Agriteach 4.0

Connecting VET teachers to Agriculture 4.0

IO2 "Training needs for the Teachers for preparing students for Agriculture 4.0 National Survey in Hungary"

Analysis

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Abbreviations

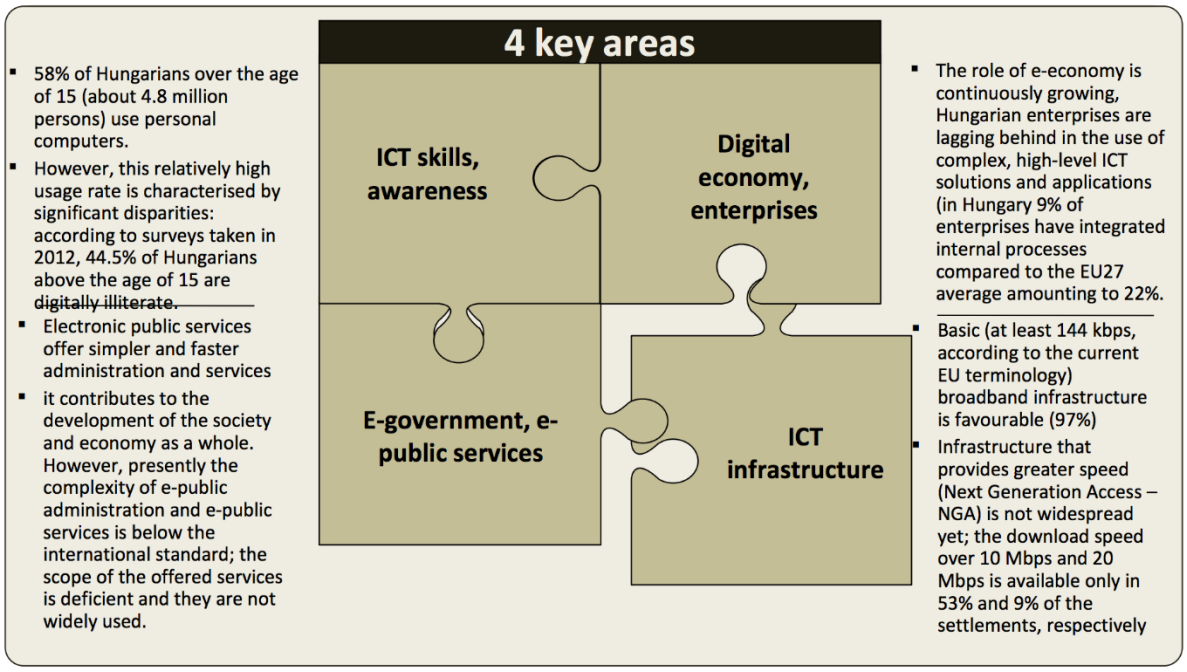
AEC	Agency for Electronic Communications
AKIS	Agriculture Knowledge and Information System
CAP	Common Agricultural Policy
DAS	Digital Agricultural Strategy
EU	European Union
GIS	Geographic Information System
GPS	Global Positioning System
GVA	Gross Value Added
ICT	Information and Communication Technology
ISCED	International Standard Classification of Education
ITU	International Telecom Unit
NQR	National Qualification Register
OER	Open Educational Resources
VET	Vocational Educational Training

1 INTRODUCTION

1.1 ICT STATUS IN HUNGARY

1.1.1 ICT SECTOR IN HUNGARY

Today digitalisation is one of the key driving forces of competitiveness, growth and welfare, therefore, the Hungarian Government is committed to digital developments. The Government has prepared the Digital Success Programme (DSP) aimed at the digital development of the Hungarian society and the Hungarian national economy based on the results of the InternetKon survey.



ICT developments between 2014-2020, Dr. Csaba Kelemen: Ministry of National Development, 2013

Based on Government Decree 2012/2015 (XII. 29) and the results of the national consultation on the internet and digital development projects (InternetKon), the strategies determining the direction of digital development projects for the upcoming years have been drawn up within the allotted deadline according to the Digital Success Programme being implemented by the Government:

- The Digital Child Protection Strategy of Hungary,
- The Digital Education Strategy of Hungary,
- The Digital Export Development Strategy of Hungary,
- The Digital Startup Strategy of Hungary.

In Hungary, the digital economy makes up 20% of the gross value added (GVA) of the national economy as a whole and provides work to nearly 15% of all employees. (IVSZ-Századvég, 2015). Strictly speaking, the information and communications technology (ICT) sector accounted for 8.3% of exports within the national economy in 2014 and represented more than 10% of Hungary's R&D expenses in 2013. The sector – including,

in particular, the ICT processing industry – is characterised by the presence of large companies, while domestic small and medium-sized enterprises have an increasing role in the ICT services segment, which comprises software and application development companies, among others.

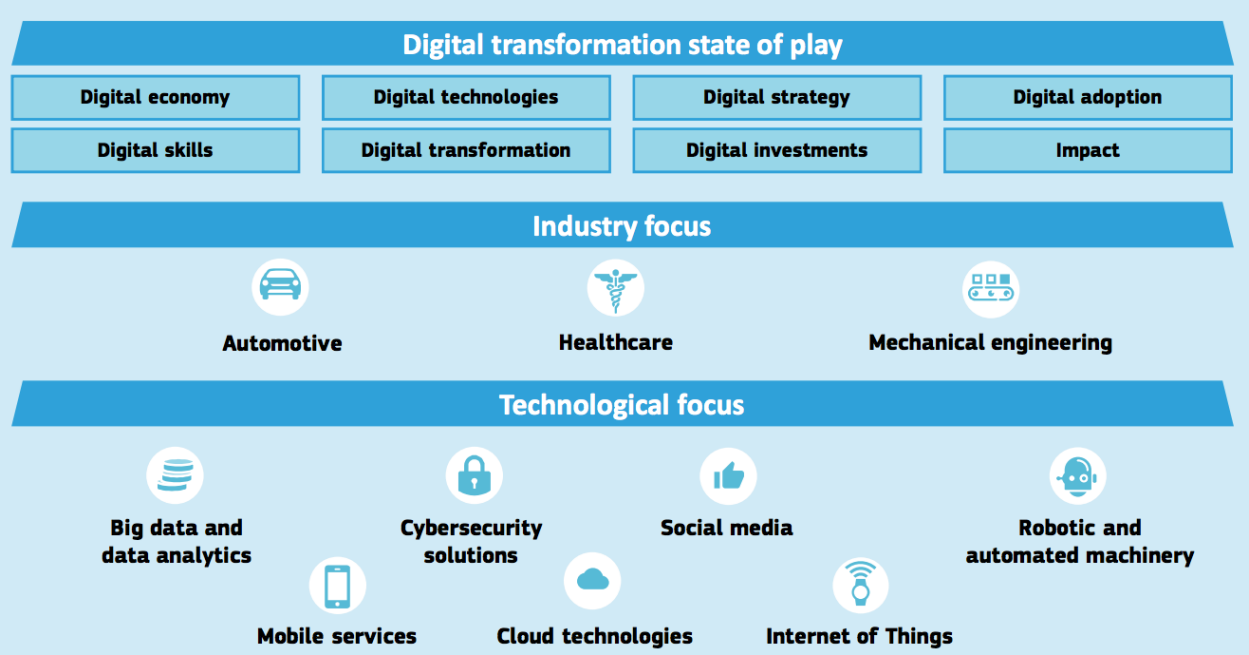
Making **governmental administration** more efficient is an increasingly strong aspect in all countries. In the past years Hungary has invested significant resources in building a digital state and implementing electronic government. The Hungarian Government has quite a few modern digital systems. Some of them were developed in an effort to meet the requirements of recent years' EU regulations (Schengen), while others were created through the digitalisation of quickly recoverable tax and contribution systems (online cash register, road toll, EKÁER - the Electronic Public Road Trade Control System) and can be competitive at international level as well.

