



How Covid-19 Affected the Slovak and Czech Mathematics and Physics Teachers' Use of Resources

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Abstract. The paper describes a study realized with Slovak and Czech teachers of mathematics and physics. The pandemic and the sudden appearance of new types of resources, which appears in the preliminary results of the pilot study of the Horizon 2020 MaTeK project (in which are authors of this paper involved) implied the need to explore if teachers' behavior in resource use was changed due to Covid-19 pandemic in a long-term or only during the time of lockdown and shortly afterward. Therefore, a questionnaire study focused on different use of resources with two lines of interest: differences between countries and differences between mathematics and physics teachers. The result of this study provides some crucial information about how teachers dealt with lockdowns and what the critical points and gaps in resource use are. Some of these factors can be starting points for further research or can provide helpful information for authors of curricular resources.

Keywords: resources · mathematics · physics · education · covid-19 · lockdown · methods

1 Introduction

More than 94% of all students in the world were affected by schools getting closed when the global pandemic hit in 2020 [1]. With the sudden shift to distance learning new approaches to teaching, lesson planning and classroom preparation had to be adopted by teachers. The need to adjust the methods commonly used by teachers or to come up with completely new ones sometimes led to seeking and researching of different curricular resources. Sharing of those resources and cooperation among the teachers increased as well [2]. The education shifted to online environments, teachers discovered lots of previously not frequently used applications or websites and many completely new materials of different kinds were created by teachers who often shared them online (e.g. in teacher groups on Facebook, in online libraries, on websites for teachers, etc.) [1]. The amount of online educational videos (YouTube, Khan Academy, etc.) increased as many

teachers were sharing their lessons online. Some teachers claim that their technology competence was boosted in that period [3] and that they feel more confident in using them now [4].

Statements of this kind caught our attention as they were quite relevant for the project¹ (more on which later) of which we are a part of. Members of the project were just in a preparation phase of a questionnaire whose goal was to assess teachers' use of resources in lesson preparation, during the classes and in connection to reasoning and proving. As the results could be influenced by the pandemic and the sudden appearance of new types of resources, the need arose to explore if teachers behavior in resource use was changed due to Covid-19 pandemic in a long-term or only during the time of lockdown and shortly afterwards. We were interested in ways in which mathematics and physics teachers' use of resources has changed. Of course, in accordance with [4], we expected increase in the use of technology and new software environments during the pandemic. However, we were also interested if teachers still use some of these resources post Covid-19 as several studies (such as [5]) suggest positive impact of online resources on learning and even recommend using these practices post Covid-19.

The distance form of learning did not only influence the resources used, but also the methods and strategies not typically used with the given curriculum [6]. These methods sometimes reflected the different classroom arrangement, distractions in the environment or the lack of motivation digital technologies might bring [7]. The methods that teachers found (more) useful during these times might also have influence on the way they teach now and the resources they started using.

2 Methodology

The purpose of our research was to inform the main study focusing on teachers' use of resources (where data is collected using Questionnaire A [see Fig. 1]) and to assess the impact of Covid-19 on use of resources in classes after the lockdown. To collect the data for that purpose a Questionnaire B was developed. The pilot study for the main study (Pilot for Questionnaire A) served us as a basis for the Questionnaire B about the Covid-19 impact (see Fig. 1).

¹ Horizon 2020 project MaTeK (Enhancement of Research Excellence in Mathematics Teacher Knowledge).

