MOBILE TECHNOLOGY USAGE IN EDUCATION PROCESS: NATURAL SCIENCE TEACHER STANDPOINT

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Abstract. New smart mobile technologies are being implemented in schools. Tablet computers, mobile telephones and other devices are used in education process. However, it has not been unambiguously revealed what influence mobile technology usage has on education achievement and learning motivation. Therefore, it is purposeful to explore mobile technology (MT) usage peculiarities in education process: phenomena limiting and encouraging the usage, teachers' opinion regarding MT usage and application perspectives. On the other hand, one of the aims of national education policy is to make conditions for education participants to skilfully use technologies in education, and encourage them to create new ICT devices. Teachers' role is the leading in MT usage, in order the technologies constantly accompanying the student become reliable helpers in learning. Reliable scientific knowledge is necessary concerning this question. Pilot research was carried out during October-December months 2019, in which 120 (n=19, 16% male, n=101, 84% female) Lithuanian natural science teachers from various general education schools took part. During the research, it was sought to analyse the frequency of MT usage, application limiting factors, and school maintenance from the point of view of teachers. It was ascertained that schools were provided with MT at a rather different level, and their usage

frequency was also different. The main application hindrance in education process is insufficient provision of schools with mobile devices, and the available equipment being old and of poor quality. The management of education process, teacher and student MT application skill shortage and lack of time for the improvement of these skills are also considered hindrances. MT usage consequence, efficacy, and effectiveness in education process problematic analysis, including also MT integration into educational practice is considered an especially important perspective of the further research studies.

Keywords: mobile technology, mobile technology usage, pilot research, science teachers

Introduction

Mobile technology implementation in education process has been taking place for more than a decade, and a lot of works have been done in this sphere. In the lessons and in other educational activities, an ordinary teaching is changed by the newer education methods accompanied by various technical teaching/learning devices. First of all, it is related to mobile technologies. Such technologies make a possibility to individualise the teaching process, to make it more versatile, more attractive, and so on. Every student can choose the amount of material and the pace of learning according to their needs and abilities. On the other hand, an individual workload is increasing, therefore, the need of mobile technology implementation in education is increasing too (Shiller, 2003).

Speaking about mobile technology application in teaching, it is necessary to analyse not only the questions of technology choice, provision with mobile devices. The abundance of such technology is great, but the application effectiveness and usefulness are not necessarily high. Therefore, it is also important to analyse organisational, didactic, management and other questions of

this technology usage. Thus, mobile technology (MT) integration into the teaching/learning process is manifold.

Most different research has been carried out in an international context. It is asserted that mobile technology seeks to meet the requirements of mobility, and also its attainability, interactivity. Mobile technology integrates education using constructivism and collaborative learning (Patiño Matos & Bayonet Robles, 2015). The researchers claim that ordinary (traditional) instruments cannot assure this at a sufficient level (Valencia-Arias et al., 2019). The research carried out in Nigeria showed that m-learning significantly increased the teaching and learning conditions, but particularly decreased the inadequacies of physical facilities (Chaka & Govender, 2020). The research also showed that mobile technologies allowed to increase teaching process effectiveness, to enrich teaching/learning environment, helped to use the newest resources and to integrate various topics, to develop critical thinking abilities and other (Burianova & Turčáni, 2016; Parigi, 2016). The research carried out in Indonesia revealed that most teachers agreed/strongly agreed to utilize mobile phones in learning physics both inside and outside classroom (Suyatna, 2019).

On the other hand, the research carried out in various countries showed negative MT usage consequences as well. E.g., the research conducted in Malaysia showed that excessive smartphone usage predicts low quality of social competence among early adolescents (Syed Esa et al., 2018). According to Barbour et al. (2017), though teachers are basically open to new technologies, their focus is more on teaching considerations, but not on professional development. The research also revealed that teachers had obvious difficulties considering incorporating a single device into a classroom of multiple students (Barbour et al., 2017). Also, quite a lot of teachers hold opposing views to the integration of technology into the classroom (Mac Callum et al., 2014).