Electronic Health Service Area (EHSA)
The Electronic Health Service Area (EHSA) has been set up in 2017 by the European Union funded by the Hungarian State Health Centre to exploit the potential of eHealth through the interconnection of healthcare providers and the unified communication space created for them. Thus, healthcare providers and recipients are more closely connected, simplifying the availability of data and documents generated during the care process, ensuring the healthcare sector's unified management and effective analysis of the available data, which is both helpful for the patient and the physician.

EHSA provides new, more service-oriented patient care services for Hungarian healthcare providers. Patients still have the usual processes, they go to the doctor as they want patients or routine check-ups and checks. However, the physician can use the information provided by EHSA to help diagnose the diagnosis faster and to provide more effective therapy for the patient. If for any reason, however, it would not reach the EHSA, say because of the lack of Internet connection, it supplies the patient in the usual manner and the data of the supply event will be automatically sent to the EHSA by the medical system it uses.

Rank of Hungary in the Digital Transformation Scoreboard -2017
According to the Digital Transformation Scoreboard published by the European Commission in 2017 Hungary is today a modest performer in digital transformation. In comparison to other European Member States, the country's main weaknesses lie in its digital infrastructure and in a limited e-leadership. However, Hungary's performance remains encouraging thanks to a good entrepreneurial culture, rather dynamic ICT sector and an attractive investment environment. Taking stock of existing challenges, the government recently implemented both strategic and operational policies to support the development of the ICT sector as well as to improve Hungarians' digital skills and infrastructure.

A country profile in the Digital Transformation Scoreboard has been created for each Member State, providing an overview of the identified key statistics through charts and figures to show strengths and areas of development regarding the enablers and outputs.

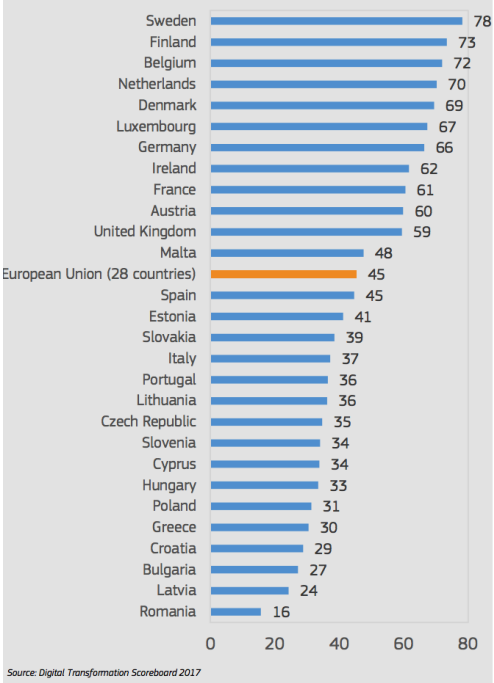


Digital Transformation Enablers' Index

The next Digital Transformation Enablers' Index (DTEI) provides a ranking for Member States based on the assumption that infrastructure, access to finance, and the demand and supply of skills are the most important factors driving digital transformation (with a respective weight of 20%, 30%, and 30% of the DTEI), whilst the indices on the environmental enabling conditions (e-leadership and entrepreneurial culture) are assumed to integrate the DTEI with lower weight (10% each).

According to the resulting index on digital transformation enabling conditions **Hungary** with its 33 scores is **below the Overall EU performance.**

Figure 89: EU Digital Transformation Enablers' Index



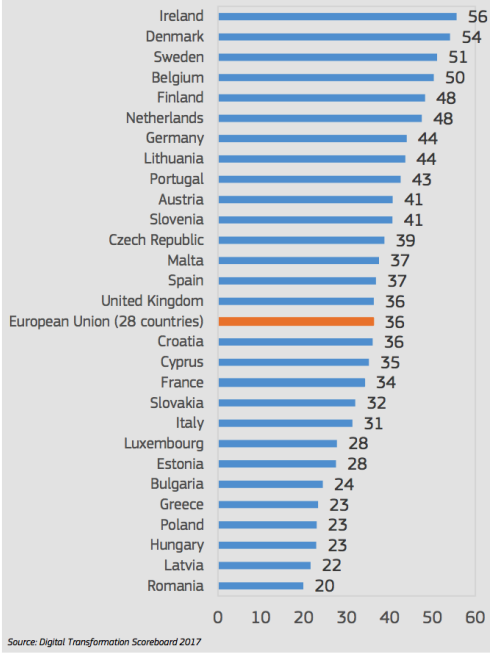
Source: Digital Transformation Scoreboard 2017

The Digital Technology Integration Index

The DTII adopted for the comparative analysis against enabling conditions only takes into account the eight individual indicators measured at national level and assumed **to reflect changes in the digital transformation of European businesses.**

The index also shows that a considerable number of Member States perform above the EU28 average rank in integration of digital technology which therefore reflects an overdispersion across the rank index (where the median is greater that the average). This result demonstrates that the **integration of digital technology is indeed taking place in a majority of EU economies**, although improvements are yet to be made in the case of central and eastern economies who are lagging behind.
The figure shows that Hungary is lagging behind with a performance level well below that of the EU average.

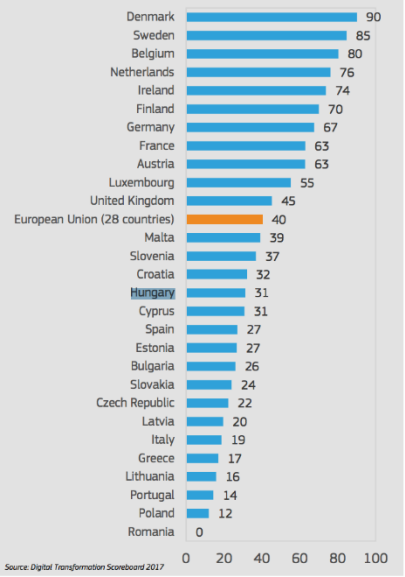
Figure 91: EU Digital Technology Integration Index



Digital skills for digital transformation

The relationship between digital technology integration and the supply and demand of digital skills was analysed using a rank index. Correlation analyses help understand the **extent to which digital transformation relates to the supply and demand of digital skills.**
In this area too, Hungary is slightly below the EU average performance.

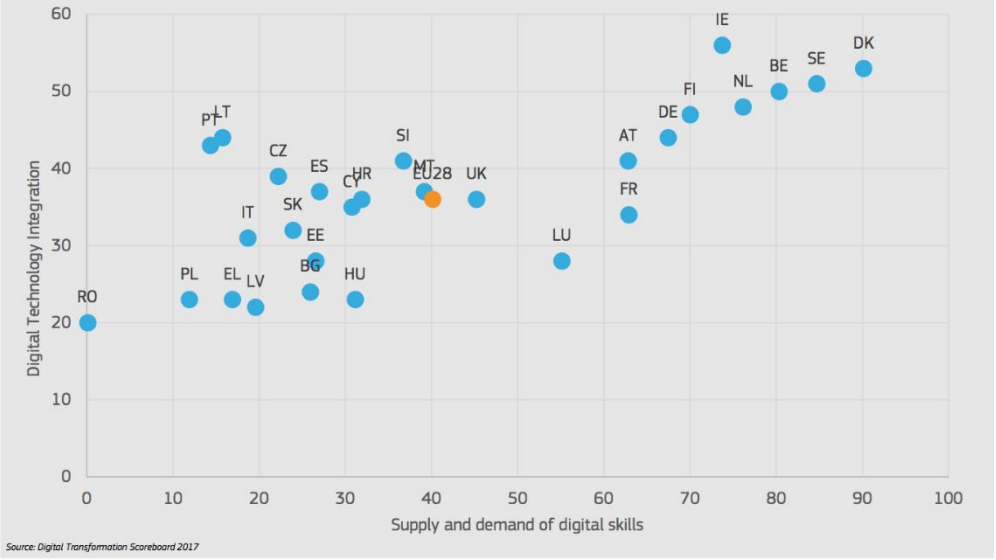
Figure 93: Supply and demand of digital skills



Positive impact of digital skills on digital technology integration

The next figure demonstrates the positive correlation between the level of supply and demand of digital skills and performance in terms of digital technology integration. The highest-performing in terms of digital skills are also the best performers in terms of digital technology integration and the same holds true for low performing countries.

