IMPROVEMENT OF SUSTAINABLE ENVIRONMENTAL AND ECONOMIC COMPETENCES USING THE E-ACADEMY FOR THE DEVELOPMENT OF RURAL AREAS

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A R T I C L E I N F O	A B S T R A C T
	Today, sustained development faces major challenges, which is based on economic, ecological and sociocultural principles, and which is a prerequisite for the development of rural areas. The goal of the work is the implementation of the professional education model for people from rural areas through the improvement of sustainable environmental and economic competencies using the E-Academy platform. The research is based on data obtained through the Survey (164 respondents), from Serbia, Slovenia and Croatia. The results show that 57% of respondents have secondary education and all are from rural areas. It has been established that the majority have elementary knowledge of the use of digital platforms and tools, so the interest in such education is at an enviable level. The significance of the results is reflected in the inclusion of the rural population in the E-Academy, monitoring the course of education and helping those who strive to improve agriculture.

Introduction

Although sustainable development faces many challenges (Ignjatović et al. 2024; Fisher et al., 2023; Mensah & Ricart Casadevall, 2019; Sima & Gheorghe, 2009) and

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continues to create the conditions for the economy to develop smoothly in accordance with ecological principles (Environment engenering group, 2024; Cepeliauskaite & Stasiskiene, 2020). Sustainable development as a concept is a prerequisite for rural development because it is based on economic, ecological and socio-cultural principles (Ignjatović, Đorđević, 2023). European rural areas are largely different, due to their natural, economic, social, cultural, political and institutional differences, as well as development opportunities (Gajić et al. 2021; Todorović, Štetić, 2009; Pantović et al., 2023; Miletić et al., 2023), also circularity (Mashović et al. 2022).

Agricultural production is an important part of economic activity. The population that mainly engages in agriculture is highly represented, while incomes from this activity are relatively small (no more than 5% of total household incomes). In recent years, the abandonment of villages has been one of the biggest problems in rural areas, along with insufficiently developed infrastructure, small and fragmented farms. The decrease in the number of inhabitants in rural areas is a constant problem in the last decades, while the potentials for the development of agriculture and rural development remain as a hope to slow down and stop this trend (Antic et al., 2017). In order for rural areas to start living and attract a larger number of inhabitants, it is necessary to invest in their development, through the improvement of infrastructure and amenities in the countryside, but also additional education as well as in populated and more developed cities.

Agricultural production plays a major role in the development of rural areas and the impact on the ecosystem in the form of reducing environmental degradation and providing healthy and safe food (Bajagić et al., 2022; Ilić-Kosanović et al., 2019; Podhorska et al., 2019). Cvijanović et al. (2020) states that food production at the local level directly affects the development of sustainable regional level, and as such is the main factor for implementing the strategy of sustainable regional development. Agriculture certainly has great potential in the development of specific products, which makes it a very rich activity (Smolović, 2022). This is especially expressed today in the production of perennial crops or vegetable gardens, where the earnings per unit area are higher, especially in intensive production (fruit growing and viticulture, vegetable production, etc.), with the possibility of producing products with added value (processed vegetables, fruit and grapes). In addition to the visions and opportunities that need to be developed and financially supported by development agencies and the EU itself, that is, the fund for rural development, another type of aid is certainly needed in order to encourage rural development as strongly as possible (IPARD, 2024). Rural development should provide current and future farmers, as well as their associations and cooperatives, with easy and accessible information, provision of advisory services related to the development of business plans. In addition, rural development would initiate the creation of databases, creation of project documentation, networking (connection), education, connection with domestic and foreign donors, promotion of potential, brands and services. The goal would certainly be to use the potential of agriculture and rural development, which is still developing poorly and slowly in Serbia (Bogdanov and Babović, 2019).

When it comes to the digital literacy of the population, inequalities are decreasing over time, thanks to the fact that the share of the population with basic or more advanced digital skills is increasing, especially in the female population. However, it should be borne in mind that the data in relation to the type of settlement in which women and men live were not publicly available, so it cannot be accurately claimed whether there are differences in both urban and rural areas (Cvejić, 2010; Lakićević et al., 2022). That is why digital literacy is necessary through the development of e-platforms, in order to improve people and provide them with support, which would further contribute to innovation and rural development.

The aim of the research

The aim of the work is to indicate the development of a model of high-quality vocational education of people from rural areas through the improvement of sustainable ecological and economic competences using the E-Academy. The primary task of this research is the collection of information and the analysis of the current situation and the necessary measures, which represent the basis for finding the best model.