A preliminary research carried out in Lithuania showed that all teachers acknowledge that proper MT usage encourages better learning and increases learning motivation. They pointed out that using MT, education becomes more

available, information more memorable, mastering of knowledge gets faster, teaching process becomes more interesting and vivid, students become more active, experience less stress accepting learning as a game. MT provides education process with a lot of attractive tools such as interactive evaluation and self-evaluation platforms, virtual experimental laboratories, quick information search and its transference, photographing, assembling footage, modelling possibilities. Teachers identify that teaching/learning using MT will become inevitable in future and pedagogues should accept it as a challenge (Lamanauskas et al., 2019). Teachers claim that seeking to make MT usage meaningful in education process, teacher's personality itself is very important, i.e., what teacher's MT usage skills are, how the teacher is able to choose digital teaching/learning devices, how he properly uses them in the lessons, how he manages the education process itself. Most of the teachers still lack MT usage skills and time for the improvement of these skills. Besides, proper MT usage in education process is also limited by insufficient school provision with mobile devices, internet access. However, the teachers indicated an inappropriate mobile device usage in education process as one of the most important hindrances of MT usage in education (Pribeanu et al., 2020).

Thus, it is obvious that mobile devices, mastered various computerised programmes, open source software provide enormous possibilities to learn various natural science subjects. On the other hand, there also exist various hindrances of their effective and purposeful usage. The aim of this research was to analyse Lithuanian natural science teachers' position (standpoint) in the aspect of mobile technology usage in education process. Teachers' position is considered incredibly significant seeking to make MT usage more effective in education process. There is still very little research in Lithuania about MT application in teaching, their purposeful and rational choice. On the other hand, technical and pedagogical support is necessary in order to facilitate both teachers' and students' understanding about such technology educational potential and effective usability (Montrieux et al., 2015).

The following research questions were formulated: (1) What hinders / limits MT usage in classroom? (lack of equipment, internet access, students' inappropriate usage of MT, lack of skills); (2) How is your school or class provided with MT? (laptops, tablet computers, smart bracelets, internet, "Wi-Fi" etc.); (3) How often do you use these MT?

Research methodology

General research characteristics

Mixed type socio-educational research was carried out applying quantitative and qualitative approach. On the one hand, a naturalistic and interpretive approach is used (Kardelis, 2002), on the other hand, certain statistical data were collected and analysed (Kačerauskas, 2014) in order to best reflect the phenomenon under study.

The research is based on inductive research strategy, when generalisation is given referring to research findings (Blaikie, 2000). The fixed facts were analysed, compared, and categorised without a null hypothesis. This is a pilot research of limited size. The research was carried out in the months November to December 2019.

Sample

Natural science teachers from 29 Lithuanian regions participated in the research. 120 general education school different qualification and different subject natural science teachers: 38 (31.67%) - biology, 6 (5%) - biology and chemistry, 11 (9.17%) - biology and integrated natural science course "Nature and man", 27 (22.5%) - physics, 8 (6.66%) - physics and other natural science, 15 (12.5%) - chemistry, 6 (5%) - chemistry and other natural science, 9 (7.5%) - geography, answered the survey. 101 (84%) of them were female and 19 (16%) of them were male.

The teachers' having participated in the research distribution by age is as follows: 3 teachers belonged to (20-29) year age group, 14 teachers to – (30-

39) year, 29 to – (40-49) year, 50 teachers to – (50-59) year age group and 24 teachers were 60 and more years old. According to qualification: teachers – 18 (15%), senior teachers – 32 (26.7%), teachers-methodologists – 56 (46.6%), and teachers-experts – 14 (11.7%) (Table1). Teachers' qualification by age is given in Table 2.

Table 1. The respondents' characteristics (N (%)).

Age (year)	20-29	30-39	40-49	50-59	60+	Total
	3 (2.5)	14 (11.7)	29 (24.1)	50 (41.7)	24 (20)	
Qualification	Teacher	Senior teacher	Teacher meth-odologist		Teacher expert	
	18 (15)	32 (26.7)	56 (46.6)		14 (11.7)	120 (100)

Table 2. The respondents' characteristics by age and qualification (N (%))

Age, year	Qualification (N/%)				Total
	Teacher	Senior teacher	Teacher methodolo-gist	Teacher expert	**Total**
20-29	-	-	2	1	3
30-39	1	3	10	-	14
40-49	3	6	13	7	29
50-59	11	19	18	2	50
60+	3	4	13	4	24
Total	18 (15.0)	32 (26.7)	56 (46.7)	14 (11.7)	120 (100.0)

From the teachers having participated in the research, 30 work with all age group students, i.e., with 5th - 12th forms, 23 – with 7th - 12th forms, 38 – with 9th – 12th forms, 1 only with 12th form, 14 – with 5th - 8th forms, 5 teachers each 5th -10th forms and 7th -8th forms and 2 teachers each 7th -10th and 9th -10th forms.

