# Designing an Electronic Communication Resource: a Practical Experience of Shaping Advanced Professional Competencies for Future Teachers*

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**Abstract**

Developing digital society sets forth advanced professional teacher competencies, with a transdisciplinary approach to mediated communication - multilingual and multicultural abilities, interpersonal skills, telecollaboration and co-working. The paper presents a two-step model proposed for preparing students of pedagogical education direction to design a communication resource. Firstly, students were invited to act as participants in an already designed resource. Secondly, they were offered to develop their own communication resource and to involve other participants in the discussion based on it. When designing a communication resource, students used a small variety of communication algorithms, but a wide variety of discourse enhancement techniques. The experience shows that designing a communication resource gives students an opportunity to practice space, time and speech capabilities together with limitations, risks, communication and technological features of mediated communication that is beneficial for acquiring advanced professional competences.

**Keywords:** *mediated communication, online discussion, professional competences, teacher training, digitalisation.*

# 1 Introduction

Digital technologies gradually, with an accelerating pace, penetrate into all social processes, transform all aspects of human life, change a familiar nature of work and relationships, and alter economy entirely. Education faces the necessity to respond flexibly to new demands of an emerging digital society. The determinants of the development of this phenomenon are international legislative trends: strategies for the development of digital economy in Europe, in the USA, and in Asia. Particularly in Russia were proposed several programmes: "The Development Program of the Digital (Electronic) Economy in the Russian Federation until 2035"; Information Society Development Strategy in Russia (until 2030); State program "Development of Education" (until 2020).

The educational system meets the needs of preparing for work in the context of complex challenges that will occur in the near future. Effective and systematic use of digital innovations in educational practices (for example, digital learning environments, e-learning, blended learning, smart learning, the creation of MOOCs, distance learning technologies), has led to an understanding of a special priority of theoretical studies and qualitatively new practical pedagogical experience in the area of professional training for future specialists.

The requirements for the professional training of teachers, who will have to operate with new digital tools, to set new intellectual and technological objectives are changing dramatically. Traditionally, the main activity of a teacher is interpersonal communication with all participants of the educational process. However, the digitalisation of education, which involves the migration of many its aspects into the digital environment, will entail an increase of technology-mediated interaction. Therefore, it is necessary to prepare teachers to implement such kind of interactions. In this prospective, a psychodidactic approach [Noskova, 2007] as a fundamental approach for understanding interactions in the digital environment, allows not only analysing, but also modelling processes (including interactions) in the digital environment from the perspective of the three main constructs of this environment: digital learning resources, electronic educational interactions (communications), and activity management, based on electronic resources. This approach makes it possible to understand the digital environment not only as a system of conditions for personal development, but also as a means of activity of all its stakeholders. For a teacher, this environment becomes a means of solving professional tasks and for a learner - a means of self-development, creation of a personal learning environment, and a personal environment for professional activities. In the philosophical aspect, the digital environment is considered as a special pedagogical entity, where a teacher brings in experience and professional skills (these phenomena are transferred to the resources of the environment). Consequently, for the functioning of this "detached" experience and professional skills, for a positive influence on a learner's personality, changes in professional training of future teachers are definitely necessary. While learning, students need to acquire various digital practices in order to have the real experience of the evolving digitalised education. Not occasionally, T. Dufva and M. Dufva propose an idea of "digigrasping" that is described "as active and empowered sense-making and participation in an increasingly digitalised world that is not based on simply a rational understanding, but on an embodied understanding as well" [Dufva T. and Dufva M., 2019, p.20].

## 2 New teacher competencies in the context of technology-mediated interactions

What advanced competencies are considered in this context? The main trends in this direction can be analysed. In Russia, an Atlas of Emerging Jobs was developed with the participation of the Agency for Social Initiatives and Skolkovo [Atlas of Emerging Jobs, 2015]. The Atlas presents professions that should become highly demanded over the next 5-10 years. In the field of education, the presented professions not merely require ICT competencies, but they are entirely realized in the digital environment, for example, digital ethics and safety teacher, designer of consciousness training tools, game educator, educational online platform coordinator, etc. To be in such jobs, a person should possess new professional skills and abilities – inter-sector communication, multilingual and multicultural abilities, and interpersonal skills.

IFTF (Institute for the Future), a futures thinking organisation, presented a future work skills summary map in 2011 [IFTF, 2011]. Key skills needed in the future workforce were named there: new media literacy, virtual collaboration, transdisciplinarity, design mindset, and other. In this context, Vinagre, M. described a practical experience of developing teachers' telecollaborative competences [Vinagre, 2017].