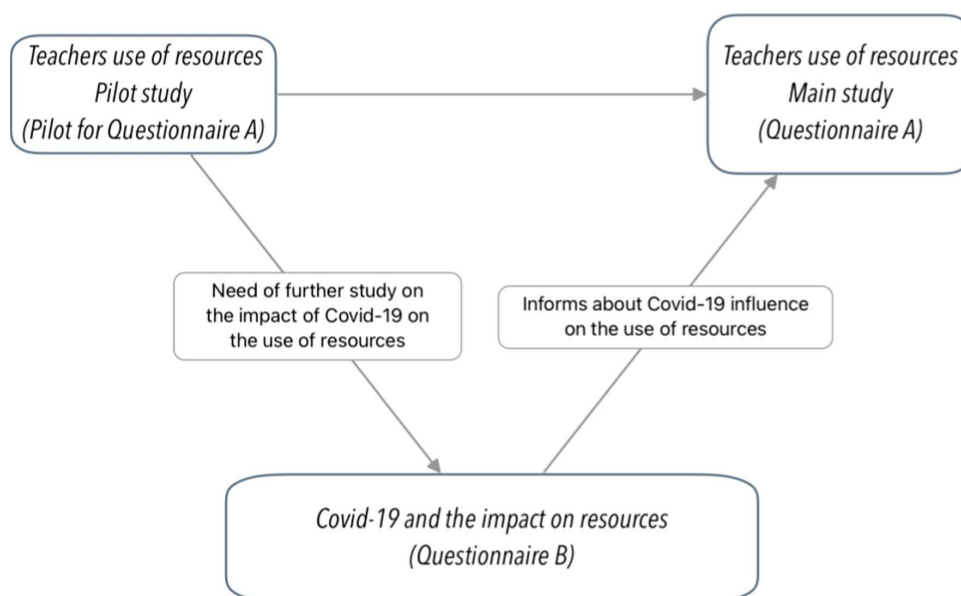


Fig. 1. Main study scheme and the place of this study in larger picture of MaTeK research.

2.1 Basis for the Questionnaire B

Our tool for data collection is grounded in a questionnaire (Questionnaire A) which was developed by the consortium of the MaTeK project. In this project, universities from five countries are cooperating: Comenius University in Bratislava (Slovakia), Charles University in Prague (Czech Republic), University of Palermo (Italy), Norwegian University of Science and Technology in Trondheim, (Norway) and Middle East Technical University in Ankara (Turkey). The goal of this research is to assess what curricular resources teachers use to plan their lessons, for assessment, to refresh the curriculum, to get inspiration and to plan lessons focusing on reasoning and proving. The questionnaire consists of 29 items, where six of them were connected to the use of resources. One of the questions included in Questionnaire A asked: “To what extent did situation around Covid-19 change the way in which you use resources now?” Teachers were to indicate their answer on a six-point Likert scale. The scale lowest value (1) corresponded with: “No change at all.” while the highest (6) with: “To a great deal.” If teacher answered that any change was present, the upcoming open-ended question appeared: “In what ways did the Covid-19 situation change how you used to use resources and how you use them now? Please describe.”

A Pilot for Questionnaire A among primary (pupils age 6–15) and secondary (pupils age 15–19) school mathematics teachers from different countries participating in the Horizon 2020 project MaTeK was conducted. It was filled in by 108 participants. The results of the closed question related to Covid-19 can be seen in Fig. 2. Mean value selected on a Likert scale is 3.66, meaning some change in the use of resources was present in our sample, but not as huge as was. From open ended question we could also observe that the change was more or less individual and not country or school type dependant. The answers varied from: “I have all the materials I use in my computer, so Covid has not affected me at all.” to: “I am still creating materials in Google Classroom,

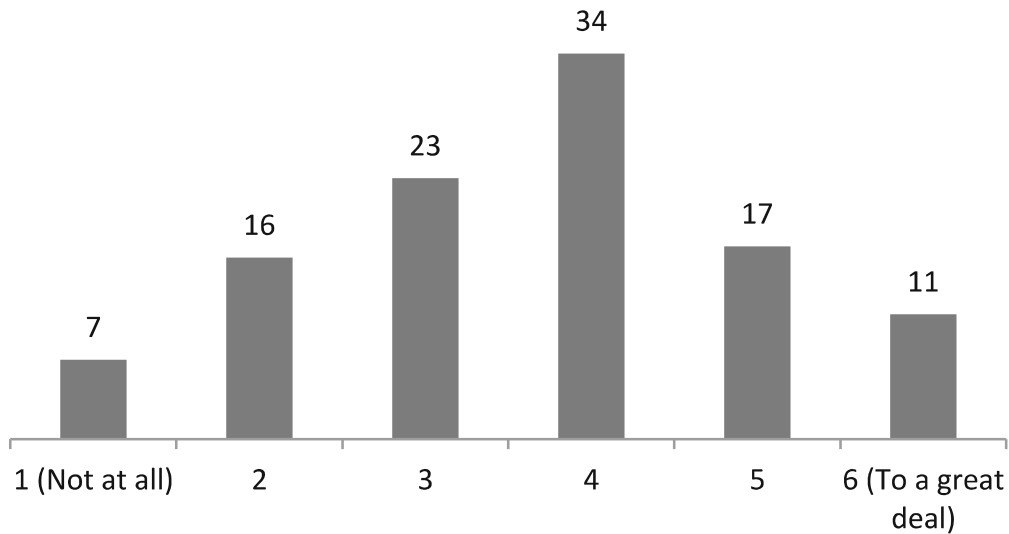


Fig. 2. How Covid-19 influenced the way in which you use resources now?

inserting documents for self-study or revision there and creating interactive worksheets.” Inconclusiveness of these results showed the need for deeper study on the impact of Covid-19 and schools lockdown on teachers’ use of resources and methods. The need to understand the use of resources and possible change in post-covid world arose. We also wanted to focus specifically on mathematics and physics teachers.