The research was carried out online, i.e., the teachers were interviewed individually by e-mail. More than 200 survey questionnaires were distributed. However, in the surveys recently one can encounter a phenomenon when part of the respondents openly refuses to answer questions, the others promise to fill in the survey, but do not do this. There are respondents who enthusiastically start filling in the survey questionnaire, but do not finish it, or because of poor motivation fill in it irresponsibly, carelessly. Such surveys were rejected and not included into the analysis process.

Instrument

Anonymous survey which consisted of open and close type questions was prepared to obtain the research data. The survey contained 3 parts: demographic information (5 questions), mobile technology usage for educational purposes (10 close type statements) and two open type questions about mobile technology usage hindrances, and about the level of school provision with mobile technologies. Nominal and rating (5point rating) scales were applied in the survey. The instrument was prepared after a preliminary research with natural science teachers in Lithuania and Romania (Lamanauskas et al., 2019; Pribeanu et al., 2020). A research model and a measurement scale were also prepared on the basis of preliminary research. The research model consists of 4 main dimensions: 1) motivation to learn, 2) better understanding, 3) social learning usefulness, and 4) teaching usefulness. The model has been empirically validated and cross-validated (Lamanauskas et al., 2020). Data analysis results obtained only on the basis of extra questions are presented in this article.

Data analysis

Quantitative question processing instrument is statistical software package SPSS. Descriptive data analysis was carried out. Absolute and relative equal value frequencies, means (M), standard deviations (SD) were calculated. The

strength of the correlation between individual variables was measured calculating *Spearman's rank* correlation coefficients *r*.

Open (qualitative) survey questions were processed using content analysis method in the following order: multiple reading of the text; category separation referring to "keywords"; category content division to subcategories; category and subcategory interpretation and validation. Based on Mayring's (2002) position, content analysis is a valid method, allowing to draw reliable conclusions referring to a systemically analyzed text (verbal data array). Seeking to show individual opinion and their combination spread in the respondents' sample, category and subcategory frequencies were calculated after open-ended question analysis.

Results

The survey results showed that schools of the teachers having participated in the research are provided with mobile technology (MT) at a different level, and mobile technology in its turn is an inseparable part of education process, and is used for different purposes and at different frequency in the lessons.

Even 83 (69%) of the teachers claimed that they had wireless internet in their schools, and that their teachers and students could use it for educational purposes and for their needs. Almost half 56 (47%) of the surveyed teachers pointed out that their schools were provided with tablet computers and a little less than a third 31 (26%) – with laptops. Only a small part of teachers (5/4%) indicated that they had computer-based teaching systems (Xplorer GLX, Nova, Einshtein, Spark and other) in their schools. Part of the teachers enjoyed the equipment of the computer, computer classrooms, 3D classrooms, smart boards, document cameras and so on. Though, some of them regretted that not all equipment worked properly, part of it was broken or old. 7 (6%) of the teachers claimed that their schools were not provided with MT or they were minimum provided.

Teachers use both laptops or tablet computers, as well as students' smart phones and mobile computer systems in the teaching/learning process, using internet access for this (Table 3).