Materials and methods

For the process of data collection, a quantitative approach to public opinion polling in the form of a closed and anonymous questionnaire and a statistical method (sample method) was used. The work is based on data collected from three different geographical areas: Serbia (Mačva), Croatia (Vukovar-Srijemska County) and Slovenia (Dolenjska). The survey was conducted by the Academy of Vocational Studies Šabac - Department for Agricultural and Business Studies and Tourism Republic of Serbia, Society for the Development of Voluntary Work Novo Mesto Slovenia and Technical College Vinkovci Republic of Croatia. The survey was conducted indirectly, based on a completely random sample. The period for completing the questionnaire is September - November 2023. The number of respondents was: for Serbia 53, of which two are not valid, for Slovenia 50 and Croatia 63, which for the analysis is the total number of respondents 164. The survey consists of 37 questions (*Table 1*). Data summarization was subjected to descriptive analysis, the results of which are presented descriptively and graphically. Additionally, in the research, an analysis of the existing situation and a clearer presentation of the conditions, education, experience and other facts, which further enable the finding of the best methods for the implementation of the basic goals, were carried out.

Table 1. Layout of the survey used in the research

1. The gender of the respondent?	1. Male 2. Female
2. Age of the respondent?	1. 15-19 2. 20-29 3. 30-39. 4. 40-49 5. 50-59 6. 60 +
3. Level of Education?	1. No qualification 2. Secondary vocational education 3. Higher education or higher professional education 4. Master of Science 5. Doctor of Science
4. Permanent residence?	1. Rural area 2. Urban area
5. Difficult access to residence?	1. Yes 2. No
6. Have you escaped from the war in Ukraine?	1. Yes 2. No
7. Do you have the technical conditions for work (computer, tablet, phone, etc.)?	1. Yes 2. No
8. If the answer to question number 7 is YES - which of the listed devices would you use to participate in the e-Academy?	1. Smartphone (Android) 2. Smartphone (iOS) 3. Desktop computer/laptop 4. Tablet (Android)
9. If the answer to question number 7 is NO - It is acceptable for me to participate in the e-Academy in the premises of the project partners in:	1. Jarmina 2. Šabac 3. Vinkovci 4. Other
10. Is translation with subtitles acceptable?	1. Yes 2. No
11. Is video work acceptable?	1. Yes 2. No
12. Is "chat" an appropriate tool for interaction with the lecturer?	1. Yes. 2. No
13. Do you need help using the chat tool?	1. Yes 2. No
14. If the answer to question number 13 is YES - Do you accept education as a type of professional help?	1. Yes 2. No
15. Do you think offline access is important?	1. Yes 2. No
16. Is an always available Q&A useful?	1. Yes 2. No
17. Do you have experience in education through an online platform?	1. Yes 2. No
18. If the answer to question number 17 is YES - Please specify which one?	
19. If the answer to question number 17 is YES - What caught your attention?	1. Good transparency of content 2. Interaction with the lecturer 3. Ease of access 4. Existence of Offline Content 5. Other

| In the following questions, circle the number that best describes the extent to which you expect/believe the following statements (1. I do not expect/believe, 2. I expect/believe a little, 3. I expect/believe a lot 4. I expect/believe more, 5. The most I expect/believe).					
20. Expectations of the e-Academy? Availability and access to modules!	1	2	3	4	5
21. Expectations of the e-Academy? Adapting to experiences and trends.	1	2	3	4	5
25. Expectations of the e-Academy? Learning flexibility.	1	2	3	4	5
26. Expectations of the e-Academy? Adapting to your own learning style	1	2	3	4	5
27. Expectations of the e-Academy? Ability to select modules.	1	2	3	4	5
28. Expectations of the e-Academy? Availability of materials.	1	2	3	4	5
29. Expectations of the e-Academy? Availability of multimedia content.	1	2	3	4	5
30. Expectations of the e-Academy? Continuous self-check.	1	2	3	4	5

25. Expectations of the e-Academy? Learning flexibility.	1	2	3	4	5
26. Expectations of the e-Academy? Adapting to your own learning style	1	2	3	4	5
27. Expectations of the e-Academy? Ability to select modules.	1	2	3	4	5
31. Trust factor: High-quality course content and instructors?!	1	2	3	4	5
32. Trust factor: Positive user reviews?	1	2	3	4	5
33. Trust Factor: Customer Support?!	1	2	3	4	5
34. Trust factor: Data protection and privacy?	1	2	3	4	5
35. Trust factor: Good design?!	1	2	3	4	5
36. Trust Factor: Regular Updates?!	1	2	3	4	5
37. Suggestions? Specify.					

