

Strategy of designing additional educational programs in the field of teachers' digital competencies of the higher agricultural education

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Abstract. The article presents a strategy for designing additional educational programs in the field of teachers' digital competencies of higher agricultural education. The relevance of the research topic is substantiated (based on a brief review of modern publications of Scopus knowledge-intensive database), we developed theoretical approaches to the empirical part of designing additional educational programs to improve teachers' digital literacy. As part of an expert survey (347 people – representatives of the pedagogical community of higher agricultural education in the South of Russia) we identified the most relevant areas of improving the digital competencies of scientific and pedagogical workers of a modern agricultural university: the ability to develop their own means of digital communication; the ability to create virtual platforms for study groups; improving the skills of developing interactive tasks in Web-2 services; ability to create visually interesting interactive materials; development of goal-setting skills in the process of choosing, changing, combining and creating digital learning resources, taking into account the educational context, educational goals and target audience. The results of the study allow us to identify important information sections for the development of a professional development program in the field of digital competence of teachers of agricultural education.

1 Introduction

In the Decree “On the National Development Goals of the Russian Federation for the period up to 2030”, the goal of digital transformation is formulated for the overall alignment of the work of all systemic institutions of Russian society. Among them, the Institute of Higher Education plays a special role, since it trains personnel for future work in new digital conditions. Accordingly, higher education in terms of digital transformation should be ahead

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of other sectors of the economy so that the digital competencies of graduates are formed at the level necessary for successful work. In this regard, special attention should be paid to the digital professional training of scientific and pedagogical staff of universities. Advanced development and digital transformation should affect all areas of professional activity of teachers: from information literacy and digital platforms for communication to the creation of digital educational content and evaluation of the knowledge acquired by students. The purpose of our research is to develop a strategy for designing additional educational programs in the field of digital competencies of teachers of higher agricultural education.

Digitalization processes are increasingly becoming part of educational practices and help to solve not only educational tasks, but also issues related to the upbringing and socialization of the individual. Therefore, the competence of teachers in the field of digitalization is important not only in terms of preparing and conducting training sessions, but also maintaining socio-pedagogical communications in the educational community. The authors of the article Bastian Vajen, Steve Kenner, Frank Reichert emphasize that teacher education should facilitate discussions about digital citizenship, which goes beyond traditional competence models [1]. In our opinion, the competence profile of a modern teacher should have digital competencies that ensure the possession of the skills of conducting a discussion in a virtual environment from the organization of a digital platform to regular monitoring and maintaining a constructive discussion in a chat. Accordingly, this should be reflected in the training and advanced training programs for this category of education workers.

Interesting research results are offered by scientists Emilie-Charlotte Monnier, Sunny Avry, Laila El-Hamamsy, et al. [2]. They analyzed experience of 14 teachers-instructors who participated in the digital teacher training program in Switzerland. The positive and negative factors of digital education of teachers are highlighted. Among them, the authors name:

- individual characteristics of teachers, which indicates the need for input control of the level of formation of digital competencies;
- interaction with stakeholders, which implies, from the point of view of the organization, to conduct, among other things, team-building informal events;
- educational content through orientation to future areas and levels of professional pedagogical activity;
- logistics, which is important for solving organizational issues of teaching digital competencies to existing teachers.

Confident possession of digital competencies makes it possible to apply them more widely in the educational practices of teachers. This conclusion is reached by the authors of the article Chiara Antonietti, Alberto Cattaneo, Francesca Amenduni, who (in a sample of more than 2000 people using factor analysis) established a positive significant relationship between digital competence and teachers' beliefs about the ease of using digital technologies and the supposed usefulness of technologies in teaching [3]. In general, increasing the level of digital competence expands the possibilities of using digital competencies in the educational process. This conclusion underlines the relevance of our research and confirms the importance of planning the training of teachers in the field of digital literacy.

Digitalization of the educational process also provides advantages in terms of an interdisciplinary approach for the development of creative thinking and systemic knowledge. The author of the article Zihua Wu presented a prototype of a digital CoP (Community of Practice) system to encourage creativity in the learning process based on an interdisciplinary approach [4]. For our research, it is important to conclude that a modern teacher needs to be prepared for the development and use of digital auxiliary tools to the educational process from the point of view of basic digital skills. Manufacturers of electronic gadgets offer their auxiliary functions and programs. Among them is Apple. The author of the article Steven Lewis analyzes the advantages of Apple Teacher, a digital learning platform of the American technology giant Apple Inc [5]. The researcher notes that the platform forms new market and

platform relations between educational spaces and participants of the educational process and helps in promoting the knowledge and experience of teachers.