Table 3. Teachers about mobile technology usage in education process

MT usage	Never N (%)	Once per month N (%)	2–3 times per month N (%)	1–2 times per week N (%)	3–4 times per week N (%)	Did not answer N (%)	*M*	*SD*
Smart bracelets	117 (97.5)	1 (0.8)	0 (0)	0 (0)	0 (0)	2 (1.7)	.01	.092
Tablet computers	74 (61.7)	25 (20.8)	9 (7.5)	7 (5.8)	3 (2.5)	2 (1.7)	.64	1.026
Computer based teaching/learning system(s)	72 (60.0)	25 (20.8)	12 (10.0)	2 (1.7)	7 (5.8)	2 (1.7)	.70	1.112
Laptops	69 (57.5)	17 (14.2)	6 (5.0)	6 (5.0)	20 (16.7)	2 (1.7)	1.08	1.542
Social networks	44 (36.7)	16 (13.3)	13 (10.8)	22 (18.3)	23 (19.2)	2 (1.7)	1.69	1.588
Educational weblogs	45 (37.5)	7 (5.8)	21 (17.5)	14 (11.7)	31 (25.8)	2 (1.7)	1.82	1.657
Smart phones	18 (15.0)	27 (22.5)	34 (28.3)	27 (22.5)	13 (10.8)	1 (0.8)	1.92	1.225
Digital textbooks, exercise-books, tests	21 (17.5)	21 (17.5)	29 (24.2)	31 (25.8)	17 (14.2)	1 (0.8)	2.02	1.315
Wireless internet ("Wi-Fi")	29 (24.2)	15 (12.5)	14 (11.7)	25 (20.8)	34 (28.3)	3 (2.5)	2.17	1.577

Note: (*N* (%) - number of users, percentages, *M* – mean of usage, $0 \leq M \leq 4$, *SD* – standard deviation)

The respondents' survey showed that smart mobile phones (*M* = 1.92, *SD* = 1.225) were used most frequently in the education process. Even 85 % of the surveyed teachers pointed out that they used smart phones in their lessons,

and more than a third (40 (33.3 %)) of the surveyed teachers used them constantly, i.e., 1–2 times per week (27 (22.5%)) or 3-4 times per week (13 (10.8%)). Laptops ($M = 1.08$, $SD = 1.542$) or tablet ($M = 0.64$, $SD = 1.026$) computers were less frequently used in the lessons. Even 74 (61.7%) of the surveyed did not use tablet computers and 69 (57.57%) - laptops in the lessons. Only 10 (8.3%) used tablet computers every week, the others – a few times or once per month (34 (28.3%)). Apart from the most common mobile computer devices, quite a big part of teachers (46 (38.3%)) had a possibility to work with computer teaching/learning systems such as Xplorer GLX, Nova500, Einshtein and other ($M = 0.70$, $SD = 1.112$). 25 (20.8%) of the teachers used computer teaching/learning systems in their lessons once per month, 12 (10.0%) - 2-3 times per month, the others – more often. Only one teacher (1 (0.8%)) indicated that their school was provided with smart bracelets, and he used them in his lessons once a month on average. The remaining teachers (117 (97.5 %)) pointed out that they did not use smart bracelets in the education process.

The analysis of the question *How often do you use wireless internet (Wi-Fi)* showed that wireless internet is a sufficiently important element of the lesson ($M = 2.17$, $SD = 1.577$). Even 34 (28.3%) of the teachers used internet in their lessons a few times per week, 25 (20.8%) - once a week, and 29 (24.2%) of the respondents - a few times per month or less. However, almost one fourth (29 (24.2 %)) of the teachers indicated that they did not use *Wi-Fi.* As a reason why they did not use wireless internet, the biggest part of the respondents pointed out that there was no possibility, i.e., Wi-Fi did not work at school, or it worked not properly.

Teachers having participated in the research, used digital textbooks, exercise books, tests, etc. often enough ($M = 2.02$, $SD = 1.315$) in their lessons. 77 (64.2 %) of the teachers pointed out that they used these digital devices 2-3 times per month and more often, and only 21 (17.5%) of the teachers did not use them at all. Weblogs ($M = 1.82$, $SD = 1.657$) and social networks ($M = 1.69$, $SD = 1.588$ occupy not a small part in the education process). Even 73 (60.8%) of the

teachers used educational weblogs and 74 (61.6 %) - social networks at different frequencies.

Correlation strength between individual variables was evaluated calculating *Spearman's* rank correlation coefficients *r* (Table 4).