Figure 94: Supply and demand of digital skills

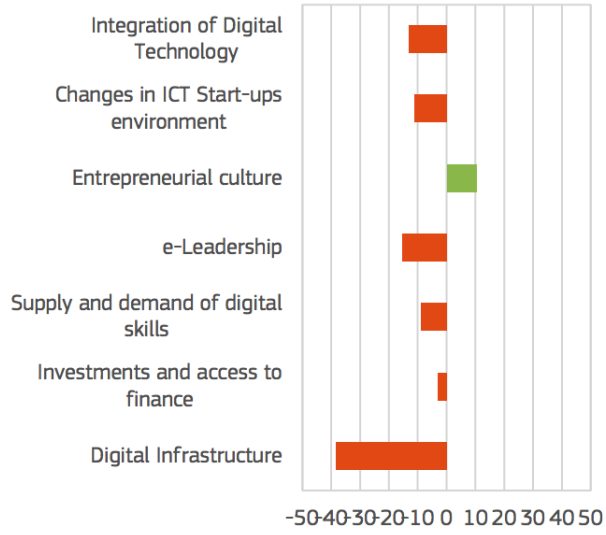


Source: Digital Transformation Scoreboard 2017

Comparison with other EU Member States

Compared to other EU Member States, Hungary performs below the average in 6 dimensions. – Entrepreneurial culture is the only field that stays above the EU average.

The digital infrastructure is the biggest challenge to overcome with 38% disparity compared to the EU average. On the contrary, the country proves to be relatively in line with EU Member States in two out of seven dimensions. Hungary scores less than 10% below the EU average in investments and access to finance, and supply and demand of digital skills. Hungary´s achievements are slightly weaker but not completely far-off the EU average in the remaining dimensions: ICT start-ups, integration of digital technology, and e-leadership. Overall, Hungary´s performance remains below the EU average across 6 dimensions. However, although Hungary scores low on digital infrastructure, the gap between the country and its European partners is marginal in many cases, such as investments and access to finance.



Note: Based on the average of the difference of the latest imputed values. Where no data available, the EU average was used.

1.2 VET SYSTEM IN THE HUNGARY

1.2.1 VET IN THE HUNGARIAN EDUCATION AND TRAINING SYSTEM

Since 2015, vocational training system has been updated to provide an adequate response to the changing trends in the education system, economy and the labour market. The reform aimed at better skills formation for young people and adults, including more dual training. The former VET system will phase out by 2019.
The compulsory schooling age is 16. Elementary education covers eight years of studies, of which four years are in primary education and four in lower secondary (grades 5 to 8, also called upper primary). In upper secondary education various learning paths are available, including VET.

1.2.2 GOVERNMENT REGULATED VET

Vocational education and training can be provided in upper-secondary, post-secondary and higher education programmes.
At age 14, after completing eight years of primary and lower-secondary education, learners may enrol in VET. Since 2016/17, there are the following VET school types:
(a) 'vocational grammar school' (*szakgimnázium*, former secondary VET schools);
(b) 'secondary VET school' (*szakközépiskola*, former VET school);
(c) 'VET school for students with special needs'.

1.2.3 VOCATIONAL GRAMMAR SCHOOL PROGRAMMES

Four-year (five-year for bilingual programmes) vocational grammar school (*szakgimnázium*) programme offers graduates a basic qualification registered in the National qualification register (NQR) at ISCED level 354, in addition to the secondary school leaving certificate.
An extra (fifth) year in this programme delivered at post-secondary level allows learners acquiring also a technician qualification at ISCED level 454 and provides access to higher education.

1.2.4 SECONDARY VET SCHOOL PROGRAMMES

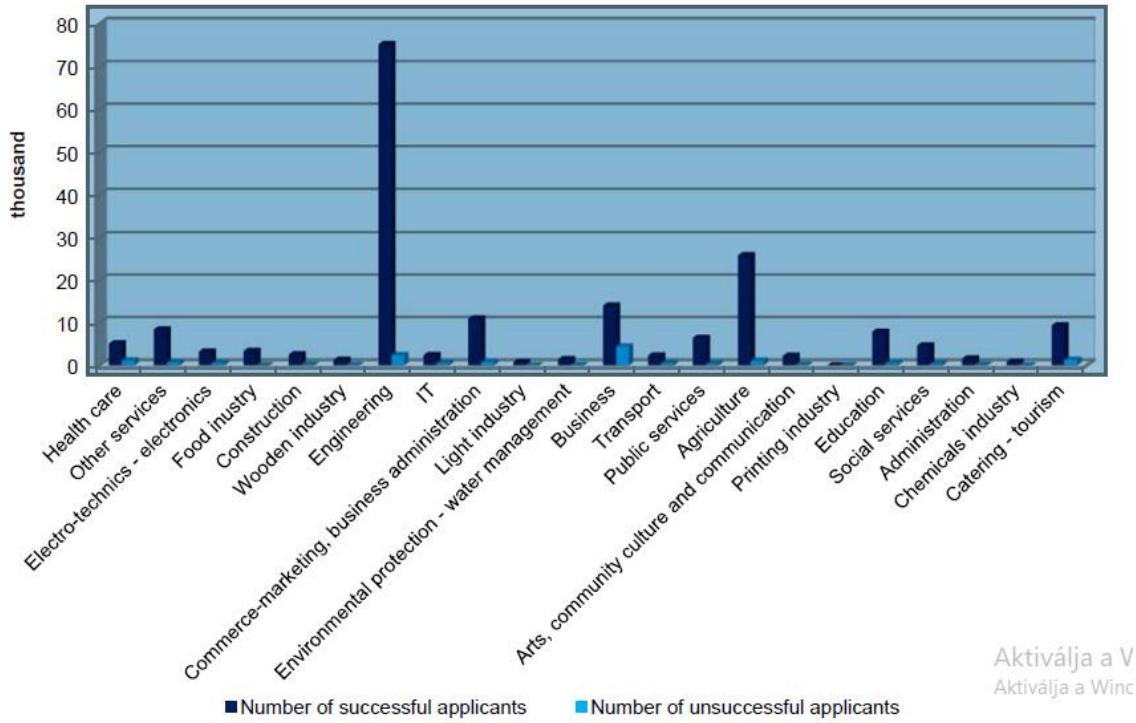
Secondary VET school programme (ISCED 353) (*szakközépiskola*) comprises three years of (dual since 2013/14) vocational training plus two years of preparation to the secondary school leaving examination. Graduates may pass school leaving examination which provides access to tertiary education. Since 2013/14, VET schools offer three-year VET programmes (in the grades 9-11) leading to an ISCED 353 level qualification registered in the NQR.These programmes do not lead to a secondary school leaving certificate and do not give access to higher education. Graduates may follow a two-year general programme to obtain a secondary school leaving certificate. Since 2012/13, learners even without this certificate can enrol in post-secondary VET (ISCED 454) given they hold a master craftsman certificate and have five years relevant working experience.
Arts programmes jointly provide general and vocational training and can be started from the fifth or seventh grade.

