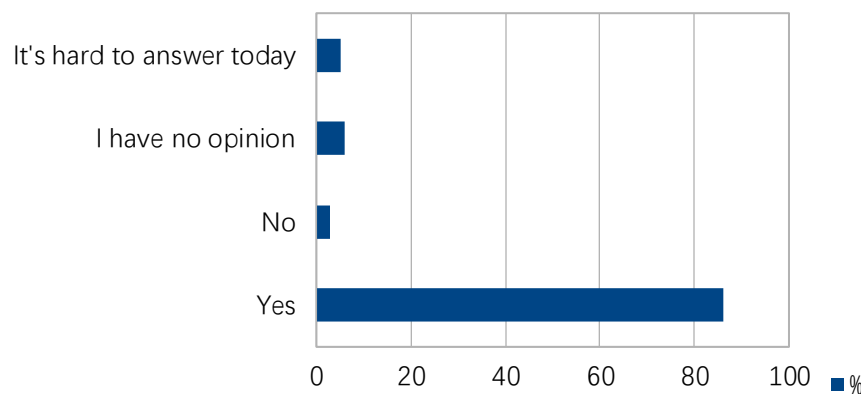


Figure 5. Graphical representation of respondents' responses indicating their satisfaction with participation in the "Laboratories of the Future" program (% of respondents)

Source: prepared by the authors.

The data obtained reveals that 86% of respondents are satisfied with their participation in the government program "Laboratories of the Future." Only 3% of teachers participating in the survey responded "No," indicating dissatisfaction. This is further supported by data showing that 6% of those who had no opinion ("I have no opinion"), which is a shame. However, 5% of respondents also selected the option "It's difficult to answer today." One can only hope that after longer participation in the program and using the teaching resources purchased with funds raised through the "Laboratories of the Future" program, their opinions on this educational initiative will become more positive.

The next question in the survey addressed to participants of the government program "Laboratories of the Future" was: "Are you satisfied with the possibility of using these teaching aids effectively?"

Table 6. Respondents' responses indicating their satisfaction with the possibility of effective use of teaching aids

Satisfaction with the ability to effectively use teaching aids	Numerical indications	Indications %
tak Yes	363	80
nie No	9	2
partly	68	15
rather rarely	13	3

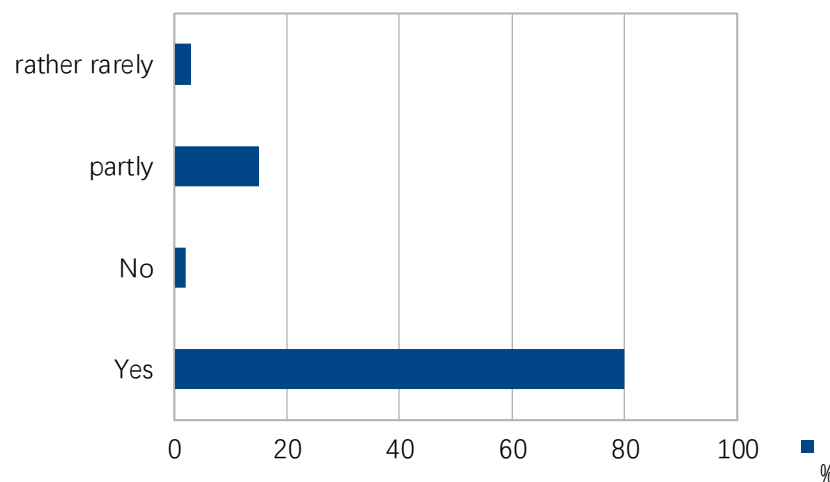


Figure 6. Graphical representation of the percentage of responses regarding satisfaction with the use of teaching aids

Source: prepared by the authors.

Eighty percent of respondents reported satisfaction with the ability to use teaching resources acquired through the government program. 15% of respondents selected the "Partially" option. 2% selected "No," and 3% selected "Rarely." Unfortunately, responses expressing dissatisfaction or infrequent satisfaction with the ability to effectively use these teaching resources were also found.