Source: Authors

Results and Discussions

The total number of respondents who participated in the survey was 166 people, but two surveys were canceled due to malfunctions, which implies that the sample used for the research results was 164 respondents. Of that number, 89 respondents were female, and 75 were male (*Figure 1, Question 1*). Expressed as a percentage, 54% of respondents are female, and 46% are male. The age structure of the respondents (*Figure 1, Question 2*) was analyzed through six clearly defined groups, namely: The first group (from 15 to 19 years old), respondents participate with 25%, i.e. 41 respondents belong to this group; The second group (20 - 29) make up 31% (51 respondents), which also represents the most numerous surveyed population, in relation to all other groups; The third age group, consists of 20% (33 respondents), while, the fourth group (from 40 to 49 years old) consists of 10% (17 respondents); The fifth group of respondents aged 50 to 59 participates with 9% (15 respondents) and the sixth, oldest group over 60 participates with 4% (7 respondent).

Figure 1. Results of the survey questionnaire (*question 1 and 2*)
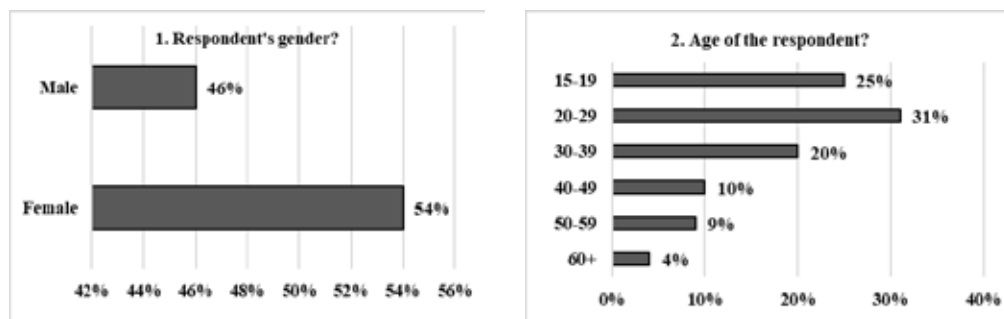
Source: Authors

The level of education of the respondents, which is shown in Fig. 2 (*Question 3*), shows that 6% of respondents, i.e. 10 people, have no qualifications. The largest number of respondents in the amount of 94 persons (57%) have a high school diploma, followed by 21% (35 respondents). Furthermore, 13% of the respondents (21 respondents) have a master's degree, and 2% (4 respondents) have a doctorate.

Figure 2. Results of the survey questionnaire (*question 3*)
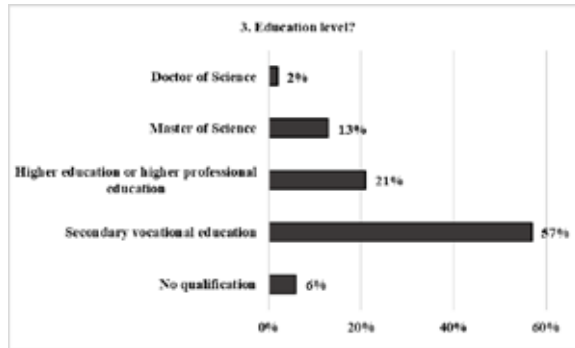
Source: Authors

To question no. 4 (*Figure 3*), which refers to the respondent's area of residence, all answered (100%) that they live in a place that belongs to the rural type, while there is not a single respondent in the urban area. When answering question no. 5, whether they have difficult access to their residence, 32% (53 respondents) answered affirmatively, where 2 respondents stated that the reason was limited or less frequent public transportation (*Figure 3*). There are 67% (109 people) of negative answers, and 2 respondents (1%) belong to the other category (none of the above). The number of respondents who belong to the group who escaped from Ukraine (*Figure 3, Question 6*), considering the current state of war, is 10% (16 respondents), while 90% (148 people) do not belong to this category. Results of the survey on question no. 7 (*Figure 3*) about the state of technical conditions for work says that 85% (140 respondents) have the conditions for distance education, while 24 respondents (15%) do not have the conditions. Some of the reasons are a bad internet connection or not having the necessary equipment.