2.2 Change in Use of Resources Due to Covid-19 (Questionnaire B)

Questionnaire B was developed based on questionnaire A which was internally and externally valid. Thus we consider the questionnaire B to be valid as well. The results mentioned above served as a starting point from which we developed a new, more thorough questionnaire about the impact of Covid-19 on the use of resources by mathematics or physics teachers. This new questionnaire was developed with specifics of Slovak and Czech school systems in mind. We decided to focus on these two countries as our school systems are close to each other as these countries share common history and the results might be compatible (see [8]). Purpose of this questionnaire was to find answers to the following research questions:

- RQ1: Which methods did teachers find useful and working for pupils during the lockdown?
- RQ2: What changed in teachers’ use of resources during and after the lockdown?
- RQ3: Do teachers still use new methods or approaches from RQ1 now? If so when, why and what for?

The questionnaire comprised two parts: First, teachers indicated what subjects they teach (Mathematics, Physics, Chemistry, Biology, Geography and Other) and based on their answers questions about mathematics, physics, or both appeared. These questions were of all types – open, semi-open and closed. Teachers were asked about their use of resources before, during and after Covid-19 schools lockdown. They were to select which

resources they used when and state what for and why. Resources were accompanied by several local examples. The same questions were asked about the methods (see Fig. 3). Second part consisted of demographic questions. Whenever teachers were to select from an array of options, there was an option *other*, where they could fill in their own ideas.

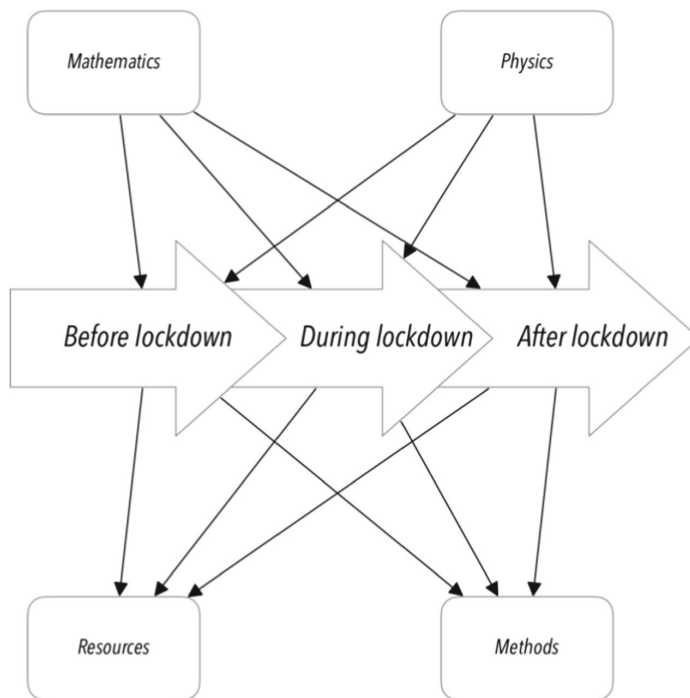


Fig. 3. Scheme of different stages in which the questions were posed.

The questionnaire included questions asking what resources the teachers used but for some reason are not using anymore, and what resources they tried to use and remain using.

Only the data from teachers who filled in the questionnaire entirely were used. Answers where contradicting answers could be found were excluded as well. This left us with 140 respondents (see Table 1 for more details, the sum of totals is greater than 140 as many teachers teach both subjects).

Table 1. Number of participants.

	Mathematics	Physics
Slovakia	62	50
Czech Republic	52	31
Total	114	81

The data was analysed using descriptive statistics. First, data for mathematics were analysed at each country separately, then for physics data were analysed in the same

manner. These sets of data were then compared with each other. Conclusions were then drawn based on these as well as on several interviews (4 from Slovakia, 5 from Czech Republic) which helped us to understand more clearly some uncertainties that arose from questionnaire results.

3 Results and Conclusions

Since we were working with two groups of teachers in both countries, we analyzed obtained data by subject taught (mathematics, physics) and compared those results between countries and subjects.

3.1 Teachers of Mathematics

Most and Least Used Resources Before and During the Covid-19 Lockdown. As for the resources mathematics teachers used the most and the least before the pandemic, three extreme valued items (three most used, and three least used) from our sample are summarized in Table 2.

Table 2. Most and least used resources before Covid-19 by mathematics teachers.