The study then asked a question in the field of proxemics: "What distance (zone) is assumed between the teacher and the student when using the teaching elements from the 'Laboratories of the Future' programme during classes and INDIVIDUAL contacts?"

Table 7. Respondents' answers indicating their distance (zone) during individual contacts

INDIVIDUAL contacts	Numerical indications	Indications %
subzone (0-15 cm)	20	4
intimate (16-45 cm)	76	17
personal (46-120 cm)	267	59
social (121-360 cm)	78	17
public (361-600 cm)	5	1
global (above 600 cm)	7	2

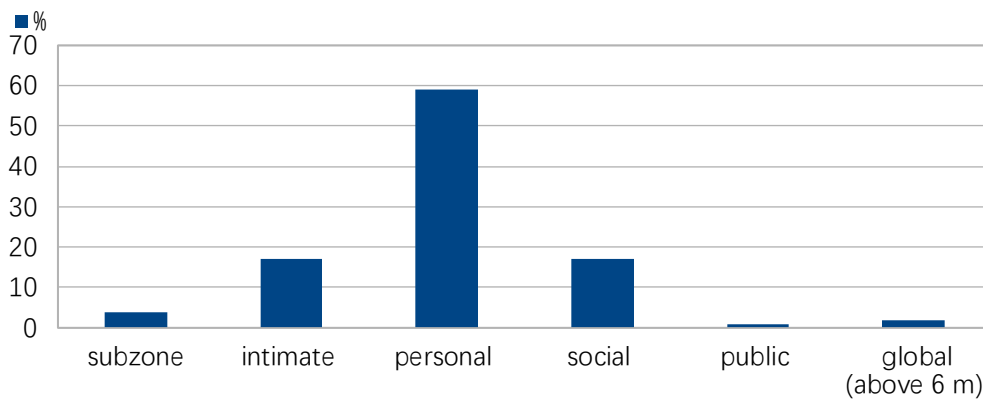


Figure 7. Graphical representation of the percentage of respondents indicating their distance (zone) during individual contacts

Source: prepared by the authors.

The numerical data (and their graphical presentation) indicate that the personal sphere is the one that strongly dominates the implementation of the government program, when it takes place during "INDIVIDUAL" classes and contacts. This was noted in 59% of the responses. A smaller response, around 17%, was found for the "intimate" and "social" spheres. A nearly symmetrical "arrangement" of responses relative to the personal sphere was evident.

The "personal" sphere was also highlighted in previous studies conducted during computer science programs and activities, such as programming and robotics classes, and the "Active Board" program, aimed at improving students' work and acquiring relevant competencies.

The next question related to proxemics in the study was: "What distance (zone) is maintained between the teacher and the student when using the program's resources, during classes, and when interacting with the GROUP (part of the class)?"

Table 8. Respondents' responses indicating their distance (zone) during group interactions

Contacts with the GROUP	Numerical indications	Indications %
subzone (0-15 cm)	15	3
intimate (16-45 cm)	41	9
personal (46-120 cm)	221	49
social (121-360 cm)	161	36
public (361-600 cm)	10	2
global (above 600 cm)	5	1