Table 4. Spearman's rank correlation coefficients

Correlation between statements	Correlation co-efficient	*p*
Using Wi-Fi and smart phones	.469	< .0001
Using Wi-Fi and digital learning devices	.437	< .0001
Using Wi-Fi and social networks	.323	< .0001
Using Wi-Fi and educational weblogs	.255	.006
Using digital learning devices and mobile phones	.343	< .0001

A strong correlation (correlation is significant at $p < .0001$ level) between the usage of Wi-Fi and smart phones ($r = .469$), digital learning devices ($r = .437$) and social networks ($r = .323$). A statistically significant correlation was also obtained between the usage of WI-Fi and educational weblogs ($r = .255, p = .006$). Wi-Fi is often necessary for using digital learning devices, social networks, and educational weblogs. One can claim that Wi-Fi is more often used with mobile phones than with laptops or tablets in the education process. It was obtained that digital learning devices were also used more with mobile phones ($r = .343, p < .0001$) than with tablets or laptops.

It was interesting to know what problems the teachers encountered using MT in the education process. In Fig. 1, a generalised individual opinion and their combination spread was presented in respondents' sample, i.e., categories and subcategories were divided, and their absolute and percentage frequencies were calculated.

The main problem the teachers encounter using MT in their lessons is the equipment itself (65 (54%)). The appropriate MT usage in the education

process is limited by insufficient school provision with mobile devices. Most of the teachers noticed that there was lack of equipment, or it was old, of poor quality and so on. Part of the teachers pointed out that their school was provided with low quality equipment (laptops, tablets), which after a few years broke, became unrepairable. As a problem, teachers also name "ageing", not always coordinated among themselves software, which requires renovation, and this becomes another problem – lack of finance. One more aspect of the problem is - lack of specialists taking care of the equipment.

One of the most important education hindrances of MT usage, teachers indicated the inappropriate mobile device (phone, tablet and other) usage in education process. Even 39/33% of the surveyed teachers encountered students' inappropriate usage of mobile technologies in the lesson. They noticed that given permission to use mobile phones in the education process, students often overindulge, i.e., they do not work with a necessary task, but e.g., go to social networks (Facebook), or other game programmes. Teachers indicate that apart from their possible advantages, mobile phones are one of the students' absent-mindedness, distraction causes in the lessons.

The other no less important problem of MT usage in education process is teacher and student personality itself, i.e., teacher's and student's lack of MT usage skills (38 (32%)). Respondents accentuate that it is very important how the teacher is able to select digital teaching/learning devices, to properly use them in the lessons, how he manages the education process itself. Most teachers still lack MT usage skills, and time to improve these skills. Not equal students' skills and work with MT experience, as well as rapidity are of no less importance. Some of the teachers point out that if a student (especially a younger one) does not manage to complete the tasks at the same speed with friends, they "fall into tears", start interrupting the others, or just simply do not do what has been assigned to them.

An appropriate MT usage in education process is also limited by technical hindrances (36 (30%)). Very often, not in all school locations there is a

wireless internet access, or it often works not properly, or its rapidity slows down (especially when 30 students log on at the same time). Because of the software not renovated on time, part of the learning environments become unacceptable. The teachers note that the usage of MT in the lesson hinders that not all students have or bring mobile phones to the lesson. Besides, students' mobile phones are of different OS, different capacity, maintain not all apps, and so on.
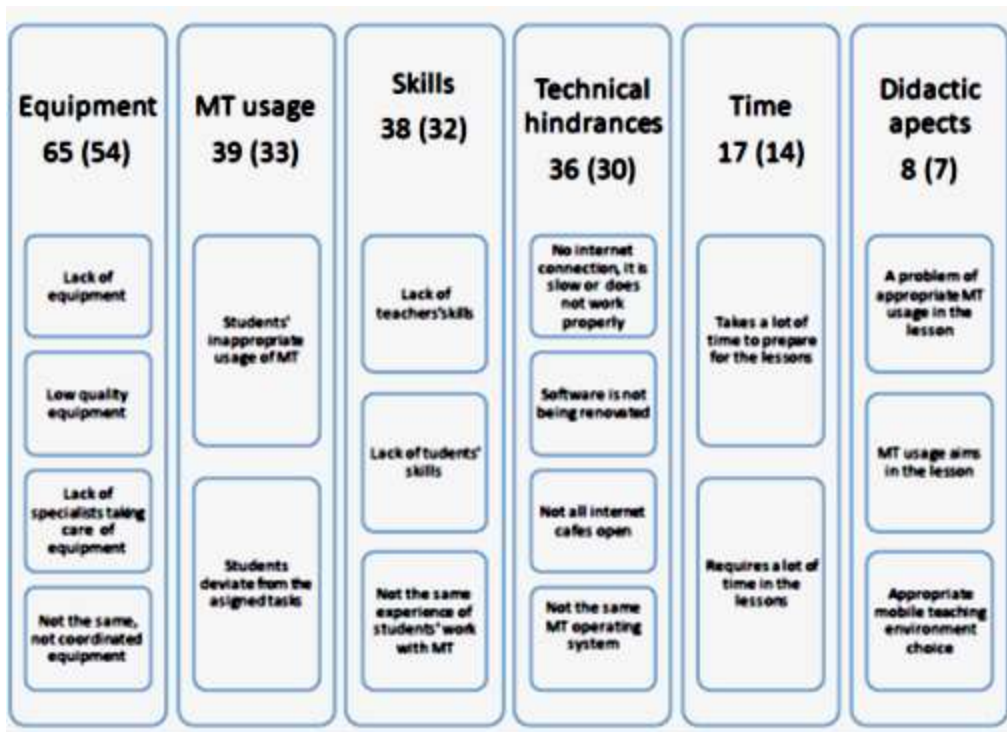

