# Students' Reflection on Online Distance Learning: Advantages, Disadvantages, Recommendations

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**Abstract.** The paper presents the results of research dealing with online distance instruction in the Czech Republic. It particularly focuses on students' feedback, detecting advantages, disadvantages, and recommendations when teaching in this manner. The main research objective was to (1) discover how students assess their learning in online distance courses, (2) consider the collected experience and opinions, and (3) reflect them into recommendations for further teacher and learner training in how to exploit online distance instruction efficiently. First, the process of online distance instruction in the Czech Republic was described and requirements were set which should be applied when designing and conducting online distance courses. Then, feedback from 272 respondents, students of upper secondary and higher education institutions, was collected. Students reflected on 64 courses which received positive or negative assessment. Advantages, disadvantages, and recommendations detected in both groups of courses were thought. Respondents' experience and opinions were monitored via a questionnaire consisting of eight open-answer items. Finally, the process of online distance learning was considered from the view of the collected data. Results proved that, as expected, even deeper teacher training is required. Main problems were detected in (1) the low level of teacher competency in this field in general, (2) time management, and (3) lack of technical support to learners. However, the fact that the necessity of learners' competency in online distance learning must be also developed was mentioned by a few respondents.

**Keywords:** Covid-19 pandemic · Online distance learning · Upper secondary · Higher education · Advantage · Disadvantage · Recommendation

## 1 Introduction

The covid-19 pandemic is an immense challenge to education all over the world. Efforts to slow the spread of the pandemic resulted in the closure of schools of all levels, i.e. an immediate shift away from the face-to-face instruction to the distance manner, mostly enhanced by the latest information and communication technologies (ICT) and conducted in the online mode. Thus, the education is exposed to the biggest change running


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in the live manner. Facing the new situation, questions appear whether both teachers and learners have appropriate competencies to succeed in online distance instruction. Generally, whether the teachers are able to teach and pupils and students are able to learn in an online distance manner. The main objective of this paper is to present the results of the research which deals with students' assessment of instruction conducted through online distance courses at selected schools in the Czech Republic.

## 2 Theoretical Background

Online distance education has been developing for nearly two decades within the Czech higher education system. Starting from the first trials shortly after 2000, this approach has been expanded and improved mainly at faculties preparing IT specialists. The reason was these institutions had appropriate technical and technological equipment, and academic staff could be systematically trained in didactics, e.g. [1–3].

At the same moment, the didactic rules binding for this process were set so that this mode could be accredited for higher education. The rules reflect (1) Comenius' didactic principles and (2) TP(A)CK framework; later on, (3) SAMR model was also implemented. These three preconditions for efficient ICT-enhanced education were accepted several years before the covid-19 pandemic started; however, they are expected to be applied in the design of online distance instruction even these days.

Principles defined by the Czech scholar and humanist J.A Comenius (1592–1670) in the 17th century were originally designed for face-to-face instruction. Comenius belonged among the fifty recognized thinkers in the field of education since Confucius' time [4]. During the whole life, he was trying to fulfil his own didactic motto *Omnes, omnia, omneno* [Everything to everybody via all available ways], thus forming the basis of the Czech educational science [5]. He wanted children – pupils – to understand the world; therefore, he introduced the world to them in a way they were capable to understand. To reach the objective, he required e.g. open access to learning for all children, reflecting the learner's age and level of knowledge, beginning with concrete items and facts previously known to learners, building the structure of knowledge in a systematic, continuous, step-by-step manner, using clear examples to illustrate new learning content, and finishing with new, abstract knowledge acquired by learners. Most of the principles are still alive and valid and form the basis of Czech education system [6]. Comenius also took a psychological view into consideration, when putting the emphasis on didactic methods to be natural, nonviolent, and consistent with mental development. As stated by Capkova [7], *Omnia sponte fluant, absit violentia rebus* [Let everything flow freely, without violent disruption], he required. Later on, Piaget summarized his principles when proving that there exists an interrelation between cognitive functions and activity, the principle of positive and affective motivation, the principle of consecutive development, the aspects of facilitation/inhibition of the educational process, and the principle of teacher-learner cooperation [8].

When ICT came to be a firm part of education, new requirements for teachers' competencies arose. They were defined as the intersection of technological, pedagogical (and) content knowledge – TP(A)CK [9]. The conjunction *and* leads us to the fact that knowledge and skills in technology do not transfer automatically into efficient teaching, but teachers have to be trained in using them [10].