Figure 3. Results of the survey questionnaire (*question 4, 5, 6 and 7*)
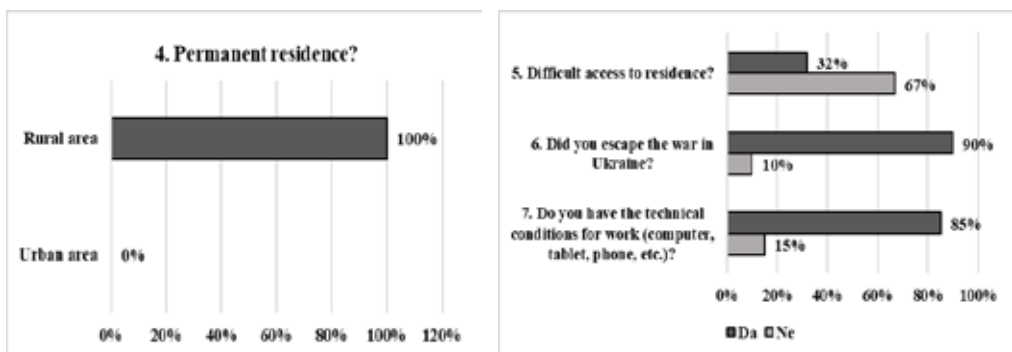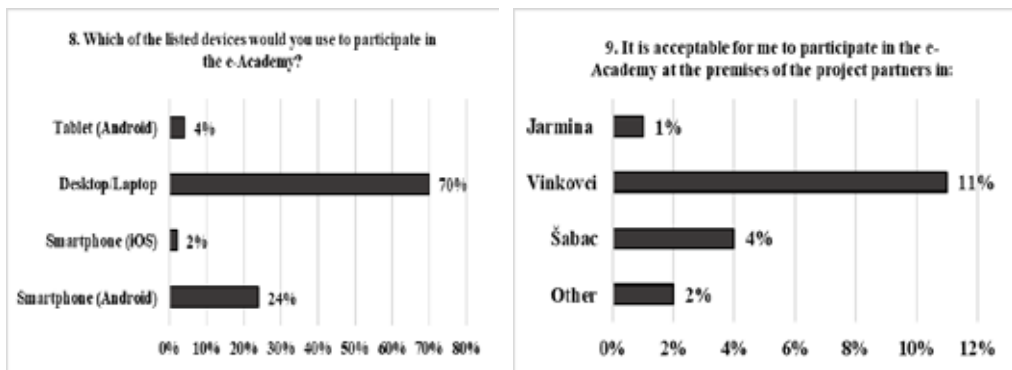

Source: Authors

Of the total number of respondents who answered affirmatively to the previous question (140 persons), to question no. 8 (*Figure 4*): What would they use to participate in the e-Academy, the survey shows that 4% (5 respondents) own a Tablet (Android),

70% (98 respondents) have a desktop computer, while 2% have an iOS smartphone (3 respondents), and 24% (34 respondents) own an Android smartphone.

Respondents who answered negatively to question number 7 (24 respondents) were offered the choice to choose places where the premises of project partners are located that are acceptable to them for participation in the e-Academy (*Figure 4; Question 9*). Holding education in the place: 1% (1 respondent) would accept Jarmin, 11% (15 respondents) would attend in Vinkovci, 4% (5 respondents) in Šabac, while 2% (3 respondents) are interested in other places. Also, it is important to note that people who have the technical conditions to access the e-Academy are interested in attending "live" education, and have listed places where they would like to come, such as Šabac, Novo mesto, Vinkovci, Županja, etc.

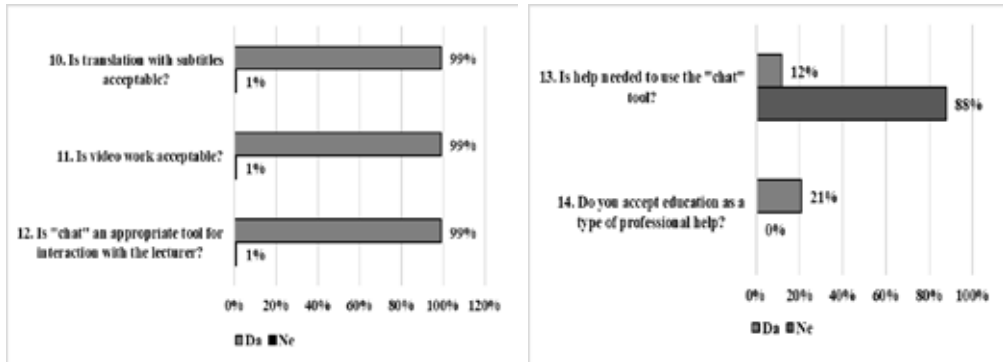**Figure 4.** Results of the survey questionnaire (*question 8 and 9*)

Source: Authors

To questions no. 10. Is translation with subtitles acceptable?, no. 11. Is video work acceptable? and no. 12. Is "chat" an appropriate tool for interaction with the lecturer? Figure 5 shows that of the total number of respondents, 99% (162 respondents) answered yes, while 1% (2 respondents) gave a negative answer.