It is important to show the modern teacher the possibilities and benefits of digital learning platforms, including in the field of popular functions of replenishing socio-psychological well-being in professional activity. The authors of the article Alesia Mickle Moldavan, Christine Edwards-Leis, Jennifer Murray give recommendations on how to develop and maintain similar platforms to ensure the well-being and preservation of mental health of teachers [6]. In the conclusions based on the results of the study, they draw attention to the need for a certain level of basic digital competencies of teachers. This conclusion underlines the importance and relevance of our research – the design of additional educational programs based on the empirically established level of digital competencies of teachers.

The introduction of new digital technologies requires a certain level of digital competencies of teachers. The authors of the article Huiqing Hu, Rayne Audrey Sperling in their work note the need to introduce digital game training programs into educational practice [7]. According to the authors, it is necessary to pay attention to the advantages of educational games in teacher training programs, to develop effective strategies for overcoming barriers when including games in education.

The authors of the article Alberto A.P. Cattaneo, Chiara Antonietti, and Martina Rausedo note that the level of digital competence of teachers is an important condition for the introduction of new information technologies into the educational process and there is not enough research on this [8]. An assessment of the digital competencies of 1,692 Swiss teachers shows that the quality of digital training depends on personal characteristics and favourable learning conditions. This conclusion suggests the need to pay great attention not only to the content of additional digital education programs, but also to the organizational conditions for their implementation.

In general, a brief analysis of the results of research in the subject area of digital teacher training shows a number of relevant areas for developing a strategy for designing additional educational programs:

- the need for input control of the level of formation of digital competencies of teachers;
- development of the content of training courses taking into account the future areas and levels of professional pedagogical activity;
- attention is paid not only to the content of additional digital education programs, but also to the organizational conditions of their implementation, including holding informal team-building events for existing teachers in order to remove psychological barriers and attitudes;
- development of skills in organizing digital platforms for discussing current problems of the educational process;
- preparation of a modern teacher for the development and use of digital auxiliary tools to the educational process, platform solutions from the point of view of basic digital skills.

2 Materials and methods

The empirical part of the study (expert survey) was attended by 347 people from among the representatives of the scientific and pedagogical community of higher agricultural education in the South of Russia. Digital professional competencies were structurally grouped into five substantive sections of the expert and questionnaire. Experts assessed 28 indicators of digital literacy of a teacher of higher education according to the degree of formation of the staff of the department, faculty for the successful completion of work tasks. The assessment is given on a five-point scale, where 1 point – the level of competence is insufficient to perform the assigned work tasks; 5 points – the level of competence allows you to successfully perform work tasks. The data obtained during the survey were processed in the SPSS Statistics program (version 23) and presented in a generalized form of statistical distributions. The

average values for the studied areas of digital literacy are presented in segmentation by training areas: Economics, Engineering, Agrobiolology, and Environment. This approach makes it possible to develop courses for improving the digital literacy of scientific and pedagogical staff of the university in the volume and content necessary for a certain direction.

3 Results and discussion

We present the results of the conducted research in an analytical table, where expert estimates are calculated in the form of average values for the areas of training and in general for the surveyed population (see the data in table 1).

Table 1. Expert assessment of the formation of the scientific and pedagogical staff’s digital competencies in the areas of education

The field of digital literacy	Engineering	Economics	Agrobiolology	Environment	On average in the areas of education
Information literacy	4,27	4,40	4,18	4,38	4,31
Digital communication formats and collaboration	4,41	4,55	4,33	4,60	4,47
Creating digital content	3,62	3,74	3,53	3,77	3,66
Security and responsible use of the online environment	4,25	4,28	4,26	4,19	4,25
Organization of training in a digital environment	4,19	4,26	4,09	4,15	4,17
General level of digital literacy	4,15	4,25	4,08	4,22	4,18

Compiled by the authors

Based on the conducted research, a number of conclusions can be drawn. The participants of the expert survey note a high level of formation of digital competencies of scientific and pedagogical workers: 4.18 points on a five-point scale (i.e. 83.6% out of 100% possible).