Source: prepared by the authors

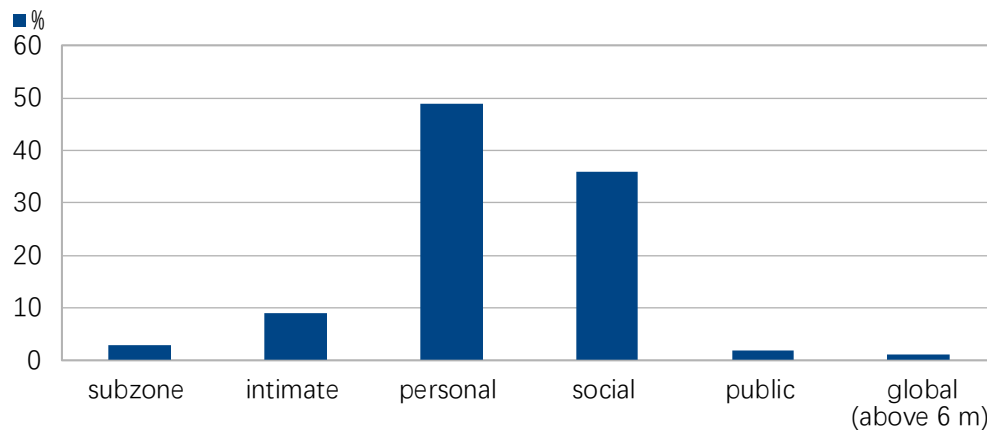


Figure 8. Graphical representation of the percentage of respondents indicating their distances (zones) during contact with the group

Source: prepared by the author.

The graphical analysis based on the numerical results also indicates that the "personal" zone is no longer as dominant during the implementation of the government program, as it occurs during classes and contact with the "GROUP." Here, this indication was noted in 49% of the responses. Fewer, 9%, referred to the "intimate" zone. However, 36% indicated the "social" zone. Chart 8 does not show a symmetrical "arrangement" of indications (in the form of a bar chart) relative to the personal zone. Looking at the overall picture, a shift to the right can be seen in Figure 8.

This situation, in the area of computer science, such as programming, robotics, and the implementation of the "Active Board" program, was also identified in previous studies conducted during programs and activities aimed at improving student performance and acquiring relevant competencies. The number of students in classes increases, and thus the teacher's distance from the students' changes. The teacher "must" be in a relationship from a greater distance, with a larger number of people being taught.

The next question in the survey – still from the area of proxemics – was: "What distance (zone) is maintained between the teacher and the student when using LP (program resources) during classes and interactions with the class?"

Table 9. Respondents' responses indicating their distance (zone) during interactions with the class

Contacts with the CLASS	Numerical indications	Indications %
subzone (0-15 cm)	13	3
intimate (16-45 cm)	23	5
personal (46-120 cm)	183	41
social (121-360 cm)	214	47
public (361-600 cm)	15	3
global (above 600 cm)	5	1

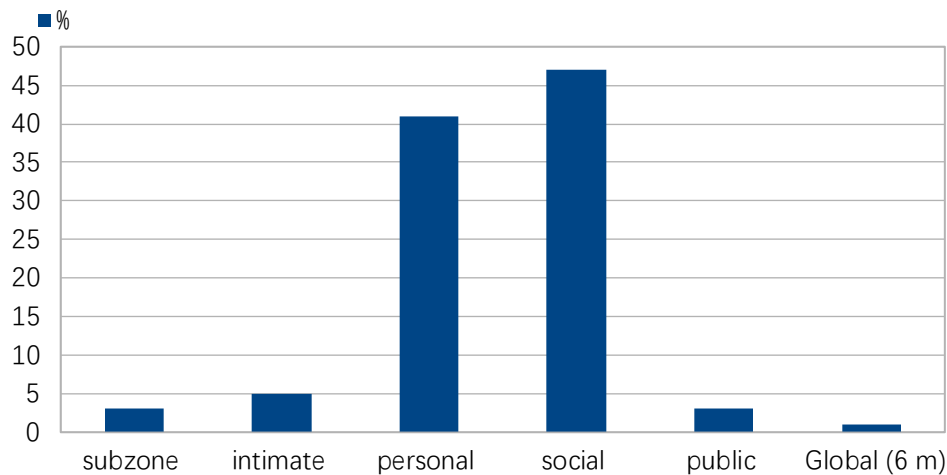


Figure 9. Graphical representation of the percentage of respondents indicating a given distance (zone) during contacts with the class

Source: prepared by the author

In the study, when class contact is considered, the most responses concerned the "social" zone – as the one that, although not as strongly, dominates the implementation of the government program when it is implemented during classes and contact with a larger number of students, i.e., the "class." This was indicated in 47% of the responses. Fewer, 41%, indicated the "personal" zone. However, 5% indicated the "intimate" zone, and 3% indicated the "public" zone. The graph does not show a symmetrical "arrangement" of responses relative to any zone.