Recently, a large-scale Russian research "Competences Foresight 2030" was conducted [Competences Foresight 2030, 2013]. The study developed a target model of future specialist competencies by 2025 focusing on cognitive (adaptability, solving non-standard tasks) social behavioural (intercultural interaction, communication) and digital skills. A characteristic feature of digital interactions in the educational context is their distinctive design that presumes not only accomplishing specific educational tasks, as a teacher usually does in a traditional face-to-face communication, but also managing complex nonlinear network communication circuits in the digital environment. A technological mediation of communication sets a number of rules for electronic interactions:

1. Algorithmisation of communication by the Internet services [Noskova, et al, 2015] determines planning communication in a suitable way. Mediated communication implies understanding capabilities of the Internet. Unlike in-classroom communication, network communication is more focused on approaching specific communication tasks, rather than on phatic communication, which allows distraction from the main topic of discussion. Communication actions become less improvised; it is much more difficult to take into account the current psychological situation of interactions. Despite the formalisation of the communication in the digital environment, it can effectively reach certain classes of objectives (question and answer activities, immediate feedback, presentation of ideas, etc.).

It is possible to identify the main algorithms underlying the achievement of educational objectives, which are now quite often used in the digital environment:

1. Search algorithm (implementation of an information request);
2. Resource algorithm (interactions, mediated by a specially designed resource);
3. Exchange algorithm (file exchange, information is clearly defined and formalized - presented in a form of a specific word, text, symbol, or image);
4. Discourse algorithm (the main purpose of interaction and communication is to ex-

change views, search for solutions, discuss, and compare positions);

5. Algorithm of network collaboration (joint network activities of students on specialized Internet services (wikis, shared documents, co-working);

6. Presentation algorithm (presentation of information or self-presentation of achievements in the digital environment - personal webpage, blog, video channel, etc.);

2. Mediated communication is implemented with the help of computer tools (ICT tools, digital tools) - original tools of intellectual activity, that can be used in the digital environment. Such tools are a complex of sign systems, software and technologies adopted for electronic communication [Noskova et al, 2018]. When applying computer tools, there is a transition from the use of signs to the use of sign systems. In social practice, the transition to the use of fundamentally new tools leads to changes in the activity itself: an increase in the requirements for knowledge, skills and abilities of an employee, and an increase in labour productivity. Usually this is accompanied by changes in the professional thinking of a person. The use of new tools in the communication activity, in turn, predetermines the necessity of setting new educational tasks and the formation of special professional competences to solve them. Thus, digital tools and modern competences allow a today teacher to set complex tasks that were inaccessible to preceding practices. The use of electronic communications complimentary to in-class communications should lead to a new quality of the activities performed. In educational activities, a new quality can manifest itself through the accumulation of a special class of resources in the network - communication resources. These resources, as compared with information resources, have a relatively small life cycle. Nevertheless, they allow space and time organisation and maintenance of educational communication. They give a possibility to monitor, analyse, manage and correct communication acts, because all these acts are saved in the machine memory, unlike face-to-face communication, the course of which is usually not recorded. This is one of the fundamentally new tasks of modern educational practice, especially educational data mining [Kapusta et al, 2018] - computer-supported learning analytics, computer-supported predictive analytics, computer-supported behavioural analytics, computer-supported visualisation analytics [Aldowah et al, 2019].

In the process of teaching, communication resources created by a teacher are accumulated in the digital environment. They include, for example, assignments for students, questions, quasi-professional situations, problematic issues in the form of webpages or educational blogs. All this is necessary for the organisation of students' autonomous work and interactions in the digital environment. A teacher can form a bank of frequently asked questions and answers to them, collect sets of verbal clichés that allow students to respond faster and clearer to the actions of peers in online educational interactions. In turn, students store their communication resources in the digital environment; put together a system of links to the resources of the global and local network, gather media materials (photo files, videos, music) related to educational activities. They write their resumes and annotations. Student' communication resources can also include a repository of email correspondence, an electronic portfolio with products of educational activities.

All described above leads to the conclusion that a modern teacher needs to learn how to design mediated communication, to approach educational tasks by communication in the digital environment using new professional tools and creating special communication resources. A teacher should be able to perform pedagogical tasks not only in face-to-face

paradigm with students, but also to ensure their solution through a specially created digital environment of educational interactions.