Figure 1. Hindrances of MT usage in education process (N (%)).

One of the problems also limiting MT usage in education process the teachers name time expenses (17 (14%)). They discern two aspects of this problem. First of all, in order to appropriately use MT in the lesson, one has to spend a lot of time to prepare for the lesson. On the other hand, MT usage in the lesson

by ourselves, also occupies a lot of the lesson's time. Therefore, only appropriate, and sensible MT usage can serve for the achievement of education purposes. Part of the teachers discern a didactic MT usage problem (8 (7%)), how to properly use MT in the lesson, what MT usage aims are, how and what learning environments to choose, and so on. The teachers claim that there is a shortage of online teaching programmes in Lithuania, didactically prepared and adapted to a concrete lesson topic.

Discussion

It is obvious that mobile technologies are changing education reality. Various technologies (devices, appliances, etc.) are very rapidly getting popular both in Lithuanian and in foreign country schools. It is understandable that their usage is both different and multifaceted.

The research aim was to analyse what MT were used in Lithuanian schools learning natural sciences, what essential hindrances existed, and what was the provision of schools with MT. The research basically confirms one essential thing that a question remains open of how to more effectively use mobile technology provided possibilities. On the other hand, it is no less important to teach mobile technology users to use the available devices in the most optimal ways. The current state in MT market allows thinking that this becomes a variant of continuous improvement and constant search. Therefore, an optimal choice of MT and its effective usage are and will be both scientific research and practical realisation, as well as effective usage object. MT change inevitably changes teacher and students' relationship, new information and knowledge acceptance ways appear, and the students' activity alters.

In fact, in Lithuanian schools, natural science teachers use various mobile appliances rather widely. The research showed that certain difficulties arise both for the students and teachers using MT. It is known that students as technology "natives" have better usage skills, or according to Prensky (2001), they are digital natives. Already in 2010, a research carried out in Lithuania, in which

663 University first course students participated, showed that they have practically unlimited opportunities to use mobile phone, computer (laptops), internet etc. (Lamanauskas et al., 2010). One can basically claim that modern students know really much about various ICT, including MT, however, not equally. A dominating assumption that in our modern society young people have a high level of technological abilities is not quite right. Researchers applying cluster analysis, singled out four different user groups, regarding their ICT usage in everyday life (Eger et al., 2018). Thus, for the teachers it is important to know about user group differences, to take them into account planning, carrying out, and evaluating teaching and learning process. A research carried out by Gudoniene (2011) showed that a lot of students use smart mobile phones for searching the net (92.5 proc.) also for logging onto various internet cafes, learning environment journals, and social networking sites to satisfy their learning needs (35.5 %). A mixed learning method is widespread in Lithuanian schools (applying ICT usage online and contact meetings in classrooms). MT role is important for this process. On the one hand, teachers acquire new knowledge and abilities more rapidly, on the other hand, new possibilities appear both for teaching content preparation, and for the possibilities to improve learning achievements. The research carried out by Gudoniene et al. (2013) revealed that new technologies provide benefit, however, teachers still lack skills and knowledge in using them. More and more attention in Lithuania is devoted to teacher qualification in MT usage sphere. E.g., mentorship programme for primary class teachers "Technology leaders" has been functioning for several years. The aim of such programme is to increase teachers' reliance on technology, and to learn to apply various technological tools in teaching/learning process. Despite this, teacher preparation to apply MT in education process remains problematic. Various research carried out in different countries over the years confirm this (Frohberg et al., 2009; Penuel & Yarnall, 2005; Sung et al., 2016) claiming that insufficient preparation of the teachers remains one of the largest obstacles to effectively implement and use MT in teaching and learning.