Most used resources before Covid-19		Least used resources before Covid-19	
Resource	Number	Resource	Number
Textbooks	106	Social media	9
Own materials prepared in the past	91	Professional periodicals (journals) for teaching mathematics	16
Consultation with the mathematics teachers in my school	85	Online professional platforms/libraries for (teaching) mathematics	22

The table was compared with the most and least used resources during Covid-19. These results are summarized in Table 3.

Table 3. Most and least used resources during Covid-19 by mathematics teachers.

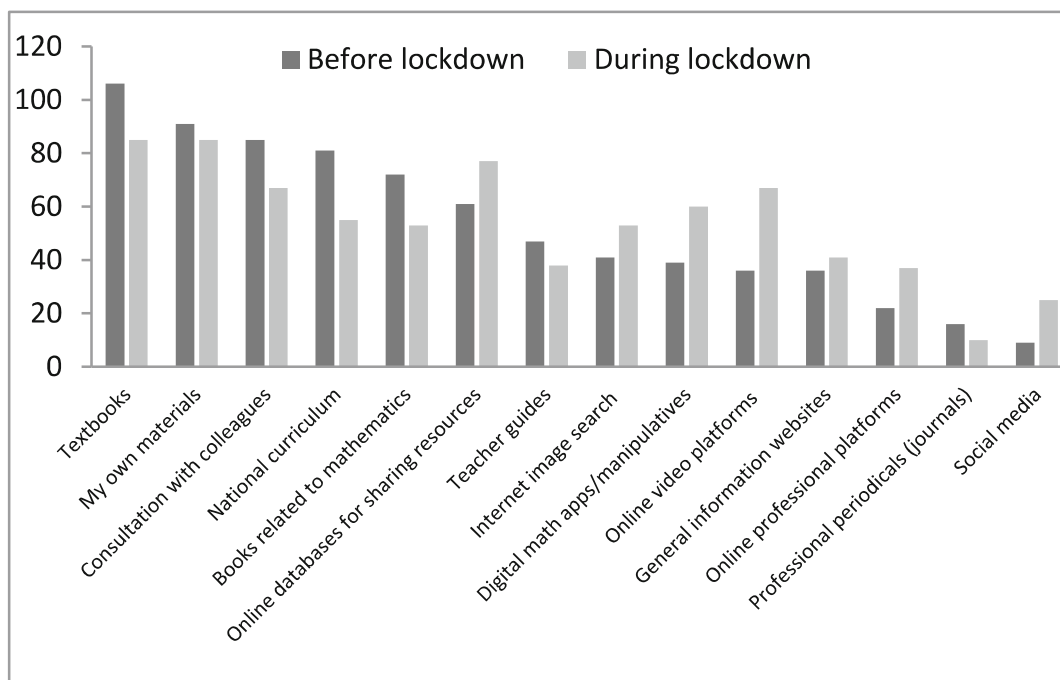
Most used resources during Covid-19		Least used resources during Covid-19	
Resource	Number	Resource	Number
Textbooks	85	Professional periodicals (journals) for teaching mathematics	10

(continued)

Table 3. (continued)

Most used resources during Covid-19		Least used resources during Covid-19	
Resource	Number	Resource	Number
Own materials prepared in the past	85	Social media	25
Online databases or websites for sharing resources created by teachers	77	Online professional platforms/libraries for (teaching) mathematics	37

The tables show that the first two most used resources remained unchanged during the Covid-19 lockdown. There is however rise in use of *Online databases or websites for sharing resources created by teachers*. As for the least used resources, they remained unchanged, only the order is different. If we take a look at other resources (see Fig. 4) we can observe the expected rise in use of several online resources such as *Online video platforms* or *Digital math apps/virtual manipulatives*.

**Fig. 4.** Resource use by mathematics teachers before and during Covid-19 comparison.

Resources Tried but not Used Frequently During Covid-19 Lockdown. Despite the rise in those two categories in our sample, interesting results were found when analysing the answers for the resources teachers tried to use during the Covid-19 lockdown but did not keep on using regularly during the lockdown. The *Online video platforms* and *Digital math apps/virtual manipulatives* were tried but nearly every third teacher who tried these abandoned these resources later. The reason for this may be that there are

already made videos on YouTube, and the teachers could not find exactly what they needed. Another reason may be, regarding GeoGebra, for example, that teachers who did not know GeoGebra before may have taken too long to prepare and the learning curve was too steep. Furthermore, regarding GeoGebra, a primary school teacher commented:

“During distance learning GeoGebra turned out not to be the tool I needed. Pupils need to observe the way in which to use compass and ruler. Thus I eventually started using simple software for interactive boards in its place, where I could work with these instruments.”