By asking question no. 13. Is help needed to use the "chat" tool?, 12% (19 respondents) declared that they would like help, while 88% of them (145 respondents) are familiar with the use of the "chat" tool (*Figure 5*).

For respondents who want help (19 people), by question no. 14. Is education acceptable to them as professional help, only 4 respondents answered in the affirmative (21%), while the rest did not declare (*Figure 5*). Also, it is important to point out that 6 respondents who do not need help using "chat" would like an additional course in order to improve the use of this tool for online communication.

Figure 5. Results of the survey questionnaire (*question 10, 11, 12, 13 and 14*)
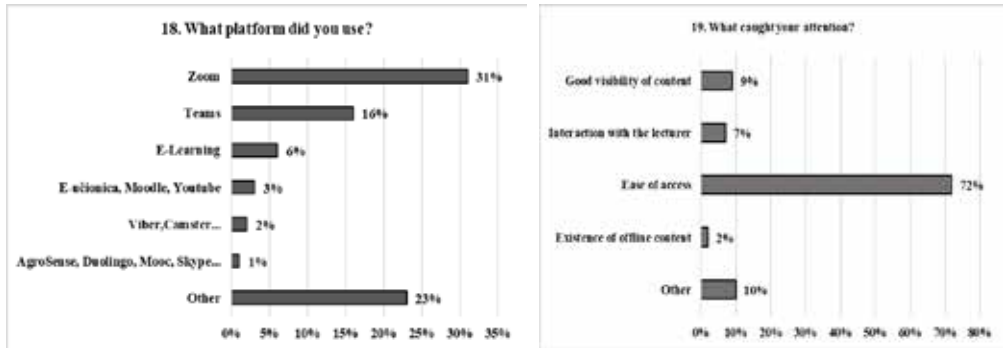

Source: Authors

Results of the survey on question no. 15. (*Figure 6*), Do you think that offline access is important?, 86% (141 respondents) think that it is important to access education even without the network, while for 13% (22 respondents) offline access is not important. Question: Is the always available Q&A useful? (*Figure 6, Question 16*), 95% (156 respondents) agreed, and 5% (8 people) indicated that it was not useful. Next question no. 17. (*Figure 6*), which refers to having experience for education through an online platform, 54% (88 persons) have experience, while 45% (75 persons) have not used distance education, and 1 respondent (1%) did not answer .

Figure 6. Results of the survey questionnaire (*question 15, 16 and 17*)
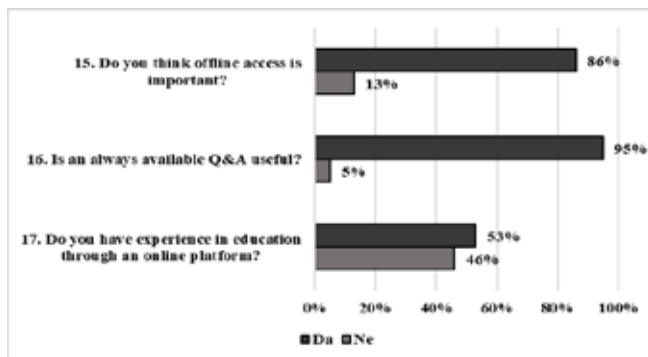
Source: Authors

Question no. 18 refers to respondents who answered the previous question in the affirmative (88 respondents), and they were asked to indicate which online platform they used (*Figure 7*). Of the above responses, the largest number used the platform Zoom (27 respondents), Teams (14 respondents), E-learnig (5 respondents), E-classroom, Moodle and Youtube (3 respondents), Campster and Viber (2 respondents), AgroSence, Duolingo, Google Meet, Graphic design, Coding, Mooc, Photoshop, Renault manufacturin e-learning, Skype and Sova (1 respondent), and 20 respondents refrained from giving an answer.