# 3 Practical experience of teaching students to design a communication resource

**Organisation of the experimental work.** In the work with students, a two-step model was proposed for preparing them to design a communication resource. At first, students were invited to act as participants in an already designed resource, to take part in an online discussion. At the second stage, they were offered to develop their own communication resource and to involve other participants in the discussion based on it. In the described experimental work, 160 bachelors (aged 19–20 years) and 40 master students (aged 22–40 years) took part. All participants were from the "Pedagogical Education" direction of The Herzen University (Russia).

**Online discussion.** Generally, an online discussion that students take part in is a popular educational technology. Traditionally, a discussion is considered as a public dispute an actual problem, issue, or a critical dialogue. The main purpose of a discussion is to search for answers by comparing and colliding different points of view. The main goal of an online discussion is not to form a common opinion, but to provide each participant with an opportunity to present their own point of view, and then draw conclusions and generalisations based on what was expressed. From a space and time point of view, an online discussion can be synchronous (for example, during a webinar or a video conference) and asynchronous (discussion in blogs, online forums). Facilities for a network discussion today are implemented in many Internet conferences and forums. Opportunities for conducting discussions exist in most e-learning software tools (LMS Blackboard and Moodle) and universal online services, especially social media (blogs, forums, mobile messengers).

How is it necessary to organise an online discussion to be effective? There are a number of directions of such organisation.

The first direction is connected with a choice of topics for discussion. A topic largely depends on the target audience of the discussion: it should not only be relevant and interesting, but also initially contain the possibility of an ambiguous response, the variability of opinions and judgments. It is necessary to create conditions for the productive work of students, in particular, to offer variable information sources on the topic under discussion.

The second direction is connected with the engagement in the discussion. There is a wide variety of techniques: posing a problem that does not have a pre-prepared, unambiguous answer; provoking (deliberately challenge); formulating a discussion slogan (a brief requirement or idea); inclusion of an oxymoron (matching words with opposite meaning); presenting media objects on the topic (photo, video, audio); presenting opinions, controversial judgments on the topic, (article, quote, value judgment); accompanying communication with other activities (voting, rating of the most vivid answers, drawing schemes). In addition, the engagement and inspiration of participants is necessary in the process of discussion with the use of additional questions, clarifications, and comments. Thus, a study carried out by Liu, Y. [Liu, 2019], proved that the use of questioning methods rises the effectiveness of engaging and challenging online learners. The third direction is connected with the formulation of clear discussion rules: a time frame for discussion (defining

a time period for comments and entering into a dialogue or a polylogue), clear wording of questions and tasks, a presence of a discussion moderator (teacher or responsible student), network etiquette rules, quoting rules, responsibility for plagiarism. It is necessary to summarise the discussion results - in the digital environment or in face-to-face mode - depending on the situation. Lei, C., Chan, C. K. K. [Lei and Chan, 2018] admitted that such type of metadiscourse is beneficial for knowledge building and computer-supported collaborative learning. To improve the quality of online discourses five online discussion strategies approach can be implemented: elaborating and clarifying; making connections; challenging others' views; building upon others' views; questioning [Gao, et al, 2009].

The implementation of these rules helps to significantly reduce a number of risks that undoubtedly exist in the process of a network discussion: a formal approach to participation, plagiarism in expressed judgments, and low discourse activity. In addition, Piro, J. S., and Anderson, G. [Piro and Anderson, 2018] found that mediated discourse often leads to cognitive biases, so participants tend to get engaged in safe, comfortable, and familiar discourses. However, this pitfall needs to be overcome in order to gain the possible benefits of a mediated discussion as an educational technology. The discussion was implemented in an asynchronous format based on a Google blog. As a statement of the problem, it was proposed to get acquainted with the ideas of M. Prensky, set forth in a publication about digital aborigines [Prensky, 2001]. Participants were asked to express their opinion on the several questions. Do they consider themselves digital natives? What are the most vivid signs of the digitalisation process in the life experience of a modern person? What is the attitude to M. Prensky's idea? What are the main problems and risks in the information environment for a modern child, teenager and adult?

The substantive results of the discussion are interesting from students' perception of modern society point of view, as well as an awareness of their place and role in it. Several examples can be described here. When discussing the signs of the digitalisation process, students were guided by ideas generally accepted today. Students named the virtualisation of all spheres of life (for example, receiving services via the Internet) as the most popular signs of the digitalisation. They also underlined the priority of information and the constant need for its perception and application, globalisation, the increase in the variety of technical devices (smartphones, tablets). At the same time, bachelor students focused on the need to acquire digital competencies (the ability to search for information, to be a confident computer user), while master students emphasised the need to critically evaluate information, regulate human behaviour in the digital environment, and reduce health risks of this environment.