Thus it may be that some teachers preferred apps and programs in which pupils could see directly how to work with a ruler and a compass.

Resources Discovered During Covid-19 Lockdown. The questionnaire also explored which resources teachers had discovered during Covid-19 schools lockdown, and we created two groups based on whether they were still currently using these resources, i.e. in face-to-face teaching, or not for some reason. In the Table 4 we can see that several respondents claim to discover the *Textbooks* and are still using them. An explanation for this may be that several publishers have made mathematics textbooks available online, and therefore online textbooks may have come up when teachers were searching for resources and discovered new ones they previously did not use either in paper or digital form. Further, we can note that many teachers have discovered *Online databases or websites for sharing resources created by teachers* and are still using them today. One of the teachers stated during the interview:

“During lessons focused on students’ self-study, I use YouTube videos, or prepared study materials found on other teachers’ websites, or books. Pupils study the topic and then work in groups to complete a worksheet. ... I am always looking for suitable worksheets for pupils on zborovna.sk (Online database for sharing resources created by teachers, popular among teachers in Slovakia). From the (school official) website I still assign homework to pupils.”

Since we know that some sites contain poor quality materials prepared for teachers, here we see an opportunity for future mathematics teachers, i.e., mathematics education students under the guidance of experienced supervisors in our faculties to produce high quality materials for mathematics teachers.

Results related to the resources teachers discovered and either still use or do not use anymore after the Covid-19 lockdown are summarized in Table 4.

Table 4. Number of mathematics teachers who discovered a given resource during Covid-19 lockdown and still do/do not use it after Covid-19 lockdown.

Resource discovered during Covid-19 lockdown	Still use	Do not use anymore
Official/national curriculum	5	3
Textbooks	11	1
Teacher guides or textbook teacher editions	8	1
Books related to mathematics or teaching mathematics other than textbooks	8	1
Professional periodicals (journals) for teaching mathematics	1	7
Consultation with the mathematics teachers in my school	8	2
Own materials prepared in the past	15	3
Online databases or websites for sharing resources created by teachers	31	7
Online professional platforms/libraries for mathematics or teaching mathematics	21	24
Online video platforms (e.g. YouTube, Khan Academy)	37	24
Digital math apps/virtual manipulatives (e.g. WolframAlpha, PhET, GeoGebra)	19	18
Social media (e.g., Facebook or WhatsApp group of math teachers)	20	19
General information websites (e.g. Wikipedia, blogs)	13	14
Internet image search engines or image libraries	13	7

We also looked separately at the results of mathematics teachers from Slovakia and the Czech Republic. However, in terms of resource use, the differences were minimal and therefore we can consider the two countries comparable in this research. As an example we can state:

- In Slovakia, before the arrival of the Covid-19 pandemic, teachers used textbooks, the national curriculum and their own materials as the primary resources in the first three places. During distance learning, teachers most frequently used textbooks, their own materials and, in terms of online resources, online databases or teacher-created sites for shared materials.
- In the Czech Republic before the Covid-19 pandemic the top three places are the same resources as above for both countries – textbooks, own materials and consultation with colleagues. During distance education, the most frequently used resources were textbooks, own materials and, as far as online resources are concerned, digital mathematical applications.

Methods Mainly Used Before and During Covid-19 Lockdown. As for the methods, we first asked about the main methods and forms of working with pupils before the

arrival of the Covid-19 pandemic, and then about the period of distance learning. The open-ended question asked respondents to comment on the present, i.e. on the methods and forms of work during the face-to-face teaching period. Looking at the Table 5, we can see that more teachers started using project-based learning during the distance learning period. We can also notice that there is only a small decrease in problem-based learning.

Table 5. Methods mainly used before and during the Covid-19 lockdown by mathematics teachers.

	Methods mainly used before Covid-19 lockdown	Methods mainly used during Covid-19 lockdown
Interpretation, explanation	103	102
Open discussion in the classroom	91	76
Working with a book or a text	68	60
Using motivation information or activity (e.g. historical interest...)	55	38
Using activating and re-activating methods (e.g. didactic games, brainstorming...)	51	44
Cooperative teaching	39	26
Teaching through problem solving	40	36
Project-based teaching/learning	24	29
Using heuristic methods	23	17

However, respondents from both countries are included in this table. If we look at the countries separately (see Table 6), we find that in Slovakia teachers have started to use project-based learning more in distance learning. When we look at the respondents from the Czech Republic, we see that during the period of distance education they included problem-based learning in the teaching process to a greater extent.