1.2.5 HIGHER VET PROGRAMMES

Two-year higher education VET programmes (previously called advanced vocational programmes) are accessible to graduates from general or vocational secondary programmes, holders of the secondary school leaving certificate (ISCED 344). Higher VET programmes award ISCED 554 vocational qualifications but not higher education degree.
Graduates can transfer (up to 90) credits to a bachelor programme in the same field.
Since 2015/16, higher VET is also offered in dual programmes. The higher VET institution signs a cooperation agreement with the company providing practical training, while the company has to sign an employment contract with the VET student.

1.2.6 PRACTICAL TRAINING

The share of theoretical and practical training in VET is determined by the ministry responsible for issuing qualifications based on the framework curricula.
A 'dual training model' was first introduced in VET in September 2013. Currently, there are two forms of in-company training:
(a) based on a company-learner apprenticeship contract; it is supervised by the representative of the regional economic chamber; a company provides training and pays allowance, also during school holidays; learners are entitled to social insurance;
(b) based on a school-company agreement; learners are not in a contractual relationship with a company and receive allowance only for the three-to-five week practice during the summer holiday.
Dual training does not guarantee employment. Learners may sign a contract already in the first VET year. Practical training may also take place in school workshops. In 2015/16, most vocational secondary school learners participated in training at schools.



Participation in the complex vocational examination in 2015

1.2.7 LEARNING PATHWAYS AND PROGRESSION OPPORTUNITIES

The Hungarian VET system is open and flexible. The system of the National Qualification Register makes this possible because its qualifications can be placed among 23 professional groups and 42 sectors. Learners' previous training can be recognised when changing study area or professional group shortening the study period. Learners having completed lower secondary education and received the elementary education certificate can continue either in general or vocational upper secondary programmes.

1.2.8 VET GOVERNANCE

VET and adult education are regulated by the Act on National Public Education. The goal is for as many young people to acquire a profession (or, if required, multiple professions) as possible. Students enrolled in school-based vocational programmes, including adult education programmes, can acquire up to two vocational qualifications for free. In exceptional cases, learners who enrol in a school-based programme to receive a third qualification (not in the same sector), have to pay.

School-based education for young people and adults is financed by the public budget. Practical training is provided by enterprises and is supported by public money through the National Employment Fund.

Adult training programmes are partly provided outside school premises. Learners conclude an adult education contract with the VET institution to obtain a state-recognised qualification registered in the NQR. For them education is for free and financed by public budget.

In Hungary, since 2015 the Ministry for the National Economy is responsible for VET and adult training. The minister coordinates tasks related to VET provided by other ministries, governs the work of bodies performing VET tasks (background institutions, organizations). The minister also cooperates with the minister responsible for general education, as IVET is part of general education.

With regards to qualifications within their sector, the minister responsible for the qualification defines the vocational and examination requirements of the qualification, elaborates examination requirements, organises vocational skills competitions and maintains the qualifications of their sectors.

In addition to the above mentioned tasks, since the second semester of 2015, the ministry for the National Economy, responsible for VET and adult training, has also been responsible for maintaining the majority of VET schools, which provide school-based vocational education.

1.2.9 FINANCIAL INCENTIVES

Financial support is available from a public budget to motivate participation in VET. VET schools receive a grant from the state for provision of NQR qualifications in demand. Companies receive grant (HUF453 000~ EUR1 450 in 2014) for training apprentices under the training contract. Coefficients apply for ifferent qualifications.

1.2.10 VET CENTRES

Since 2015 most VET schools were transferred under responsibility of the Ministry for National Economy, based on which it has set up 44 VET centres in 2015/16 – a new VET institution type in order to make VET more flexible and responsive to labour market needs. This has led to enrolment of more than 20 000 adults (above age 25) that participate in adult education in evening courses.

1.3 STATUS OF ICT IN THE EDUCATIONAL SYSTEM

1.3.1 HUNGARIAN DIGITAL EDUCATION STRATEGY

The Government has prepared the Digital Success Programme (DSP) aimed at the digital development of the Hungarian society and the Hungarian national economy based on the results of the InternetKon survey. The Programme, including the Hungarian Digital Education Strategy (DES), was brought to life based on the recognition that digital transformation is not a matter of choice: it is an inevitable phenomenon that everyone must prepare for, because 20th century knowledge will not allow anyone to be competitive in the 21st century. Digital tools and approaches should be introduced in the classrooms as they are getting deeply integrated into our everyday lives from day to day.

The immediate and radical digitalisation of the educational system is indispensable also in respect of the competitiveness and labour market chances of the upcoming generation: the functions Hungarian youths will be able to fulfil on the labour markets of Europe as well as the role the Hungarian national economy will play in international competition are being decided right now. Obviously, the best way to prepare is through conscious participation in education and lifelong learning. Therefore, since in the 21st century it is impossible to teach and learn with the methods used in the past century, one of the priority areas of the DSP is the drawing up of the Digital Education Strategy of Hungary.

In line with the strategic mandate, the DES covers the entire Hungarian system of education and training. The areas of intervention/pillars include public education, vocational training, tertiary education, adult learning, and a number of priority horizontal aspects. The individual pillars were analysed in an integrated structure, taking account of the key factors that determine the processes:

- physical infrastructure, access, intranets;
- the availability of equipment in education institutions;
- the digital preparedness and attitudes of teachers;
- the methodology applied (teacher training and further education as well as institution developments);
- content (review of the National Core Curriculum and framework curricula, digital content development);
- education management (administration and quality management, primary information system, student measurement-assessment, management information system).

1.3.2 SITUATION ANALYSIS - PUBLIC EDUCATION

The **situation analysis** carried out by pillar and **validated in the framework of broad professional consultations** found that in the case of **public education**:

- the development of **digital literacy** is not an adequately integrated part of the knowledge to be transferred in schools: a significant number of students leave public education as digital illiterates;
- **teachers rarely use ICT tools** and modern technology to support the teaching and learning process;
- **the rate of usage of available tools is low**; in other cases teachers refuse to use those technologies in the classroom because of outdated equipment or the lack of tools;
- in Hungary, less than 20% of all teachers use ICT tools in more than 25% of their classes;
- teachers do not feel competent in the use of **subject-specific ICT tools** either;
- although the transfer of digital competences appears in the National Core Curriculum
- although the transfer of digital competences appears in the National Core Curriculum as an output target, in order to meet the abstract requirements set out as horizontal expectations, teachers cannot rely on **consistent guidelines, teaching materials, instructions** or, in particular, on uniform and reliably working infrastructure;
- the **huge difference in available equipment** and the use of non-uniform methodologies and contents make the transfer of digital competences practically impossible;

- furthermore, this is **an obstacle to acquiring other skills** and makes ICT supported learning as well as other pedagogical tasks (Special Needs Education (SNE), talent development, remedial education, etc.) difficult to perform;
- there is **no measurement-assessment framework** applied in the practice of public education institutions which could measure the current digital competences of pupils, teachers, specialised teachers and practical instructors or which could designate (and subsequently re-measure) individual development paths; not only does the **insufficient supply of ICT tools** and service environment make the transfer of up-to-date IT knowledge difficult, but it also **hinders the performance of the institutions** in several areas owing to the fact that
    - it does not prepare for the real circumstances of the labour market;
    - it does not engage the attention of students;

1.3.3 SITUATION ANALYSIS – VOCATIONAL TRAINING

As regards vocational training, the situation analysis found that:

- the weaknesses and threats revealed in the case of the public education pillar are **even more present in vocational training**;
- **the ratio of digital illiterates is higher** among students learning in vocational training institutions than among secondary grammar school students;
- information technology is taught to secondary grammar school students in 180 lessons, to students studying for a secondary school leaving certificate in secondary vocational schools in 144 lessons, and to vocational training school students studying for a vocational qualification in 108 lessons as part of the compulsory curriculum, however, this classroom time is **not enough to meet the requirements of the NCC concerning competence development,** and nor is it sufficient for fulfilling the requirements of the framework curricula;
- most schools do not have the necessary conditions for presenting the latest technologies in their relevant vocational areas;
- theoretical and practical **teachers** of specialised subjects **do not have sufficient digital competences** or pedagogical-methodological knowledge to place the teaching-learning process into a digital environment;
- **the available set of tools have never been suitable for serving the purposes of digital pedagogy**, in fact, it is increasingly obsolete; vocational training is therefore unable to guarantee the transfer of necessary digital competences to students;
- with the exception of some trades (mainly related to the automotive industry), **the expectations of the labour market are not reflected** in the system of output requirements and framework curricula.