Figure 7. Results of the survey questionnaire (*question 18 and 19*)
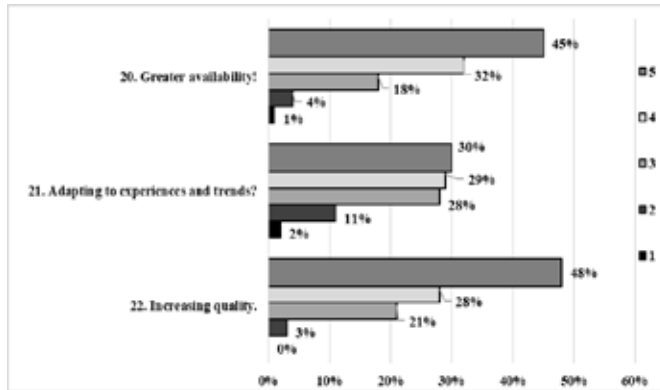

Source: Authors

The same number of respondents (88) additionally answered question no. 19. What attracted attention for using the platform? (*Figure 7, Question 19*). 9% (8 respondents) opted for good visibility of the content, 7% (6 respondents) were interested in interaction with the lecturer, ease of access is important for 72% (63 respondents), existence outside the network access is important for 2% (2 respondents), while 10% (9 respondents) did not choose any of the offered answers.

Furthermore, the Survey consisted of a group of questions (from 20 to 30 questions) related to the expectations of education through the e-Academy, where respondents were offered statements that should be answered (circled): 1. I do not expect, 2. A little I expect, 3. I expect a lot, 4. I expect more, 5. I expect the most.

To question no. 20. Is greater availability and access to education-related modules expected?! (*Figure 8*), respondents answered as follows, 1% (2 respondents) do not expect, 4% (7) expect a little, 18% (29) expect a lot, 32% (52) have more expectations and 45% (74) expects maximum availability of the e-Academy platform. Furthermore, expectations in adapting to the experiences of respondents and trends that are current (*Figure 8, Question 21*), 2% (3 respondents) have no expectations, 11% (18) expect a shift in monitoring experience and trends, 28% (46) expect a lot of adaptation to experiences and trends, 29% (47) expect more, and 30% (50) have the highest expectations in monitoring the existing systems of respondents, as well as the current current trends occurring in online education.

When it comes to expectations regarding an increase in the quality of education through the platform (*Figure 8, Question 22*), all respondents expect a certain percentage, namely: 5% (3) expect a little increase in quality, then 21% (35) have a lot of expectations in quality online education, 28% (46) expect more in the quality of this type of learning and 48% (78) the largest number of respondents expect a serious quality of education through the e-Academy.

Figure 8. Results of the survey questionnaire (*question 20, 21 and 22*)
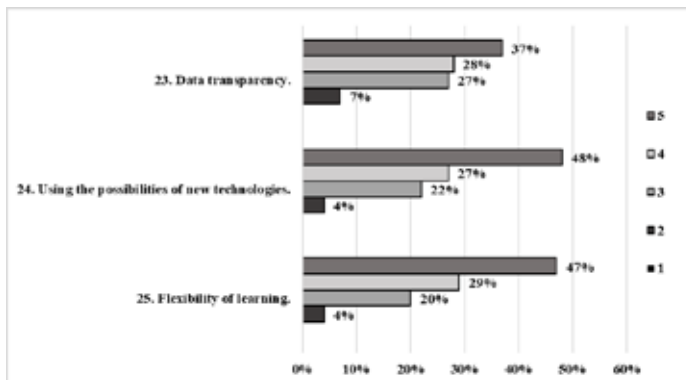

Source: Authors

Expectations related to the transparency of data, i.e. all lectures, exercises, literature that are available (*Figure 9, Question 23*), the respondents expect that it is also present: 7% (12) expect a little transparency, 27% (45) expect a lot, 28% (46) have more expectations, and the largest percentage of respondents, 37% (61), expect maximum transparency.

All survey participants expect the use of new technologies (*Figure 9, Question 24*), according to the following: 4% (6) have little expectations for the use of new technologies, 22% (36) expect a lot of use of new technologies, 27% (44) have more expectations, and 48% (78) fully expect accessibility and the possibility of using new technologies during education through the e-Academy.

Flexible learning (*Figure 9, Question 25*) is expected by everyone to an extent: 4% (6) have low expectations, 20% (33) expect a lot of flexible learning, 29% (48) expect more understanding for flexible learning and 47% (77) believe that it is necessary to enable the flexibility of education through the platform.

**Figure 9.** Results of the survey questionnaire (*question 23, 24 and 25*)

Source: Authors

In this regard, question 26 was asked about the expectation of adaptation to one's own style of learning and education through personal style and manner, where 1% (1 respondent) does not expect permission to change the style of education, 6% (10) expect some adaptation from professionals, 18% (29) expect a lot, 29% (48) expect more, while 46% (75) expect complete understanding and adaptation of students' style during education. One person did not respond to any of the offered expectations (*Figure 10*).