80% of bachelors confidently attributed themselves to digital natives. The remaining 20% offered an intermediate version, calling it "digital nomads", or "advanced migrants". They noted that it is necessary to constantly adapt to changes in the information sphere, to pay attention to something new that arises, to learn every day. On the contrary, about 81% of master students identify themselves as digital migrants. They noted the ambiguity of the statements of the American publicist about the division of society into two polar "camps", as well as the relative applicability of this approach to Russian reality due to some lag of the digitalisation policy being announced and its implementation.

A variety of statements caused the question of the main problems and risks in the digital environment for a modern man. The main problem identified by bachelor students was the insufficient ability to regulate their behaviour on the network, to plan their time, to manage information flows, to choose what is necessary. For example, a student wrote,

"Of course, I try to limit my time in social networks in every way; unfortunately, this is quite a difficult task in our computerised society." In addition, the majority of students, one way or another, noted insufficient level of digital skills, "Some digital skills are not available to me, for example, such as installing new software"; "I have not enough skills to make the most productive use of the opportunities provided by the computer and the Internet".

Master students who already work in educational institutions as teachers, psychologists, consultants, analyse these problems from the practical point of view, "I work at school and can describe an interesting example. One of the students, finding it difficult to answer the questions on the given subject, used a mobile application and very quickly coped with the solution of the problem". They note, "A modern teenager owns technologies, and he is already adapted to the Internet environment much better than his teachers". "Among serious problems, I see, firstly, a useless web surfing, a switch from one link to another with a merely entertainment purpose, without a conscious goal". "For development, it is better for a child to play traditional games with 'real' children". "Children perceive the digital space as a source of entertainment." Thus, practicing teachers speak against the substitution of real life for the virtual one, and in the first place, they need to teach children to think and reason independently in direct interaction with others.

Summarising the results of the discussion, a specificity of students' judgments in terms of occupation and age can be noted. Bachelor students consider all issues through the prism of their own educational activities and everyday life, while master students analyse problems in terms of a teacher's professional activities. In addition, the responses of master students more clearly show a critical attitude to the consequences of digitalisation for society and education.

Network discussions contribute to the assimilation of various roles relevant for a future teacher – a moderator, a discussion participant, an expert, and a manager. The particular value of online discussions lies in the possibility of preserving discourses in an electronic environment for subsequent analysis and self-analysis. Network discussions help not only learning to formulate a thought, entering into a dialogue or a polylogue, expressing agreement, disagreement and doubt. They are important in the development of critical thinking, the ability to give valid conclusions, make reasoned assessments, present own interpretations of facts, phenomena, and events. The listed skills become especially relevant in the conditions of the development of the information space, in which each person, including a teacher, constantly faces the choice of information sources, assessments of information content, and seeks to expand communication links.

**Designing a communication resource.** At the second stage, only master students took part in the experimental work. They were asked to design their own communication resources: to select an actual problem for discussion, to determine the technological basis for the implementation of the discussion (online tools, mobile technologies, etc.), to attract participants and to act as moderators. Presented communication resources were analysed in four directions:

1. Theme of a communication resource,
2. Variety of communication algorithms used,
3. Variety of methods for maintaining and enhancing discourse,

4. Technology used for communication.

*Theme of a communication resource.* All resources designed by students related to educational issues:

• teacher-student interactions (teacher's age, student's appearance and school dress code);

• educational motivation (importance of higher education, attitude to education, modern school, school of the future);

• questions of teaching methodology (teaching foreign literature at school, teaching spelling, preparing for pedagogical practice, learning a foreign language);

• ideological aspects of education (religious education, tolerance);

• e-learning and modern educational technologies.

*Variety of communication algorithms used.* Only one student used two interaction algorithms - discourse and resource algorithms. During the discussion, participants were invited to share their examples on the topic (video, links, screenshots, and graphics). Thus, a thematic bank of electronic materials on the subject has accumulated. This motivated the participants to be more active, as in this discourse, the highest activity in the number of replicas was noted.

*Variety of methods for maintaining and enhancing discourse.* 20% of participants used two or more methods: a problem question, video, graphics, voting or rating, and quotations.

*Technology used for communication.* 25% of participants chose mobile applications, various messengers to implement the discussion. The rest of the students carried out their discussions in social networks.

All the listed qualitative indicators for the designed communication resources are presented in Figure 1 in relation to the number of students that showed these features.