SAMR model [11] assists teachers in the implementation of the latest (smart) technologies into the process of instruction. The model consists of four successive steps (levels) which cover two areas (Enhancement, Transformation). Each area includes two steps (Substitution and Augmentation within Enhancement; Modification and Redefinition within Transformation). In steps 1 and 2, the learning content is enhanced (Substitution) and improved (Augmentation) by the technology, in steps 3 and 4, teacher exploits the technology to make changes in educational forms (Modification), or uses completely new forms which could not be enabled without the technology (Redefinition) [12]. In other words, at the Substitution level, identical tasks and activities are performed as can be conducted without technology, i.e. there is not any functional change in teaching and learning. At the Augmentation level, technology works as an effective tool enhancing the process of instruction; thus students may become more involved in the process. At the Modification level, the first step is made between enhancing the 'traditional' teaching/learning and accomplishing substantial changes within this process through the use of technology. This is a significant change; new methods and tools are used that enable e.g. listening activities, rewriting texts etc. Finally, the Redefinition level appears, providing a completely new approach and strategy that could not be allowed without technology – it is not the target but means enhancing students' learning.

## 3 Methodology

### 3.1 Process of Online Distance Instruction

The first period of online distance instruction in the Czech Republic started in March 2020 and covered approximately a period of three months (depending on the school level). The closure of schools was immediate and unprecedented. This fact was reflected in the quality of online distance instruction at that time – teachers did not have sufficient competencies in teaching online, schools did not have appropriate equipment (both hardware and software), all learners had neither own computers (notebooks, tablets), nor the skills to learn online. Immediately after the closure, public TV provided lessons to primary school pupils, step-by-step, various web pages started to offer texts, experiments, exercises, tests, and other didactic means to support learning from home. Generally, both parents and teachers expected it would be a single period of ICT-enhanced learning which would be finished by the end of the school year (June 2020). However, the covid-19 pandemic did not disappear during the summer holidays (July–August 2020), and showed up again. The school year started in September 2020, entirely providing teachers a short period to briefly prepare learners for online distance instruction. Meanwhile, teachers were briefly trained in developing the competency in teaching in this manner before lessons started (in August 2020). In the institutions which are under the focus of this research, teachers attended 10-hour-long course in which both theoretical knowledge and practical skills were included. Reflecting this fact, teachers were expected to design and conduct their lessons in compliance with Comenius' principles, exploiting TP(A)CK framework, and SAMR model. MS Teams was selected as a nation-wide platform by the Czech Ministry of Education. Whereas in the spring period (March–June 2020) learners' participation in online distance instruction was voluntary, in August 2020, a new act was

introduced defining this way of instruction as compulsory for each learner [13]. Moreover, during the summer months, didactic recommendations for teachers were produced by the Ministry of Education providing principles and rules of successful distance education [14]. Unfortunately, they were rather general and schematic, neither distinguishing learners' age, nor other criteria, e.g. applying the Comenius' principles mentioned above. They rather reminded of promotional slogans: Join every learner, Communicate, Follow the rules, Support others, Monitor and appraise the process. Therefore, schools organized the training by themselves, being aware of all related negatives to the future quality of education which the lack of teacher's competency in this area can cause. In February 2021, another semester started with online distance instruction conducted in MS Teams.

### 3.2 Research Objectives and Expectations

Online distance instruction, which is under the focus of this research, was conducted from September 2020 to January 2021. Teachers were expected to teach their subjects in the form of courses in MS Teams; the courses were expected to be designed and conducted in accord with Comenius' principles, TP(A)CK framework, and SAMR model. As online distance instruction appears rather unexpectedly at all school levels and cannot be replaced by "traditional", time- and research-verified face-to-face instruction, it is highly required to have feedback on this process. In this research, students' reflection on this manner of instruction was under focus. The crucial questions are how the process is conducted, particularly if appropriate didactic principles are implemented, the latest technologies exploited, teachers sufficiently competent for conducting the process, and finally, whether learners can reach learning objectives. Arising from the questions, *the main objective of this research was to (1) discover how students assess their learning in online distance courses, (2) consider the collected experience and opinions, and (3) reflect them into recommendations for further teacher and learner training in how to exploit online distance instruction efficiently.*

Teachers' qualification and competency are crucial preconditions in the process. If the design of online distance courses follows didactic principles and the courses are conducted in compliance with them, we can expect learners can reach the planned learning outcomes which are defined in Framework Education Programme for Upper Secondary Education [15] and by the syllabi of particular courses within higher education.