Taken as a whole, a significant shift to the right can be observed (Figure 9).

This situation was also highlighted in previous studies in the field of computer science, for example, programming, robotics, and the "Active Board" program, implemented during programs and activities aimed at improving student performance and acquiring relevant competencies. For "classroom" activities, the number of students in the class increases, and thus the teacher's distance from the students changes significantly. The teacher "must" interact from a much greater distance with a much larger number of students (in the classroom).

3. Comparison of Three Graphs Created After Analyzing Individual Work, Group Work and the Whole Class

Table 10. Summary of the comparison of the results obtained, as described above

Zone in the study	INDIVIDUAL	GRUP	CLASS
subzone (0-15 cm)	4	3	3
intimate (16-45 cm)	17	9	5
personal (46-120 cm)	59	49	41
social (121-360 cm)	17	36	47
public (361-600 cm)	1	2	3
global (above 600 cm)	2	1	1

The following graphical comparison was obtained.

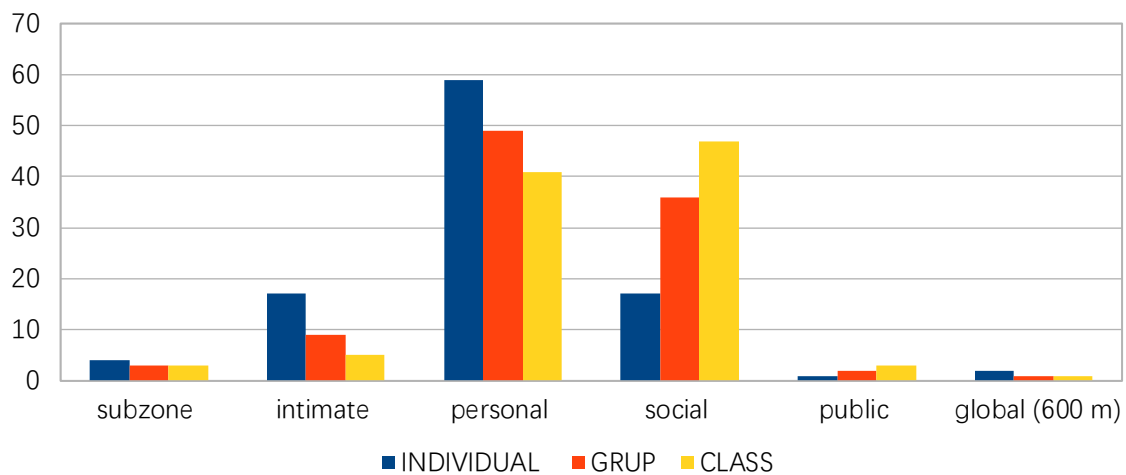


Figure 10. Comparison of data from three studied situations during the implementation of the program

Source: prepared by the author

The shift in the maximum value visible in the graphical presentation for three variants of work with students during the implementation of the "Laboratories of the Future" program.

While the personal sphere dominates individual action, it is smaller for group action, and the social sphere becomes significantly more prominent. The social sphere dominates class action.

The survey asked teachers what, in their opinion, the distance between teacher and student influences positive relationships when using program resources.