To question 27 (*Figure 10*), whether they expect the possibility of choosing educational modules according to their own needs and potential, all answered positively, namely: 5% (9) have low expectations, 17% (28) expect a lot of choice, 26% (42) expect more, while 52% (85) of respondents have the highest expectations for the possibility of choosing educational modules according to their own needs and potential.

When it comes to the availability of learning materials, 2% (4) have low expectations, 15% (24) expect a lot of present and available material, 26% (42) expect more, and the largest number of respondents, 52% (85), expect maximum availability of all materials for easier online education (*Figure 10, Question 28*).

Figure 10. Results of the survey questionnaire (*question 26, 27 and 28*)
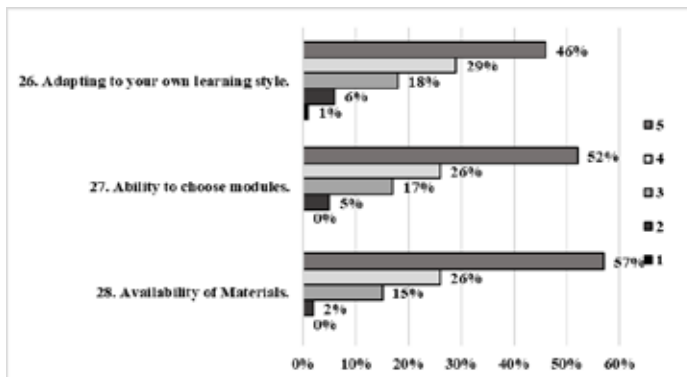
Source: Authors

For the availability of multimedia content (*Figure 11, Question 29*), 5% (8) have low expectations, 17% (28) expect quite good availability, 26% (43) expect more, while 51% (84) definitely expect always presence multimedia data. One respondent did not answer. Expectations regarding continuous self-checking (*Figure 11, Question 30*), 1% (1 respondent) do not expect self-checking, 6% (10) expect little, 19% (31) expect a lot of engagement for self-checking, 29% (47) expect more, and 45% (74) are interested in constant continuous self-checking during education through the e-Academy. One respondent did not state his expectation.

**Figure 11.** Results of the survey questionnaire (*question 29 and 30*)
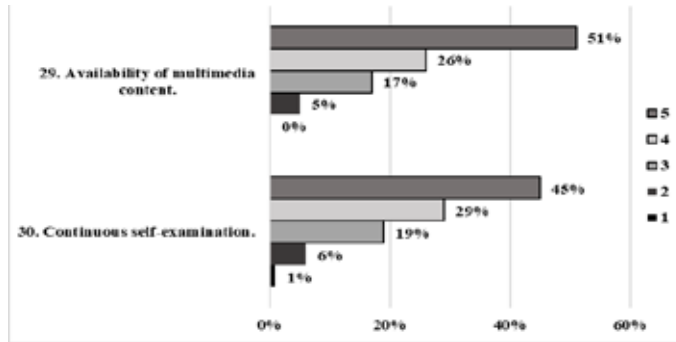
Source: Authors

The following 6 questions of the Survey refer to trust factors during the education offered by the e-Academy platform (from 31 to 36 questions), and the respondents marked the answer to what extent they trust the set factors: 1. I do not believe, 2. I believe a little, 3. I believe a lot, 4. I believe more, 5. I believe the most.

To question 31 (*Figure 12*), whether they believe that the e-Academy represents high-quality course content and the quality of the expertise of the instructors who run the e-Academy, respondents answered positively, so that 3% (5 respondents) have little confidence, 13% (21) believe a lot, 29% (47) believe more and 55% (90) of respondents have full confidence in the quality of the course and the instructor. One respondent did not answer.

Do they believe in positive user reviews based on the content of the course and the instructor's presentation (*Figure 12, Question 32*), the respondents answered according to the following, 1% (1 respondent) have no confidence, 5% (9) have little confidence, 26% (42) trust a lot, 32% (52) trust more, and 36% (59) have the most trust in the presence of positive user reviews. Only one person did not answer. Regarding user support during e-learning (*Figure 12, Question 33*), 4% (7) have little faith in support during education, 20% (33) believe a lot, 25% (41) believe more, while 50% (82) has maximum confidence in the customer support of the platform when using it.