### 3.3 Research Methods and Tools

A questionnaire method was exploited for data collecting. The questionnaire consisted of eight items. Respondents provided their opinions on learning in online distance courses and described their experience in the form of open answers: (1) What were the main advantages of learning in online distance courses?; (2) What were the main disadvantages?; (3) What would you recommend towards improving online distance learning?; (4) What are your other comments on this way of learning?

Respondents described learning in two courses taught in an online distance manner. First, in a course in which didactic principles were appropriately implemented, their learning was fluent, the use of study materials and teaching methods efficiently targeted towards reaching the expected learning objectives. Students enjoyed learning in these

courses and were satisfied with the way how the courses were designed and conducted and considered learning through them efficient. These courses received positive assessment and are called P-courses further on. Second, students provided their experience and opinions from courses, learning in which they did not like and did not consider it helpful for learning. In their opinion, these courses did not bring them to acquire the new knowledge efficiently (if ever). These courses received negative assessment and are called N-courses further on.

### 3.4 Research Sample

Totally, data were collected from 272 respondents. More respondents were of female gender (M = 94; F = 178). They attended three institutions:

- upper secondary school for medical staff (N = 131; M = 22; F = 109),
- advanced studies for higher medical staff (N = 69; M = 30; F = 39),
- university, faculty of education, department of information technologies or English language and literature (N = 72; M = 42; F = 30).

Upper secondary students formed the sample group of secondary students; students of advanced studies and university students were included in the sample of higher education (HE).

Respondents provided their opinions on 64 online distance courses conducted by 72 teachers. All monitored courses were taught 2–3 times per week (90–135 min) by qualified teachers, i.e. the teachers had qualification in the field and in teaching. The institutions were intentionally selected for the following reasons: (1) The preparation of medical staff, of higher medical staff, of prospective teachers of IT subjects and English language belongs to the profile fields of graduation exams which have been under the focus of the system of education since 2008 [16]. (2) The institutions under research were authors' home institutions so that the conditions for conducting online distance courses were firmly set. Moreover, the authors also participated in teacher training in online distance instruction and continuous consultation as mentioned above. (3) All researched courses included both theory and practice (in hospitals, laboratories, and schools); however, only theoretical courses taught in the online distance manner were under the focus of research.

## 4 Results

Results are structured in five subchapters, dealing with advantages and disadvantages in online distance learning, both in courses reaching positive and negative assessment. Then, students' recommendations and additional comments are included in the reflection.

### 4.1 Advantages Detected in P-Courses

In courses with positive assessment (P-courses), the length of answers was from six to 289 characters including spaces, the average length was 43 characters including spaces. Answers were accepted both in bullets and full sentences.

The most appreciated advantages of online distance learning were detected in two areas: (a) the convenience of the home environment for learning, (b) time management. As a result of the convenience of the home environment for learning (N = 139), students mentioned the increase in motivation to learning (23), learning at an individual pace (14), no stress from learning, particularly that they did not understand the learning content (4), they did not have enough time for meeting the requirements: finishing online tests (16), preparation of presentations and fulfilling tasks (7), preparation for online exams (4). Numerous students appreciated the time flexibility of online distance learning (47) – some of them liked they had more leisure time (16), either for hobbies, or for themselves, others were happy, they did not have to commute to school (21), they did not have to get up early (17), even they could learn from bed (13). More time for learning in general was expressed by 61 students, 36 ones emphasized they learned more. Rather low occurrences were detected in the lack of teacher-student contacts (39) and student-student contact (22), other two students mentioned it was good for them not to meet those students they did not liked. The need for competency of autonomous learning was expressed; some students thought that they had the competency before the observed period (14) or they strengthened it (13), none of them felt a lack of competency. A few students appreciated that they developed IT competency (8) within online distance learning, saved money for not commuting (18), had more study materials available compared to the face-to-face lessons (16), some of them were presentations with sound records (22). One student emphasized how creative the teacher was, two students appreciated the teachers' openness and possibility to contact them any time. Seven students did not find any advantage when learning in an online distance manner, three students' response was I do not know. The majority of above-mentioned advantages was summarized by student #107 who stated that: *"The greatest advantage of this way of learning is that I did not waste time on commuting, scheduled learning to my preferences, was not exposed to stress, and could work from the comfort of my home, which was much better for learning"*.