Table 6. Methods mainly used before and during Covid-19 lockdown in Slovak and Czech Republic by mathematics teachers.

	Methods mainly used before Covid-19 lockdown		Methods mainly used during Covid-19 lockdown	
	Slovakia	Czech Republic	Slovakia	Czech Republic
Interpretation, explanation	52	51	52	50
Open discussion in the classroom	53	38	46	30
Working with a book or a text	40	28	34	26
Using motivation information or activity (e.g. historical interest...)	31	24	24	14
Using activating and re-activating methods (e.g. didactic games, brainstorming...)	33	18	26	18
Cooperative teaching	25	14	15	11
Teaching through problem solving	27	3	23	13
Project-based teaching/learning	15	9	22	7
Using heuristic methods	13	10	11	6

These two methods are also indicated in the Table 6. The number of teachers who incorporated *project-based learning* into their teaching might have increased during the distance learning period due to some teacher's inexperience in the digital environment and therefore they tried to shift the responsibility to the digital space of younger pupils, who are, according to some, "born with technology in their hands". As far as *teaching through problem solving* learning is concerned, its rise could also be explained by inspiration in videos (use of which surged) that start with a problem, followed by an explanation. Since for most teachers in both countries, the frontal presentation is the most natural form of classroom work, the lockdown and the work in the online environment has opened their eyes in differently organized classroom.

In an open-ended question, respondents were asked to describe the methods and forms of work that they used in distance learning and that they currently use in face-to-face teaching. Teachers commenting on *teaching through problem solving* and *project-based learning* mentioned that they usually include activities of that kind either at the beginning or at the end of the thematic unit. Teachers also mentioned that they consider it an advantage that pupils can work together, explain things to each other and have more time to do the assignment. They also mentioned the fact pupils can use a variety of resources, including online ones even in classrooms.

3.2 Teachers of Physics

Most and Least Used Resources Before and During the Covid-19 Lockdown. The Tables 7 and 8 show the most and least used resources selected by physics teachers in our sample.

Table 7. Most and least used resources before Covid-19 by physics teachers.

Most used resources before Covid-19		Least used resources before Covid-19	
Resource	Number	Resource	Number
Textbooks	72	Social media	6
Official/national curriculum	54	Online professional platforms/libraries for (teaching) physics	13
Own materials prepared in the past	53	Professional periodicals (journals) for teaching physics	20

Table 8. Most and least used resources during Covid-19 by physics teachers.

Most used resources during Covid-19		Least used resources during Covid-19	
Resource	Number	Resource	Number
Online video platforms	56	Professional periodicals (journals) for teaching physics	10
Own materials prepared in the past	54	Social media	16
Textbooks	52	Online professional platforms/libraries for (teaching) physics	22

In terms of the resources that teachers tried and used regularly during distance learning, there was no change present in the last three places (except for the order), but there was in the first two. It can be noticed (see Fig. 5) that online video platforms have moved from 7th place to first. As for the other online resources, they have also moved up in the ranking. We expected such results, so our assumptions have been confirmed.