The conducted research revealed that Lithuanian schools are provided with MT rather differently. According to Bartasevicius (2012), in the technologically rich learning environment, technology grounded activity is integrated into the education content. In this way, one is encouraged to get interested in the learning subject, willingly attend lessons, collaborate with teachers, participate in educational activities. The research by Strazdiene et al. (2018) showed that primary school teachers and students are not sufficiently provided with IT devices, also including MT. Though almost all teachers had a computer in their classroom, and almost half of the surveyors – a digital projector, only a small part of teachers had an interactive board and tablet computers in their classroom. Besides, by earlier research it was stated that town primary school teachers, comparing with those working not in town, had more possibilities to use IT (Merkys et al., 2007). This tendency remains up to now. The researchers notice that it is important for the schools to provide teachers with necessary resources and support. Technical and pedagogical support is necessary in order to facilitate teachers' understanding of the full potential of MT (Montrieux et al. 2015). It is important to encourage them to communicate and collaborate with colleagues, in this way increasing their reliance on technology integration (Chen et al., 2019).

MT is and will remain an innovation sphere. Students coming to schools are already technology "natives", therefore, the weakest link is the teacher. Teacher has to constantly renew himself, change and vary his working style, and also working methods and devices. On the other hand, researchers notice certain contradictions as well. Such statements as 'digital native' and 'digital immigrant' are often opposed and such opposition is dangerous (Bayne & Ross, 2007). Contrary, one has to become more critical and more responsible because relation between learners-teachers-technologies is very complex. Alrasheedi & Capretz (2015) carried out research metanalysis showed that teachers' technological competence is not considered a very significant success factor. Researchers notice that research often focuses only on perceived benefits from learner

perspectives (students), at the same time ignoring the other users, for example, teachers. Therefore, research on teachers' opinions, views, evaluation remains equally important. The researchers notice that empiric research related to perceptions on mobile technology and mobile learning is still limited (Nikolopoulou, 2020).

Speaking about research perspective, it is worth accentuating that most of the research studies both at national and international level are focused on IT user opinion, interest, perception, and on the other research (Al-Zahrani & Laxman, 2014). It is necessary to analyse more exhaustively MT usage consequence, efficacy and effectiveness problems in education process, including also the problems of MT integration into educational practice. The aim of the research was not to analyse social and demographic factor affect/interaction with MT usage. Social and demographic factors such as gender, learning subject, learning experience and length of pedagogical work, are inevitably related to mobile technology perception, and their usage for teaching/learning. A detailed analysis of these factors regarding the discussed question, remains a perspective direction of further research.

Conclusions

Generalising research results, one can claim that schools of the teachers having participated in the research, are provided with mobile technology at a different level, and mobile technology in its turn is an inseparable part of the teaching process, and is used in the lessons for different purposes and at different frequency. Teachers using internet access in the education process, in most cases use students' smart phones, rarer tablets and laptops.

The main hindrance of mobile technology/device usage in the education process is insufficient school provision with mobile devices, and getting old, low quality equipment, for the renovation of which there is lack of funds.

The other not less important MT usage problem is - education process management, when students are using mobile devices not for learning purposes

during the lessons. An important hindrance in MT usage was that teachers and students still showed lack of MT usage skills. In addition, there was lack of time for the improvement of these skills.

Technical hindrances also limit an appropriate MT usage in education process: limited internet access and rapidity, software not renovated on time, students' available mobile phones of different OS, different capacity, maintaining not all mobile apps and so on. One more aspect limiting MT usage in education process is didactic MT usage problem. This depends on teacher's MT usage skills, teacher's abilities to choose digital teaching/learning devices, and the ability to properly use them in the lessons.

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