The most formed competencies are those related to the organization of communications and cooperation – 4.47 points on a five-point scale (i.e. 89.4% out of 100% possible).

The urgency of priority competence building exists in terms of creating digital content, where the lowest value of expert assessments is noted – 3.75 points on a five-point scale (i.e. 73.2% out of 100% possible). The data is presented in table 2.

Table 2. Expert assessment of the formation of the scientific and pedagogical staff’s in the field of digital content creation

Competencies in the field of digital content	Engine ering	Economics	Agrobio logy	Environ ment	On average in the areas of education
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3.1. The skill of developing interactive tasks in Web 2.0 services	3,16	3,39	3,18	3,83	3,39
3.2. The ability to create visually interesting materials (integration of animation, multimedia, interactive elements, etc.)	3,62	3,58	3,67	3,83	3,68
3.3. Goal-setting skills in the process of choosing, changing, combining and creating digital learning resources taking into account the educational context, educational goals and target audience / group of students	3,79	3,95	3,65	4,00	3,85
3.4. The ability to create virtual platforms for study groups: blogs, websites	3,26	3,41	3,22	3,25	3,28
3.5. The ability to develop their own means of communication (blog, forum, own website)	3,18	3,27	3,19	3,17	3,20
3.6. Knowledge of the requirements for the observance and protection of intellectual property rights on the Internet	3,90	3,82	4,08	4,17	3,99
3.7. Skill of working with authorship verification systems (anti-plagiarism)	4,42	4,70	4,57	4,17	4,46
The overall level of digital literacy in the field of digital content creation	3,62	3,74	3,53	3,77	3,66

Compiled by the authors

When organizing training seminars and advanced training courses, it is necessary to pay attention to the following competencies related to the “Digital content creation” section, which received the lowest expert scores:

- the ability to develop your own communication tools (blog, forum, own website) (3.20 points on a five-point scale);
- ability to create virtual platforms for study groups: blogs, websites (3.28 points on a five-point scale);
- the skill of developing interactive tasks in Web 2.0 services (3.39 points on a five-point scale);
- ability to create visually interesting materials (integration of animation, multimedia, interactive elements, etc.) (3.68 points on a five-point scale);
- goal-setting skills in the process of choosing, changing, combining and creating digital learning resources (DLR) taking into account the educational context, educational goal and target audience / group of students (3.85 points on a five-point scale).

The information segmented in the context of training areas shows the uneven formation of digital competencies necessary to solve current work tasks. The highest opportunities for building digital competencies exist in the engineering and agrobiological areas, which must

be taken into account when distributing control figures in the organization of advanced training and the development of additional education programs.

4 Conclusion

The theoretical analysis of scientific sources made it possible to identify relevant areas for developing a strategy for designing additional educational programs and organizing the process of their implementation. This is the need for input control of the level of formation of digital competencies of teachers; development of the content of training courses taking into account future areas and levels of professional pedagogical activity; attention to the organizational conditions for the implementation of additional educational programs, including informal team-building activities for existing teachers in order to remove psychological barriers and attitudes; development of skills in organizing digital platforms for discussing current problems of the educational process; preparation of a modern teacher for the development and use of digital auxiliary tools to the educational process, platform solutions from the point of view of basic digital skills.

The urgency of priority competence building exists in terms of creating digital content, where the lowest value of expert assessments is noted – 3.75 points on a five-point scale (i.e. 73.2% out of 100% possible).

When organizing training seminars and advanced training courses, it is necessary to pay attention to the following competencies related to the section “Creating digital content”, which received the lowest expert points: the ability to develop their own communication tools (blog, forum, own website); the ability to create virtual platforms for study groups: blogs, websites; the skill of developing interactive tasks in Web-2 services; ability to create visually interesting materials (integration of animation, multimedia, interactive elements, etc.); goal-setting skills in the process of selecting, changing, combining and creating digital learning resources (DLR) taking into account the educational context, educational goal and target audience /group of students.

The general map of digital competencies of research and teaching staff obtained during the survey can be used as a basis for the preparation of additional educational programs to align the digital profile of university research and teaching staff.

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