We most appreciate the answer by student #121 who defined the advantage as follows: *"The best thing of online distance learning is we have time to help in hospital"*.

### 4.2 Advantages Detected in N-Courses

In courses with negative assessment (N-courses), the length of answers was from seven to 219 characters including spaces, the average length was 26 characters including spaces.

Despite the negative assessment of these courses, the most appreciated advantages of online distance learning related to time management, i.e. time flexibility (47), which included more leisure time (32), learning at an individual pace (12), sufficient time for learning (25), doing homework – tasks (22), online tests (28), presentations (14), no commuting to school (35), no getting up early (42), enough time to profile subjects (31), lessons were mostly held in the morning, i.e. in the time which is better for learning than late afternoon (21). The convenience of the home environment was mentioned by fewer students (19), as well as the availability of more study materials, exercises, and online tests (15). However, similarly to the advantages in P-courses, students were aware the autonomy in learning is necessary – in this case, they mentioned it as a missing feature (28). One student had repeated technical problems with the computer,

three students declared they were not able to learn anything in N-courses, and other four students appreciated the teachers' efforts and good teacher-student communication. Seven students did not know what to answer, 33 ones did not find any advantage when learning in N-courses.

In spite of the fact that the conditions for learning through N-courses were poor or borderline, the truth is on the student #106'side, who summarized: *"It was my decision whether to learn or not. However, much effort was required … "*.

### 4.3 Disadvantages Detected in P-Courses

In courses with positive assessment (P-courses), the length of answers was from eight to 642 characters including spaces, the average length was 52 characters including spaces. The most criticized disadvantages of online distance learning were detected in three areas: (a) technical problems, (b) students' motivation to learning, (c) teachers' competency and experience.

Within the general technical problems (42), which caused students' absence in lessons or not understanding the learning content, if the connection was not strong and fluent (34), the low quality of the Internet connection was the most frequently emphasized problem (39). In some students, teachers thought the problems were intentionally made to disturb the instruction or not to participate (13).

Insufficient motivation to learn was also frequently mentioned (47), as well as low concentration on learning (32). Contrary to the above-presented subchapters on advantages, when online distance learning from home was considered convenient by the students, here, some students state they were disturbed by siblings or family environment and consider learning from home to be a disadvantage. This finding can be connected to socially weak conditions of the family.

Despite all teachers were trained in general online distance instruction, particularly in using MS Teams, students consider some of them unexperienced, others did not meet the didactic requirements – learners described their instruction to be chaotic (14), not providing enough information on tasks and deadlines (34), conducting rare communication with students (42), providing little explanation but having high demands (9), showing little effort (23), displaying presentations only followed by online tests (4). Moreover, students' experience is that the teaching organization differs in each course a little, which results in a waste of time when finding study materials, tasks, exercises, tests, and deadlines (23). Students conceded their own procrastination (18), laziness (9), cheating in tests (15), but they longed for missing social contacts (32), even with teachers (16). They complain about the long time in front of the computer (17), monitoring their behaviour during lessons (9) and online distance exams (4) by camera. On the other hand, they understand it is difficult for teachers not to see students' responses when speaking. They sum up, it is difficult to acquire the learning content without direct contact with teachers (29), to learn autonomously (14), to understand problems without practical experience (23). Additionally to the above mentioned, student #73 states that *"It is more efficient and much comfortable for me to listen without being disturbed, concentrate, and then understand the problem. I also understand teachers who reject to exploit online tests for assessing students' knowledge (because of cheating)"*.

### 4.4 Disadvantages Detected in N-Courses

In courses with negative assessment (N-courses), the length of answers was from six to 647 characters including spaces, the average length was 47 characters including spaces. The most criticized disadvantages of online distance learning were detected in three areas: (a) T-S communication, (b) conducting of online distance instruction, (c) students' self-control.