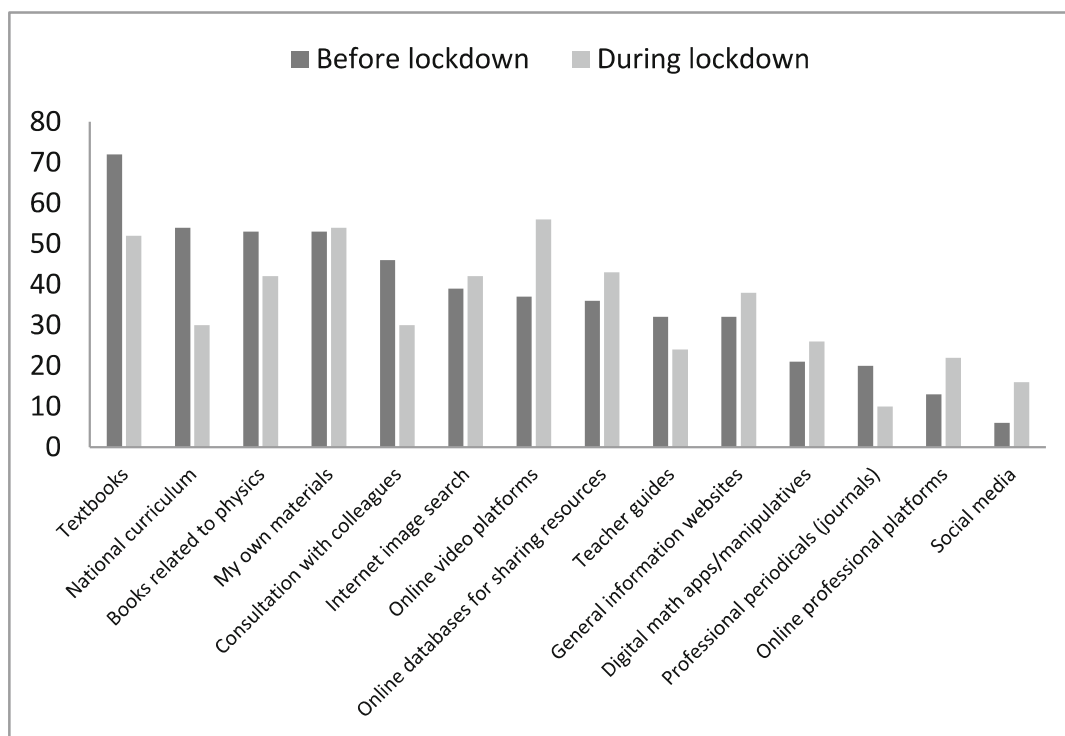


Fig. 5. Resource use by physics teachers before and during Covid-19 comparison.

Resources Tried but Not Used Frequently During Covid-19 Lockdown. We can note the interesting fact that when it comes to books related to physics or teaching physics other than textbooks, more teachers included them in distance education than not (see Table 9). The possible reason for using this resource could be in teachers' ability to assign homework for the students to study the information on a certain topic or unit by themselves. One teacher mentioned such a use:

“Different books – lots of interesting things – I give out the articles to the pupils and then they have to mark in the text what they knew already, what is new for them... or they can make a short excerpt from the text or create a comic book or crossword puzzle based on it.”

If we look at online resources, we can notice that physics teachers were too more likely to use them regularly during distance learning than not. However, we expected this fact, as almost everything was online at that time.

Table 9. Resources tried and either used frequently or not anymore during the Covid-19 lockdown.

	Tried and frequently used during Covid-19 lockdown	Tried but did not keep on using during Covid-19 lockdown
Official/national curriculum	30	18
Textbooks	52	13
Teacher guides or textbook teacher editions	24	7
Books related to physics or teaching physics other than textbooks	42	13
Professional periodicals (journals) for teaching physics	10	16
Consultation with the physics teachers in my school	30	12
Own materials prepared in the past	54	5
Online databases or websites for sharing resources created by teachers	43	12
Online professional platforms/libraries for physics or teaching physics	22	14
Online video platforms (e.g. YouTube, Khan Academy)	56	11
Digital physics apps/virtual manipulatives (e.g. WolframAlpha, PhET, GeoGebra)	26	15
Social media (e.g., Facebook or WhatsApp group of physics teachers)	16	14
General information websites (e.g. Wikipedia, blogs)	38	12
Internet image search engines or image libraries	42	6

As in the case of mathematics teachers, we wanted to know which resources teachers tried and kept on using but also which they decided not to use frequently during Covid-19 lockdown. The results for physics teachers are shown in Table 10.

Resources Discovered During Covid-19 Lockdown. In the last question, which was related to resources, we asked physics teachers which resources they had discovered during distance learning, and of those resources which they were still using during face-to-face teaching, or, on the contrary, for some reason they were no longer using them at present. Results are shown in the Table 10. We can note that 14 respondents indicated that they discovered the possibility of consulting with colleagues thanks to distance learning, and most of them still use this possibility. From interviews we learned that teachers started consulting more technical things with their colleagues and wanted to know how to teach something better during the Covid-19 lockdown.

Table 10. Number of physics teachers who discovered a given resource during Covid-19 lockdown and still do/do not use it after Covid-19 lockdown.

Resource discovered during Covid-19 lockdown	Still use	Do not use anymore
Official/national curriculum	5	6
Textbooks	9	5
Teacher guides or textbook teacher editions	3	0
Books related to physics or teaching physics other than textbooks	13	4
Professional periodicals (journals) for teaching physics	4	8
Consultation with the physics teachers in my school	10	4
Own materials prepared in the past	12	5
Online databases or websites for sharing resources created by teachers	13	9
Online professional platforms/libraries for physics or teaching physics	18	13
Online video platforms (e.g. YouTube, Khan Academy)	33	5
Digital physics apps/virtual manipulatives (e.g. WolframAlpha, PhET, GeoGebra)	19	10
Social media (e.g., Facebook or WhatsApp group of physics teachers)	9	12
General information websites (e.g. Wikipedia, blogs)	16	9
Internet image search engines or image libraries	16	2