Figure 12. Results of the survey questionnaire (*question 31, 32 and 33*)
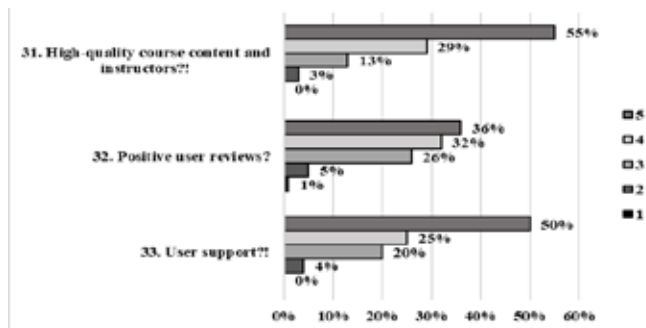
Source: Authors

When it comes to the protection of data and privacy of all persons using the e-Akademija platform (*Figure 13, Question 34*), 1% (1) of respondents do not trust the protection, 4% (7) have little faith that the protection is present, 17% (28) believe a lot, 24% (40) believe more, and 52% (86), more than half of respondents believe in the support of the e-platform that offers protection of all data and complete privacy. One respondent did not answer question no. 33 and 34. Question 35 (*Figure 13*) refers to the belief that the design of the e-Academy is good, respondents answered as follows: 1% (1 respondent) do not believe in a good design of the platform, 5% (8) believe little, 17 % (28) believe a lot in good design, 30% (50) believe more and 45% (74) completely believe in good design of the e-Academy for ease of using the platform. Do they believe in regular updates of the e-Academy (*Figure 13, Question 36*), 1% (1) respondents do not believe in regular updates, 5% (8) little believe, 18% (30) believe a lot, 30% (50) believe more in the help of platform updates, while 44% (72) completely believe that updates will be essential from the customer service during any changes to the platform. On questions 35 and 36, 2%, that is, 3 respondents did not give answers to the offered trust factors.

Figure 13. Results of the survey questionnaire (*question 34, 35 and 36*)
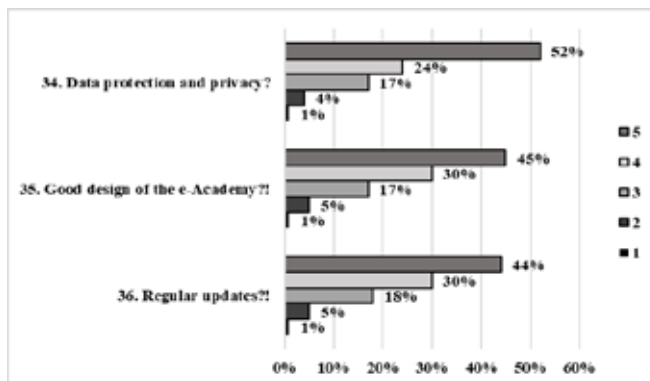
Source: Authors

The respondents had the opportunity to make suggestions regarding the improvement of the strategy and the provision of the best conditions for online learning through the e-Academy application (*Question 37)*, where some respondents answered that an extremely good internet connection is necessary, that the platform be as easy to use as possible, and that there is a certain level educational and cultural education during group educations (no talking, no jobs that can interfere with the course of education).

Conclusions

Sustainable development, which today faces major challenges, is a prerequisite for the development of rural areas. It is based on economic, ecological and socio-cultural principles that together lead to development. Abandonment of villages, in recent years, is considered the biggest problem in rural areas, along with insufficiently developed infrastructure, small and fragmented farms. One of the ways to stop migration is digital

literacy, which can be improved by developing e-platforms, with the aim of training people, that is, providing support, which would result in innovation and rural development.

According to the results of the Survey, the views of respondents indicate that most respondents are interested in education through the e-Academy, continuing education, that they have the technical conditions for education, as well as basic knowledge of the application of various e-platform tools. The problem of the population in rural areas is the distance from urban areas where educational institutions are located, and most of them are already engaged in some form of agriculture, which requires constant presence and work.

An additional satisfaction of the success of this kind of education is that the respondents are from rural areas, and there is a motivation and desire to improve both in the educational and practical sense. In this way, educated profiles of the population would be created, favorable conditions for the improvement of agricultural farms and rural tourism, as well as their synergies with those who are already engaged in these activities, on the one hand, as well as those interested in starting a business in the mentioned activities, on the other hand. Also, it is important to point out that the e-Academy platform was designed and built in accordance with the expectations of the respondents, and it does not need to be additionally modified. The direction of further research should be based on starting the education of people through the e-Academy, monitoring the course of education and guiding people who complete the education, and additionally work on marketing and promoting this type of learning for future generations who live in remote places and have the desire to improve in in every respect.

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Conflict of interests

The authors declare no conflict of interest.

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