Students complained about low frequency and late responses from teachers (44), which resulted in problems with understanding the learning content and/or missing deadlines for submitting tasks. Some teachers sent study material without explanation (32), they required much work on tasks and in worksheets, however, the work did not target towards building new knowledge (17), it was groundless and purposeless work. As a result, students were not able to acquire new learning content (28), they felt they did not know much (37), if no practical lessons were held (26), no aids were available (4). Moreover, some of them were aware that hard self-control is needed (18), autonomy in learning (28), high motivation (26), and concentration (12). Some students did not find the home environment convenient for their learning (22). Other students concluded that teachers were not competent enough for online distance instruction (18), they did not exploit the tools of MS Teams appropriately (36), in some cases, they proclaimed they did not like this way of teaching (27). On top of that, technical problems, including mainly low quality of Internet connection, were detected (25). Additionally, students state they hated online lessons (14), particularly cameras (3). A missing social contact was declared by one student only. Answer in 16 students was I do not know. All these factors cause stress in students (and teachers), and have a strong impact on the process of instruction; no wonder students gave a negative assessment to these courses. Moreover, some of them required lessons should be inspected by headmasters (6). As student #73 summarizes: *"Irregular lessons, too many study materials, hardly any communication with teachers, and low-quality Internet connection cannot result in efficient learning and good knowledge of students"*.

### 4.5 Recommendations for P-Courses and N-Courses

In courses with positive assessment (P-courses), the length of answers was from 17 to 348 characters including spaces, the average length was 44 characters including spaces. Thirty-four students' answers were Nothing to recommend, twenty-two students stated I do not know. In the context of recommendations, we think both answers can be considered identical, declaring the students do not have any recommendations on these courses. Additionally, 29 students expressed that online distance courses suited their learning. In courses with negative assessment (N-courses), the length of answers was from 16 to 1,030 characters including spaces, the average length was 42 characters including spaces. Sixteen students' answers were Nothing to recommend, eleven students stated I do not know.

In both types of courses, recommendations focused on the following areas: (a) time management, (b) providing feedback to students, (c) exploiting one tool for conducting online distance instruction. In brackets, first, occurrences in P-courses are presented, followed by occurrences in N-courses after the +sign.

The main recommendation dealt with scheduling the online distance lessons. Students required each online lesson was divided in two parts; in the first part, new learning content was explained and practiced, in the second part, students' questions were answered by teachers (23 + 28). Another requirement was the lessons had been firmly planned (28 + 31), not announced a few hours (in the evening or night) before. Identical recommendation was with online tests (15 + 20) because students are not continuously connected and may miss the test.

Most students would appreciate more time devoted to explanation (19 + 24), providing teachers' feedback whether they correctly acquired new learning content (29 + 41), in the form of online answers to questions (11 + 0), discussions during online lessons (26 + 28) or in the written form (16 + 0). Opposing proposals appeared: some students required more or longer online lessons in general, without specifying the main purpose (22 + 0), or fewer lessons and more autonomous work (16 + 0), less time in front of the computer to save the eyes (14 + 39), breaks between lessons to rest the eyes (17 + 0), more or fewer tasks for homework (6 + 0) etc.

Moreover, one tool (platform) should be exploited for online distance instruction (9 + 3); students and teachers should be trained in using it (34 + 11). Teachers' effort and engagement could be higher to motivate students towards better performance (13 + 27). And, technical support from the school administrator (if available) would be appreciated (6 + 24). In N-courses, students strongly required online distance lessons were held in all subjects, not only presentations sent via e-mail (0 + 26). Several students expressed their wish of having online distance learning no more (6 + 8), others proclaimed recognition and support when stating *Both sides do maximum* (student #43) or *It is difficult for both the students and teachers* (student #96). An appeal to follow was expressed by student #62: *"If you want to know anything, you have to learn it by yourself"*.

### 4.6 Additional Comments on P-Courses and N-Courses

In courses with positive assessment (P-courses), the length of answers was from 20 to 229 characters including spaces, the average length was 51 characters including spaces. In courses with negative assessment (N-courses), the length of answers was from seven to 138 characters including spaces, the average length was 40 characters including spaces. Both in P-courses and N-courses, comments were either identical to the recommendations presented above, or students provided various types of justifiable complaints on didactic problems which appeared in the courses, e.g. lack of study materials, tests, meaningful activities and exercises, mistakes in tests and their assessment, missing final assessment etc. As student #26 stated: *"We wish we had more competent and creative teachers.",* or *"In some lessons, we finished with singing a song."* (student #4).