Table 11. Respondents' opinion on the influence of the distance between the teacher and the student on positive relationships when using the program resources

Influence on POSITIVE relationships	Numerical indications	Indications %
subzone (0-15 cm)	14	3
intimate (16-45 cm)	43	9
personal (46-120 cm)	290	64
social (121-360 cm)	98	22
public (361-600 cm)	3	1
global (above 600 cm)	5	1

Source: prepared by the author

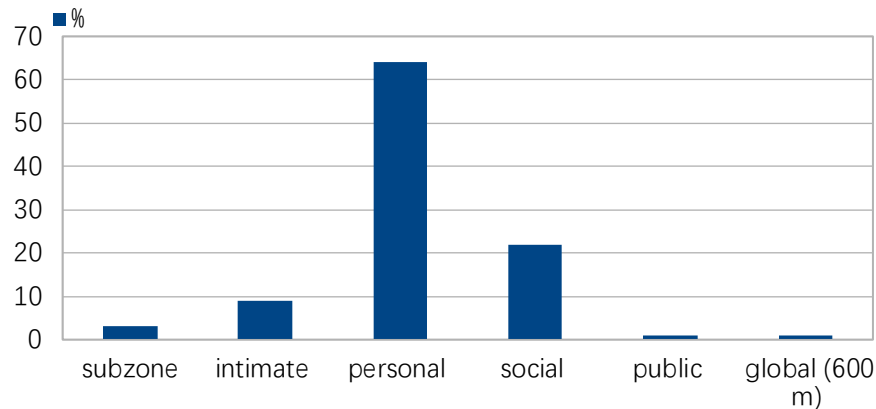


Figure 11. Respondents' responses indicating their distance (zone) between teacher and student influences positive relationships when using program resources

Source: prepared by the authors.

When using teaching aids from the government program "Laboratories of the Future," the "personal" zone occupied by the teacher in relation to students influences positive relationships between participants in the educational process – this was stated by 64% of respondents. The "social" zone was mentioned less frequently – 22%. However, 9% of surveyed teachers indicated the "intimate" zone. The zone with a distance of 0–15 cm, called the "subzone," was mentioned by 3% of respondents. The remaining zones were included in the responses by 1% of surveyed teachers. This situation was also highlighted in previous studies in the field of computer science, such as the "Digital School" program, programming and robotics instruction, and the "Active Board" program, implemented during programs and activities aimed at improving student performance and acquiring relevant competencies

In the survey addressed to teachers, they were asked what distance (zone) they believed was acceptable between teacher and student that influenced the positive assessment the student received when using teaching aids purchased with funds obtained from the program.

Table 12. Respondents' responses indicating their distance (zone) between teacher and student that influenced the positive assessment when using resources from the program

Impact on a student's positive grade	Numerical indications	Indications %
subzone (0-15 cm)	15	3
intimate (16-45 cm)	44	10
personal (46-120 cm)	282	62
social (121-360 cm)	104	23
public (361-600 cm)	4	1
global (above 600 cm)	4	1

Source: prepared by the authors.

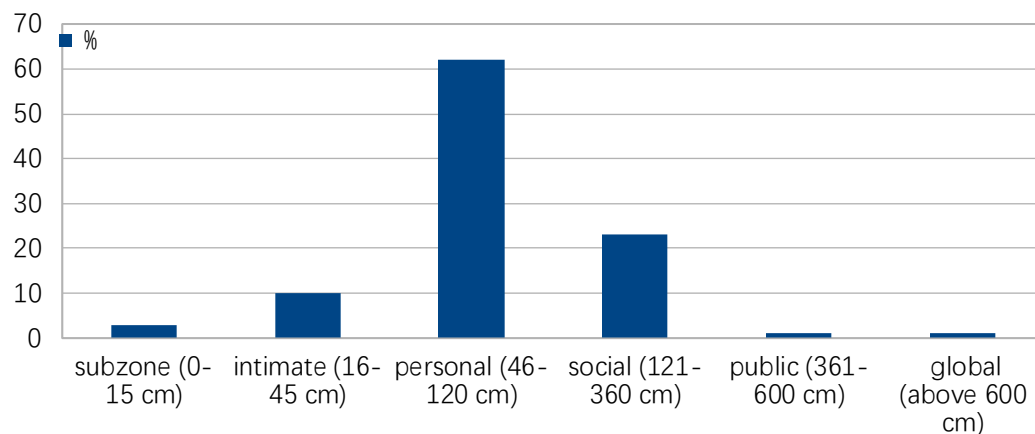


Figure 12. Graphical representation of the percentage of respondents indicating a given distance (zone) between teacher and student that influences positive assessment when using resources from the "Laboratories of the Future" program

Source: prepared by the authors.