# 4 Results and conclusions

Analysis of the experience received in the process of teaching students to design a communication resource leads to a number of conclusions. Technology-mediated educational interactions will become increasingly in demand, due to the changes in education – wide implementation of e-learning, especially in the context of continuing education when learners combine professional activities and acquisition of new skills or plan changing a profession. Therefore, a teacher needs to possess skills of an organiser, a moderator, a facilitator of online communication. These skills have to be purposefully acquired in practical activities.

The experience of participating in a network discussion gives students an opportunity to practice space and time, speech, communication and technological features of this interaction genre, its capabilities, limitations and risks.

A professional objective of designing a communication resource is even more difficult than participating in a network discussion. It is important to understand that it might be ineffective to transfer methods used by a teacher in the interpersonal interaction to the digital environment. For the successful life cycle of a digital communication resource, it is necessary to define clearly its goals, to choose the most convenient technology in the particular situation, to select several methods of attraction to the resource, and to think up methods of activating participants during the discourse. The most successful is

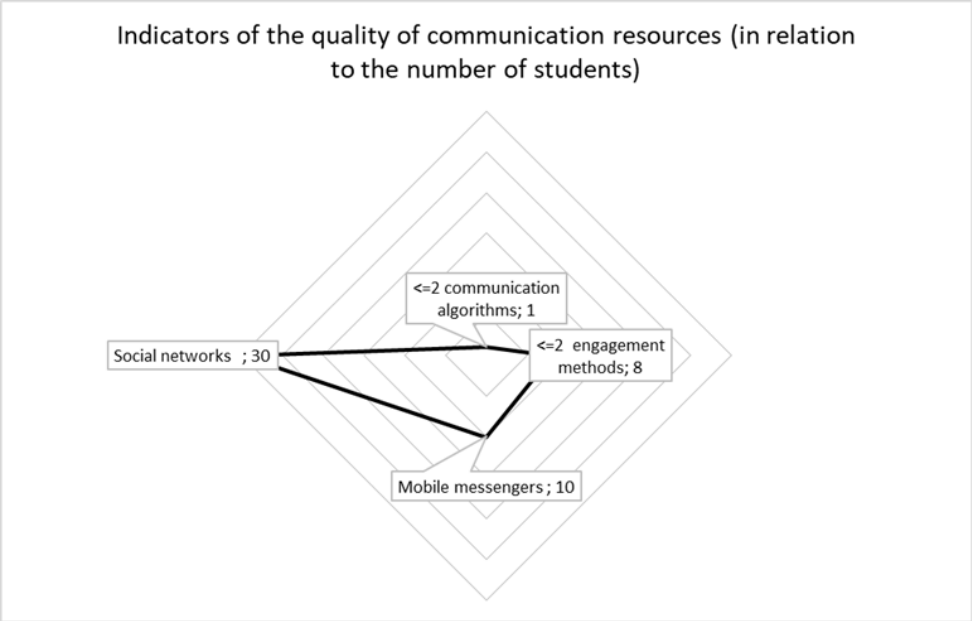


Figure 1: Indicators of the quality of communication resources (in relation to the number of students)

such a resource where a communicative activity in the discussion process belongs to more to the participants than to the moderator. This assumption was proved by the authors [Alghasab et al, 2019] who showed that when teachers take a directive approach, students tend to interact with the teacher rather than with the peers. However, in the case of a dialogic approach, a greater student-to-student interaction and collaboration activity in the course of making jointly constructed texts is generally marked. Such findings point to the benefits of adopting a dialogic approach to teaching.

Experimental work with students showed that mobile technologies are now the most popular for mediated communication. In the design process, students selected either mobile messengers or social networks, which are also operated on the basis of mobile applications. This feature allows realising a comfortable interaction, in any place at any time and entirely corresponds to the informational behaviour of modern students. At the same time, when designing a communication resource, students use a small variety of communication algorithms: the discourse algorithm was implemented by all students. Only one student used both the discourse and resource algorithms. This suggests that learners are trying to transfer their experience of interpersonal communication to the electronic environment. This is not always productive; therefore, it is necessary to further work on mastering the diversity of communication algorithms. Mediated communication, especially based on social media, involves to the greatest extent when people not only use oral or written language, but also accompany messages with some activities – uploading files, voting, sharing links, etc. However, a wide variety of discourse enhancement techniques used by students suggests that they recognise the importance of maintaining

communication in the digital environment.

Participating in a mediated discourse can contribute to such advanced teacher competences as interpersonal communication, media competence, and virtual collaboration. Designing a communicative resource in the digital environment helps to develop presentation, motivation, organisation and management skills that are of a vital importance for future teachers.

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