1.3.4 OVERALL STRATEGIC GOAL – PUBLIC EDUCATION

The **overall strategic goal** is to ensure that **public education can provide opportunities for acquiring the digital competences required by society and the labour market** with special regard to the requirements of vocational education and training, higher education and lifelong learning as well as to the aspects of effectiveness, equity, and efficiency. We broke down the overall strategic goal to further development objectives:

- the ICT knowledge, methodological culture, motivation and use of educational staff should meet the requirements of digital education;

- the supply of digital content, methodological support and knowledge sharing should make it possible to integrate the use of ICT tools in the process of teaching-learning and assessment in all subjects;
- the Internet and equipment supply of classrooms and places where public education tasks are performed should meet the requirements of digital education;

1.3.5 OVERALL STRATEGIC GOAL – VOCATIONAL TRAINING

The **vision for vocational education and training** is that teachers and vocational instructors use digital systems that support learning at the level of competence in teaching general and vocational theoretical subjects as well as during practical training, relying on the students' own IT tools; students have access to a sufficient amount of high-quality digital learning materials which are validated with the involvement of labour market participants; the focus of the pedagogical process is the support of students' individual learning paths, which contributes to reducing the number of early school-leavers.

The **overall strategic goal** is to ensure that students completing vocational education and training acquire general and vocational digital competences required by the labour market and necessary for continuing education. Specific objectives:

- to increase the commitment of institution heads towards digital education and digital education administration;
- to develop the digital competences of teachers and vocational instructors in line with the technical and trade-specific requirements of the 21st century;
- to improve the infrastructure necessary for digital education in vocational training institutions;
- to ensure the availability of digital vocational content in respect of all trades.

1.4 EXISTING PRACTICES ON ICT IN THE VET SYSTEM IN THE HUNGARY

Regarding the development of digital learning materials, the preparation of teachers and the expansion of methodological knowledge in vocational education, from the early 2000s Apertus Közalapítvány (Public Foundation), the Regional Integrated Vocational Training Centres and Tempus Közalapítvány have implemented the most significant development projects. Nevertheless, looking at the whole spectrum of vocational education, the sporadically, if at all, available contents are far from being complete, and most of them have become obsolete and need updating due to the rapid technological development of certain trades.

Among the first valuable projects was the so-called " **TENEGEN - Connect the teachers to reach and teach the Net Generation"** project between 2008-2010 coordinating the predecessor of iTStudy.

The project aims was to

- draw the teachers' and the schools' attention to the pedagogical possibilities hidden in the connectivism and network learning by replying to the radically changed communication and learning habits of net generation;
- establish an European environment of 'connectivism' for VET teachers and trainers, to show the significant advantages of being connected to the net-Gen instead of simply 'delivering' knowledge through virtual classrooms and Learning Management System;
- elaborate a pedagogical model of network learning and 'connectivism'.

TENEGEN was selected among the **BEST PRACTICE**s in the LLL Programme in the category of "Skills and competences of VET teachers, trainers and tutors".

For more good practices see the Hungarian National Agency (Tempus) webpage: http://www.tka.hu/celcsoport/2486/stories-and-best-practices/127/erasmus

At present situation in Hungary, teachers use the opportunities offered by information technology mainly for enriching the process of teaching, rather than learning, and they rarely engage in joint creative work online.

All in all, it can be concluded that the current vocational education and training system does not ensure the development of digital competences: in many cases schools do not have the necessary conditions for presenting the latest technologies of the trades concerned, the theoretical and practical instructors of vocational subjects do not have an adequate level of digital literacy or pedagogical-methodological knowledge to place the teaching-learning process into a digital environment, and the equipment, which has never been suitable for serving the purposes of digital pedagogy, is becoming increasingly out-of-date.

In order to make sure that VET graduates acquire the general and vocational digital competences required by the labour market and necessary for continuing education, in harmony with and complementing the VET concept approved by Government Decision No 1040/2015 of 10 February 2015 entitled "Vocational education and training in the service of the economy" as well as the goals set by the public education pillar, the vocational education and training pillar of The Digital Education Strategy of Hungary aims to achieve the following strategic goal in respect of the vocational education and training sector: To ensure that students completing vocational education and training acquire general and vocational digital competences required by the labour market and necessary for continuing education**.**

2 METHODOLOGY

The purpose of our analysis is to get acquainted with the current skills of professional teachers. Through specific questions, let us examine where the education of the knowledge of ICT tools is held in the teaching of agricultural knowledge. How well have we been able to link the teaching of the knowledge of digital devices to the teaching of agricultural knowledge?

1.) Do Hungarian professional teachers know about the trends in Agriculture 4.0 / Agriculture 4.0?

2) Are they prepared to teach agronomic knowledge in their field of expertise?

3) How advanced is the ICT toolbox for knowledge transfer?

All partners (who are in the field of industry and education) with detailed, prior consultations hypothesis of assumption of initial situation analysis:

H0: There is a significant requirement for the provision of ICT training in these areas

The results of the survey will be used directly for the further stages of the project and the final curricula. The vocational training system will directly include the results and conclusions of the questionnaire

2.1 USED METHODS FOR DATA COLLECTION

In Hungary, agricultural VET schools are maintained by the Ministry of Agriculture. The Ministry established a Network of Agricultural Training Schools. The directors of the schools in the network regularly consult each other and organize meetings, so that the access and involvement of teachers in the survey did not cause any difficulties. A total of 114 agricultural VET teachers completed the questionnaire. The questionnaire consisted of 30 questions which could be complemented by additional questions on a voluntary basis.

Through the online questionnaire we asked our colleagues about their

- professional status (time spent in education, professional orientation, etc.)
- pedagogical ICT skills, the knowledge acquired in the use of ICT tools
- knowledge of the terminology used in the field of agricultural ICT
- schools' ICT infrastructure
- needs to improve their competences of the current ICT
-

2.2 STATISTICAL METHOD

The survey was online, the results could be extracted from the online interface in excel format. For better transparency, graphs are used to show the results graphically. The conclusions were based on the percentage of the results.

It is important to note that sampling is not suitable for statistically correct conclusions. The survey is a guide to the further steps in the Agriteach 4.0 project, enabling to map the opinion and preparedness of the majority of the participant teachers.

3 RESULTS

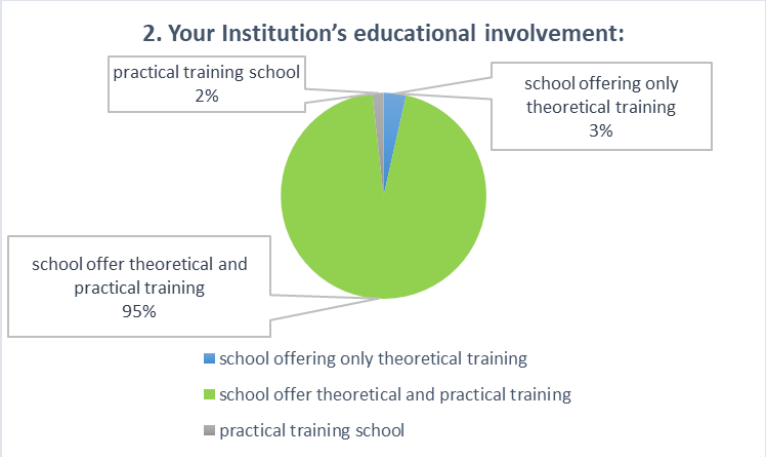
3.1 TEACHERS PROFILE

The survey was completed by **114 teachers** in the schools maintained by the Ministry of Agriculture.