The use of teaching elements acquired through the government program "Laboratories of the Future" allowed us to identify the "personal" zone occupied by the teacher in relation to students as the one that influences the positive assessment of participants in the educational process (students) – this zone was indicated by 62%. Fewer responses concerned the "social" zone – 23%. However, 10% of the surveyed teachers indicated the "intimate" zone. The zone, whose distance is between 0 and 15 cm, referred to as the "subzone," was selected by 3% of respondents. The remaining zones were included in 1% of the surveyed teachers.

This situation was also highlighted in previous research in the field of computer science, such as the "Digital School" program, programming and robotics instruction, and the "Active Board" program, implemented during programs and activities aimed at improving student work and acquiring relevant competencies.

Continuing the series of questions in the area of proxemics, a question was formulated about the distance (zone) that, in the respondents' opinion, is assumed (adopted) between teacher and student and influences the student-student relationship when using teaching aids from the "Laboratories of the Future" program.

Table 13. Respondents' responses indicating their distance (zone) between teacher and student that influences the student-student relationship when using teaching aids from the "Laboratories of the Future" program.

Impact on student-student relationships	Numerical indications	Indications %
subzone (0-15 cm)	17	3,8
intimate (16-45 cm)	103	22,7
personal (46-120 cm)	251	55,4
social (121-360 cm)	76	16,8
public (361-600 cm)	2	0,4
global (above 600 cm)	4	0,9

Source: prepared by the authors.

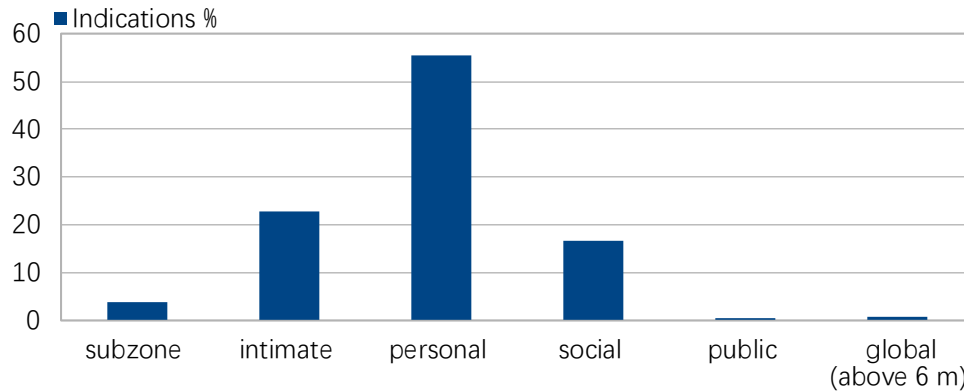


Figure 13. Graphical representation of the percentage of respondents indicating a given distance (zone) between teacher and student that influences student-student relationships when using program resources

Source: prepared by the authors

Following a study related to the government program "Laboratories of the Future," the "personal" zone occupied by teachers in relation to students was identified as one that influences student-student relationships in the educational process. This zone was selected by over 55% of respondents. Fewer, approximately 23% of surveyed teachers, indicated the "intimate" zone. Nearly 17% of respondents selected the "social" zone option in the survey. A zone with a distance of 0–15 cm, referred to as the "subzone," was identified by approximately 4% of surveyed teachers. Less than 1% of surveyed teachers included other zones.

This situation has also been highlighted in previous studies in the field of computer science, such as the "Digital School" program, programming and robotics instruction, and the "Active Board" program, implemented during programs and activities aimed at improving student performance and acquiring relevant competencies.