Of the online resources, video platforms are predominant among our respondents in the sense that they have discovered them, started using them, and still use them to some extent in the classroom. Given the nature of the responses, it can be concluded that a large proportion of these are videos of experiments (not only those that would be

inappropriate for home or school experimentation for safety reasons, but also those for which, for example, the school does not have the equipment). Looking more closely at the data from Slovakia, teachers tend to embed these video experiments in worksheets for pupils to work on at school or at home. As can be seen from the answer below, there are several reasons for including videos in the classroom:

“Before the pandemic, we did experiments with pupils in the classroom, and thanks to them we often created a problem situation. Sometimes it happened that for various reasons it was not possible to carry out the experiment in school conditions, so I resorted to video or animation of the phenomenon under study. During the pandemic-related online classes, we used video demonstrations and various applets much more often in the classroom, so that I could create a problem situation or attract the attention of the pupils. Also, pupils carried out various physics measurements via applets, in case the home conditions were not sufficient to carry out the real experiment and the measurement associated with it. After returning to the school, I opted for the use of a short video in the lessons to demonstrate and arouse the interest of the pupils with greater frequency. Also, some of the measurements that the pupils did during the online lessons I later chose to do again in this form during the school lessons, as it was more illustrative, and every pupil could do the measurement.”

Methods Mainly Used Before and During Covid-19 Lockdown. Table 11 shows teachers’ methods, primarily before and during the Covid-19 lockdown. We noticed that all the numbers decreased during the Covid-19 lockdown, and the order changed. Project-based teaching/learning was used more than other methods during the lockdown period. Teachers confirmed and explicitly told us that they more frequently used projects as assignments for their pupils. They saw many advantages because pupils could cooperate in an online environment, look for the information needed on the internet, and have more time to do so than in a school environment. Interviews with physics teachers also suggest that teachers who frequently used experiments in their classes before the lockdown also tried to include experiments during the lockdown. For that purpose, mainly online videos, online applications, or project-based teaching were used.

Table 11. Methods mainly used before and during the Covid-19 lockdown by physics teachers.

	Methods mainly used before Covid-19 lockdown	Methods mainly used during Covid-19 lockdown
Interpretation, explanation	70	56
Open discussion in the classroom	59	49
Working with a book or a text	42	37

(continued)

Table 11. (continued)

	Methods mainly used before Covid-19 lockdown	Methods mainly used during Covid-19 lockdown
Using motivation information or activity (e.g. historical interest...)	47	39
Using activating and re-activating methods (e.g. didactic games, brainstorming...)	37	24
Cooperative teaching	23	14
Teaching through problem solving	40	27
Project-based teaching/learning	33	30
Using heuristic methods	19	13

3.3 Discussion

The most used resources before lockdown in both countries and subjects were *textbooks* and *own materials prepared in the past*. On the other hand, teachers did not usually use *online resources* or *journals for teaching mathematics or physics*. During the lockdown all the teachers frequently used *digital applications (such as GeoGebra, WolframAlpha, etc.)*. In comparison to pre-lockdown situation the greatest surge was present in *online video platforms (such as YouTube, Khan Academy)*. There was also increase in the use of *online databases or websites for sharing resources created by teachers*. Other uses of resources remained similar to pre-lockdown situation. Several teachers responded that they only tried these online resources but did not use them frequently during the lockdown. We were also interested in resources that teachers discovered during the lockdown and do still use them nowadays. Results suggest that teachers still use *online video platforms* and *websites where teachers can share their materials with others*. They also still use online versions of *textbooks*, as well as *consultations* with other teachers from their school.

4 Conclusion

The results of the research will be used within the MaTeK project as part of an intervention in the undergraduate course Didactics of Mathematics and Physics. Expected rise in use of technology related resources was visible in our sample. In concordance with [9] several teachers shared that they feel more confident to use different apps and digital technologies in their classrooms than before the schools lockdown. As online teaching might remain part of everyday life, we consider it important that student teachers, i.e. future mathematics or physics teachers, are familiar with the different resources

and methods that the interviewed teachers mentioned in the questionnaires. It is also important for student teachers to be familiar with the materials found online and also be able to critically evaluate them. Results show these “new” resources teachers started to work with during the lockdown period did not replace the resources previously used, but enriched teachers existing “toolbox”. As Pepin [10] says: “Introducing a new resource does not necessarily lead to the replace end of the old one but leads to a re-organization of a teacher’s resource system.” This reorganization was apparent in interviews with the teachers, who claimed to use different resources they used in different ways or in combination with newly discovered ones.

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