In the first part of the survey, we asked for the status of teachers, their age characteristics and the correlation between their qualifications.

2. Your Institution's educational involvement:

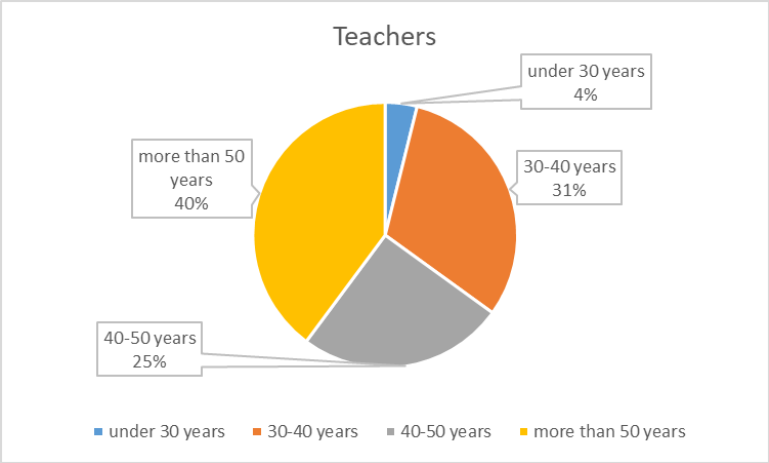
school offering only theoretical training	4
school offer theoretical and practical training	107
practical training school	2



Based on the answers, it can be concluded that **in Hungary the vocational theory and practical education cannot be separated** in the framework of agricultural VET training. **95% of teachers are involved in both types** of training,

3. Your age:

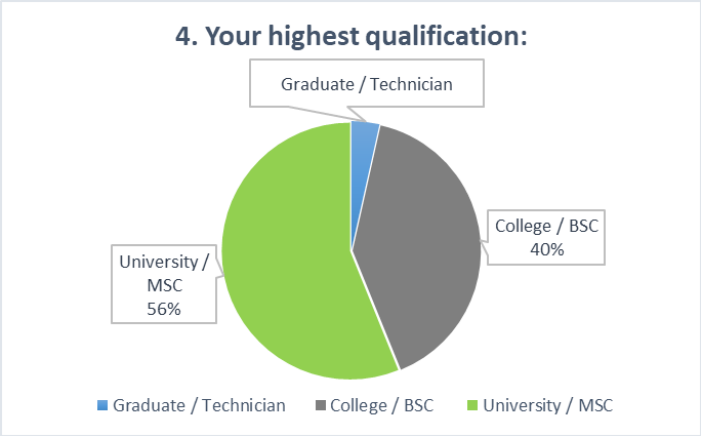
Age	Teachers
under 30 years	4
30-40 years	32
40-50 years	26
more than 50 years	41



40% of the respondent teachers are older than 50, but **younger than 50 years teachers take 60%.** This generation is certainly more open to new knowledge and methods that are beneficial for the project.

4. Your highest qualification:

Graduate / Technician	4
College / BSC	46
University / MSC	64

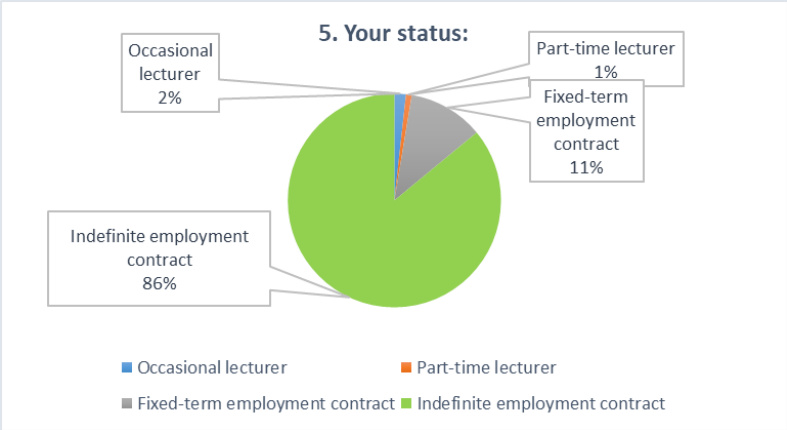


Most of the respondents have a university degree. Compared to age, it can be seen that teachers under 40 years of age 50-50% is the proportion of university and college graduates, while over 50 is 90% of teachers have university degree.

Most of the professional teachers with BSC qualifications earns the university degree in his profession parallel with their teaching work.

5. Your status:

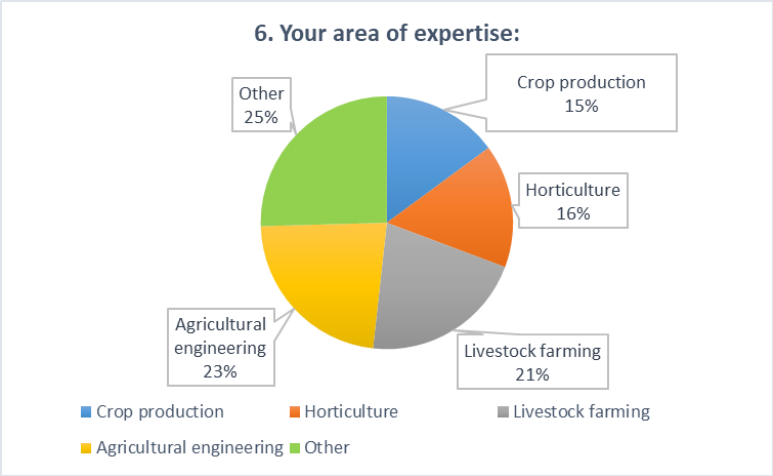
Occasional lecturer	2
Part-time lecturer	1
Fixed-term employment contract	13
Indefinite employment contract	98



86% of professional teachers worked for an **indefinite period of employment contracts**. The status of appointment does not correlate with age and qualification.

6. Your area of expertise:

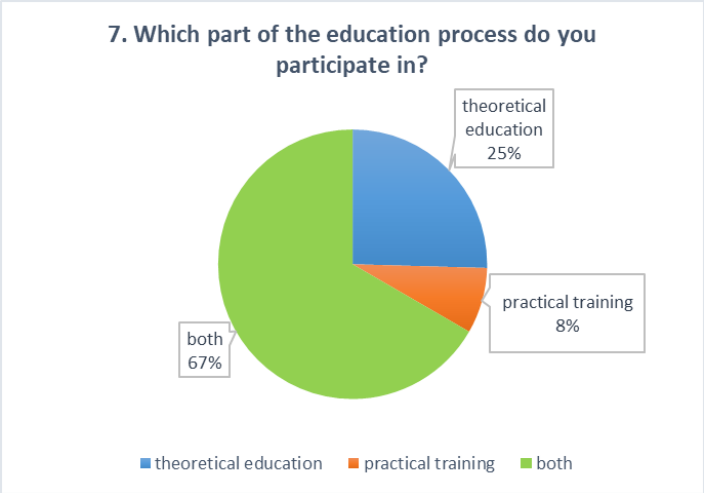
Crop production	17
Horticulture	18
Livestock farming	24
Agricultural engineering	26
Other	29



Among the participants in the survey, the number of teachers employed in agriculture engineering and livestock farming is almost the same. The number of crop production and horticulture teachers are similar, but less than the previous areas. Based on the ratio of survey participants, it can be stated that **there is no exceptionally high or low area in Hungary.**
In the other category, forestry, food industry and economic knowledge responses appeared most often (6-9-5).
Beyond the objectives of the Agriteach 4.0 project, it is worth thinking about how to reach and involve additional areas such as: forestry - engineering, food industry - mainly laboratory areas.