In the next question, respondents were asked whether they communicated with other people participating in the program during the implementation of the "Laboratories of the Future" program.

Table 14. Respondents' responses indicating their communication during the implementation of the "Laboratories of the Future" program

Communication with other people	Numerical indications	Indications %
Yes	370	82
No	83	18

Source: own study.

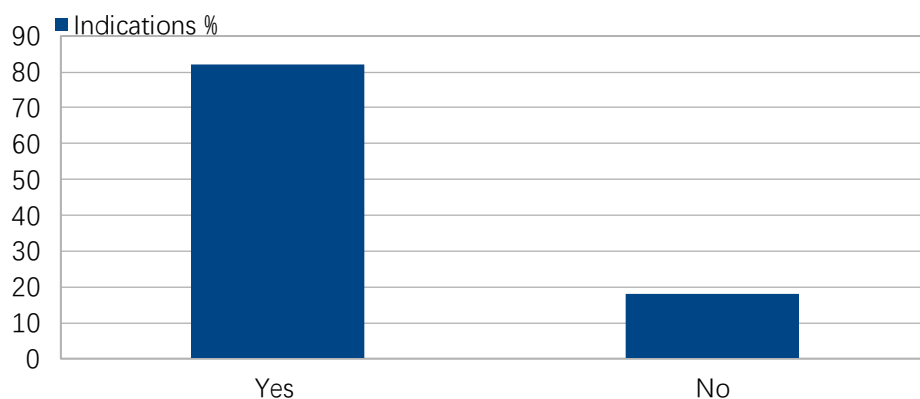


Figure 14. Graphical representation of the percentage of respondents' responses to the question about communication during the implementation of the "Laboratories of the Future" program.

Source: prepared by the authors

Eighty-two percent of surveyed teachers indicated they participated in the "Laboratories of the Future" program during classes with students, including communicating with others. Eighteen percent of respondents did not communicate while participating in this government program.

Interesujące odpowiedzi uzyskano na pytanie, czy w trakcie prowadzenia zajęć z wykorzystaniem elementów z zestawu środków dydaktycznych programu „Laboratoria Przyszłości” realizacja zagadnień podczas zajęć edukacyjnych odbywała się przy współpracy z podmiotami zewnętrznymi.

Next, the survey asked whether using elements from the "Laboratories of the Future" set influenced learning outcomes. The responses are presented in a table and graph.

Table 15. Respondents' responses regarding the impact of using elements from the "Laboratories of the Future" set on learning outcomes

Is there an impact of the set on learning outcomes?	Numerical indications	Indications %
Yes	316	70
No	8	2
sometimes	90	20
I have no opinion	39	8

Source: prepared by the authors.

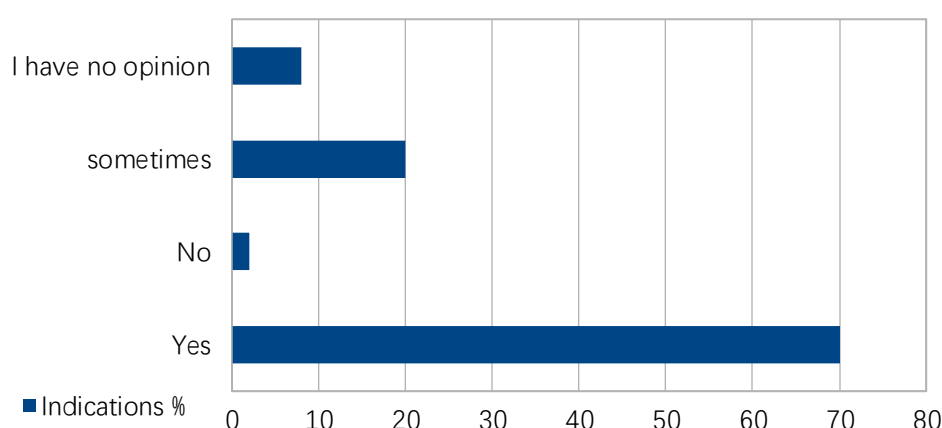


Figure 15. Graphical representation of the percentage of responses regarding the impact of teaching aids on learning outcomes

Source: prepared by the authors.