## 5 Conclusion, Limits, and Further Research Activities

To sum up the collected data, from the view of the number of observed courses (64), even occurrences around ten responses are of rather strong value. Unfortunately, not in each course Comenius' principles were applied to a maximum extent; however, some features could be discovered. Methods, tools, and outcomes relating to SAMR model

were not detected in students' reflections, the impact of TP(A)CK framework could be found with some teachers only. The finding shows that students' attention was mainly paid to the following features and areas in P-courses and N-courses:

1. home environment;
2. teachers' competency in online distance teaching, particularly time management, appropriate teaching methods, and communication;
3. technical support to the process.

Whereas the home environment was considered a comfortable and convenient advantage for learning in P-courses, some students considered it disturbing and lowering their concentration in N-courses. Thus, it suggests that the conditions differed substantially. If students had their own rooms and computers, the home environment was appreciated by them. In the opposite case, if students shared the room and/or computer with siblings, the learning conditions were not suitable for learning. Thus, the social aspect plays an important role in students' learning.

Teachers' competency in online distance teaching was considered the crucial skill for conducting the process in an efficient and pleasant manner in P-courses and N-courses. Both features contribute to the final result. If appropriate teaching methods are applied and enhanced by ICT, the process results in expected learning outcomes and students' satisfaction is supported, which consequently makes an impact on their motivation to further learning. And, if the environment is pleasant for learning, mainly stimulating and inspiring, not causing stress, the process of learning can run fluently. If students have enough study materials of various types, delivered to them in various ways and explained if teachers assess students' performance and provide feedback on their learning continuously so that students were able to make corrections before the final fixing of new knowledge. Whereas in P-courses teachers' effort in conduction online distance instruction was appreciated, in N-courses students complained that there hardly was any effort on the teachers' side, and the interest in student learning was missing.

Time management, which firmly plans the scheduling of lessons, consultations, tests, and exams on a regular basis, in "active" time (not late evenings, night), and which also provides enough space for T-S, S-T communication. This feature closely relates to the teachers' competency mentioned above.

Technical support was required mostly by students in N-courses, particularly from an alive person – administrator, not from an electronic document on the Internet, mainly if the quality of Internet connection was low. This resulted in the fact that they did not see and hear all what was said and done in online lessons, they were disconnected in key moments of the lessons, presentations, tests, exams, … (whether it happened intentionally or not was not investigated within this research). We can guess whether it related to the low quality of the hardware and software used (these students often learned through smartphones, they did not have computers, notebooks, or tablets available), and thus to the weak social conditions of the students, as it was with the convenience of the home environment for learning.

To sum up the above-mentioned findings, if Comenius' didactic principles were implemented in online distance instruction, they were appreciated by students and courses were included in P-courses. If only some of them were applied, or all were

omitted (as can be deduced from some students' comments), the courses were ranked in N-group. Therefore, under current conditions, teachers' qualification should be widened and competency in online distance teaching should be strongly required, as several students also mentioned. We understand that teachers' work is even more demanding these days; however, the efficiency of teaching will not improve until teachers' skills in the field improve. Then, the requirements of TP(A)CK framework will be met, and SAMR model can be applied. Only at this level, the latest ICT will efficiently enhance the online distance learning. Unfortunately, we were not able to discover from students' feedback whether the SAMR model was implemented in the design of courses.

Unfortunately, when assessing online distance instruction during the whole semester, we must conclude that our expectations were not met. Much work must be done in building teachers' competency in online distance teaching. However, at the same time, students' competency in online distance learning must be improved. Not much time has been devoted to student training so far. Moreover, study materials are highly needed in the digital format, which can help in teaching in general, and in the SAMR model application as well. Finally, online distance communication must be part of the instruction; half of the time as a minimum should be devoted to speaking with students.

Of course, the findings of this research are limited by the sample, which included courses conducted at intentionally selected educational institutions in one country and assessed by their students in a total amount of 272. However, the results provide us with the insight in the state and give the basis for improvements in the future. For further research, we suggest attention should be paid to adaptive learning from the view of learning styles and motivation types. Methodologies for online distance instruction should be set for various subjects (at all levels of school education), didactics of online distance teaching and learning should be included in pre-service teacher preparation, and in-service teachers should be trained within life-long education courses.

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