7. Which part of the education process do you participate in?

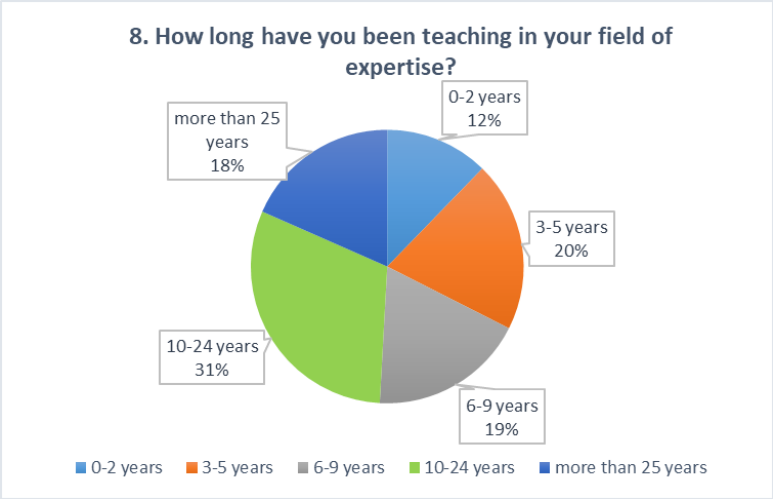
theoretical education	29
practical training	9
both	76



It is clearly visible on the basis of the responses - and in comparison with the answers to the first question - that the **advantage of agrarian VET training is the parallel theoretical and practical education.** Thanks to the government efforts, students can acquire the theoretical and practical skills of their profession at the same training venue, often from the same teacher.

8. How long have you been teaching in your field of expertise?

0-2 years	14
3-5 years	23
6-9 years	21
10-24 years	35
more than 25 years	21



It is interesting to compare this results with the age. In addition to the apparent correlations, it is surprising that there are a large number of people over the age of 50 (43) with educational experience of 0-2 years (7 responders), 3-5 years – 6 (responders). This figure is 30% in this age, which is very high.

9. Do you have any business experience in your field of expertise?

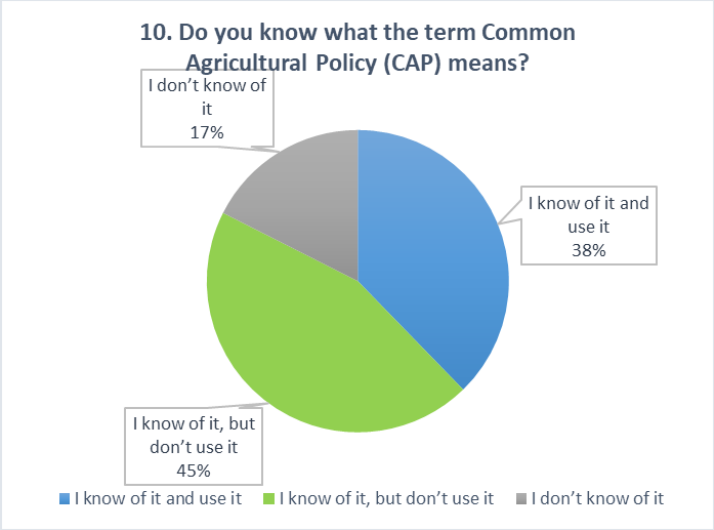
yes	81
no	33

About **three quarters of the teachers have business experience** in their field of expertise. This is very beneficial, as teachers with experience gained in production can provide a lot of life-like practices and knowledge to their students.
Interestingly, in comparison with the previous question, we find that most of the teachers who are over 50 years old, but less than 5 or fewer years have expertise in their field of expertise. This may mean that many of the people working in agricultural production are also willing to work as a teacher.

3.2 TEACHING METHODOLOGIES

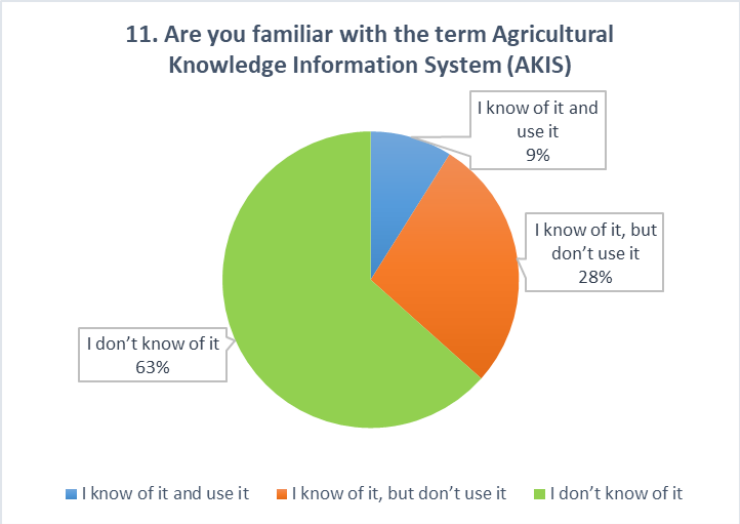
10. Do you know what the term Common Agricultural Policy (CAP) means?

I know of it and use it	43
I know of it, but don't use it	51
I don't know of it	20



11. Are you familiar with the term Agricultural Knowledge Information System (AKIS)

I know of it and use it	10
I know of it, but don't use it	31
I don't know of it	71



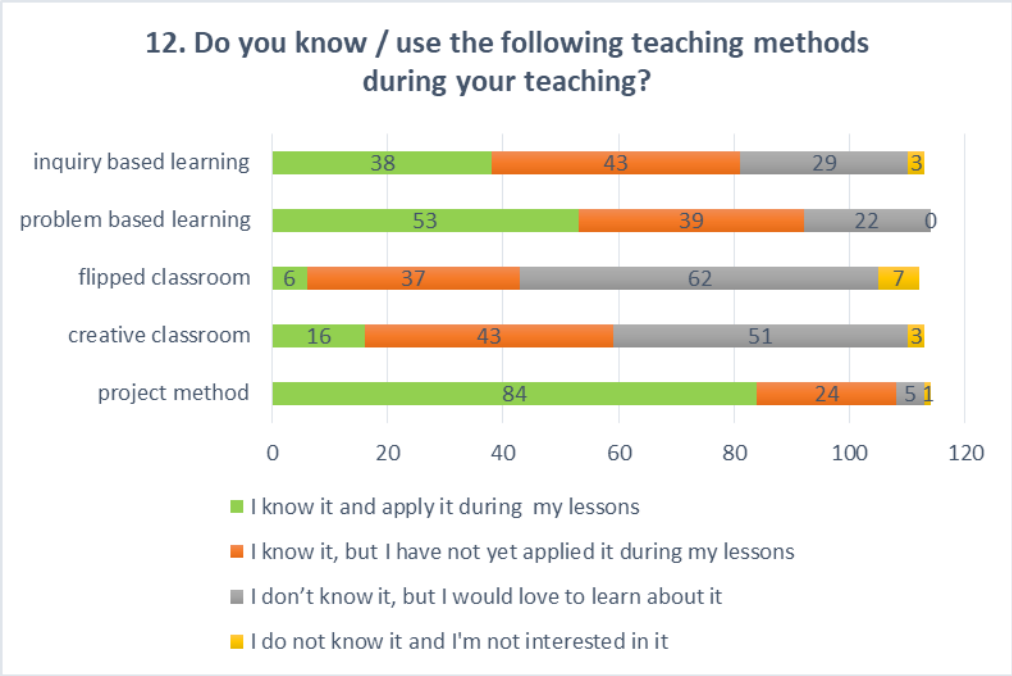
Based on the answers to the previous two questions it can be stated that almost the **half** (45%) **of the** professional **teachers know**, but **do not use** the Common Agricultural Policy (CAP).