The data collected shows that 70% of respondents answered "Yes," while 20% indicated "Sometimes." This represents a significant positive impact of using teaching aids on educational outcomes. Only 8% of teachers indicated "I have no opinion" on this issue, while 2% of respondents responded "No." Could such a negative response require additional training for teachers?

4. Summary of the Study Results

To sum up the data and information presented above from the survey conducted among the participants of the government program "Laboratories of the Future", both principals and teachers of public and private primary schools, it can be concluded that this government program was a complete success.

The research findings presented above may be relevant to the classroom process, and generally during computer science instruction at subsequent levels in Polish education. The apparent dominance of one area, called "personal," despite changes in the learning process with varying numbers of students, occurs during the implementation of other tasks mentioned in the text.

The issue of using appropriate teaching resources to implement the learning of specific topics in formal education remains an open question. Knowing the research results in the context of proxemics, one can consider the use of appropriate teaching resources, of course, supported by computer and digital technology.

Each study, by providing specific data for a specific group at a specific time, allows for the construction of information that should translate into teaching outcomes. By reviewing research findings and considering current and emerging conditions in the context of proxemics, we can influence the effectiveness of teaching and the development of teaching for future cohorts of students at every stage of their education.

In the presented research, the student plays a crucial role. By asking teachers, we could have expected comprehensive, credible answers that offered not only new data but also information about the state of interpersonal relationships in Polish schools, naturally in the context of proxemics. The information obtained from respondents indicates the dominance of the "personal" sphere in almost every issue addressed in the research.

References

- Comparison of selected results of own research in the context of proxemics. In E. Baron-Polańczyk (Ed.), *ICT in Educational Design, Processes, Materials, Resources* (s. 27-37, Vol 13, (red.), 2018). University of Zielona Góra.
- Mikulski, K. (2014). *Proksemika cyfrowej szkoły*. Wydawnictwo Adam Marszałek, Toruń.
- Mikulski, K. (2017). *Nauczyciel cyfrowej przestrzeni w kontekście proksemiki*. Wydawnictwo Adam Marszałek, Toruń.
- Mikulski, K. (2018). *Nauka programowania w kontekście proksemiki*. Wydawnictwo Adam Marszałek, Toruń.
- Mikulski, K. (2018). Proxemics in the Context of the Digital School. *Cognitive Science – New Media – Education*, 4(1), 93-108. <https://doi.org/10.12775/CSNME.2018.007>
- Mikulski, K. (2018). The influence of the distance between the teacher and a student for school grades. *Cognitive Science – New Media – Education*, 5(2), 103-119. <https://doi.org/10.12775/CSNME.2018.015>
- Mikulski, K. (2022). Distance Between Teacher and Students During Class, Group and Individual Classes. *Teacher Education and Curriculum Studies*, 7(2), 46-56. <https://doi.org/10.11648/j.tecs.20220702.11>
- Mikulski, K., & Królikowski, T. (2020). *Robotyka w edukacji w kontekście proksemiki*, Wydawnictwo Adam Marszałek, Toruń.
- Mikulski, K., & Królikowski, T. (2023). *Tablica interaktywna w edukacji w kontekście proksemiki*. Wydawnictwo Uczel niane WSG, Bydgoszcz.
- Mikulski, K., & Królikowski, T. (2025). *Laboratoria przyszłości w edukacji w kontekście proksemiki*. Wydawnictwo Uczel niane WSG, Bydgoszcz.
- Mikulski, K., & Mikołajczyk, J. (2023). *Kompetencje cyfrowe w edukacji w kontekście proksemiki*. Wydawnictwo Uczel niane WSG, Bydgoszcz.

Note

Note 1. The survey was available on the website WWW: <https://forms.office.com/e/AFD04fGUkn>