The related knowledge system, the Agricultural Knowledge Information System (AKIS) is only used by the 9% of the teachers. Even more surprising, **63%** of them **have never heard** of the Agricultural Knowledge Innovation System. This is an important indicator for curriculum design! Further training in the project will involve the expansion and the transfer of useful knowledge.

In the next section, we asked about the general methodological competences of VET teachers, the vocational English teaching in the schools, and the innovation needs of the professional teachers.

12. Do you know / use the following teaching methods during your teaching?

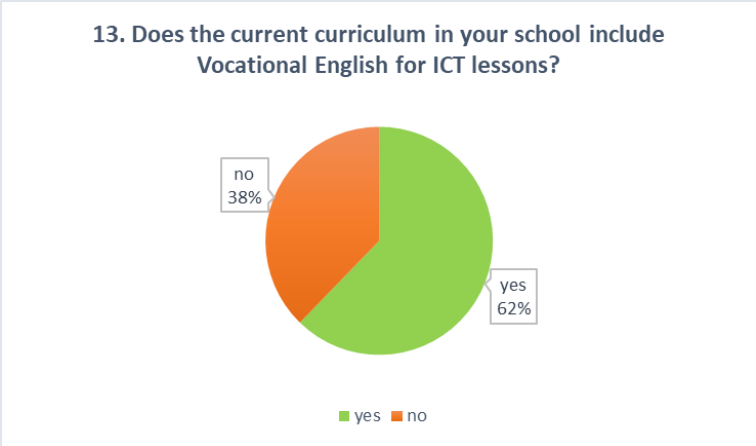
	I know it and apply it during my lessons	I know it, but I have not yet applied it during my lessons	I don't know it, but I would love to learn about it	I do not know it and I'm not interested in it
project method	84	24	5	1
creative classroom	16	43	51	3
flipped classroom	6	37	62	7
problem based learning	53	39	22	0
inquiry based learning	38	43	29	3



According to the answers, it is well-documented that in recent years, Hungarian education policy has focused on **project methodology and problem-based** teaching.
The creative and flipped classroom method is far less known among Hungarian vocational teachers, so it is worthwhile presenting them in more detail in the project, which are useful methods for attracting students and maintaining their interest.

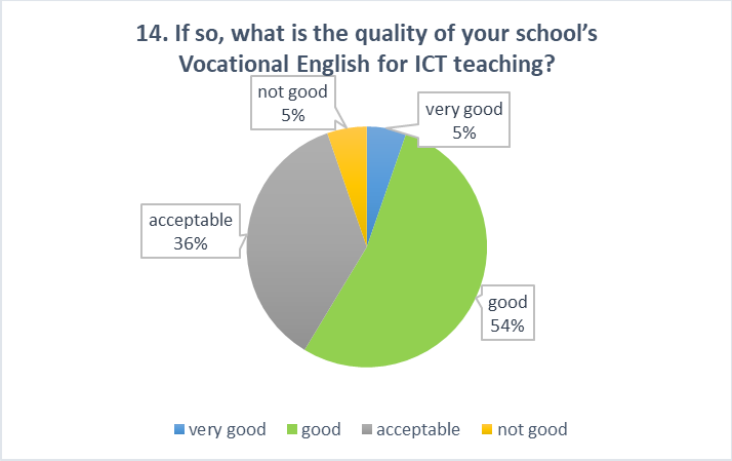
13. Does the current curriculum in your school include Vocational English for ICT lessons?

yes	71
no	43



14. If so, what is the quality of your school's Vocational English for ICT teaching?

very good	4
good	40
acceptable	27
not good	4



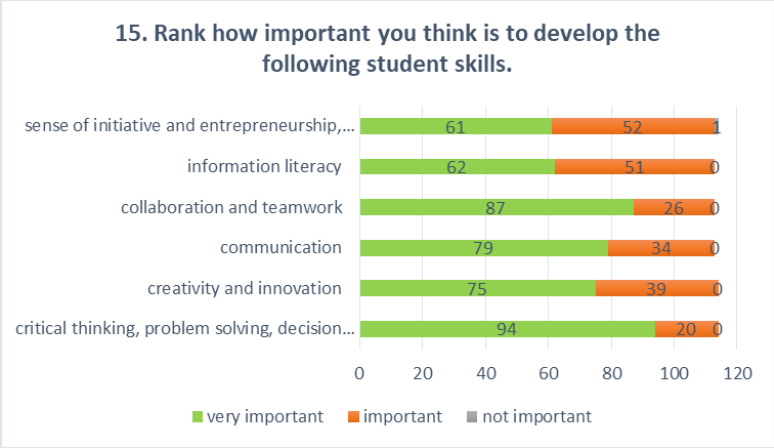
Assessing the above two questions in the same time, foreign language is obligatory in the vocational grades of the schools in the framework of the Employment I professional subject. It would also be interesting to evaluate in which schools professional English language teachers are employed. 38% of the schools do not consider it appropriate to teach professional English.

Among the answers given in the text section, several people formulate the cause of the problem, which is as follows:

"At school, teachers do not teach professional English, but general English.
In many cases, English teachers are not trained in professional English, do not know the agrarian and IT professional English vocabulary well. It is worth considering, therefore, whether within the planned curriculum, there will be opportunities for teachers and students to develop their professional English proficiency.

15. Rank how important you think is to develop the following student skills.

	very important	important	not important
critical thinking, problem solving, decision making	94	20	0
creativity and innovation	75	39	0
communication	79	34	0
collaboration and teamwork	87	26	0
information literacy	62	51	0
kezdeményezőkészség és vállalkozókedv az életben és a karrierben	61	52	1

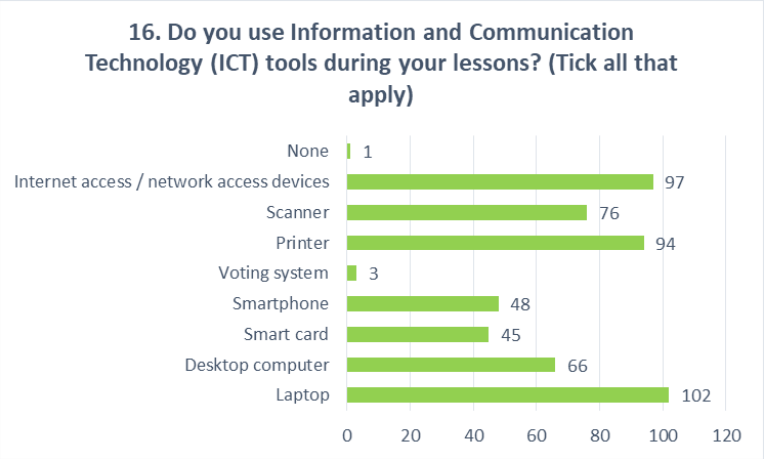


It is obvious that **teachers consider all 21st century skills to be important**, especially the critical thinking and problem solving, collaboration and teamwork skills. Traditional teaching methods are not really suitable for the development of these skills, so returning to question 12 will be important for the transfer of knowledge of creative teaching methods to teachers.

3.3 CURRENT AGRO-INFORMATICS COMPETENCE LEVELS

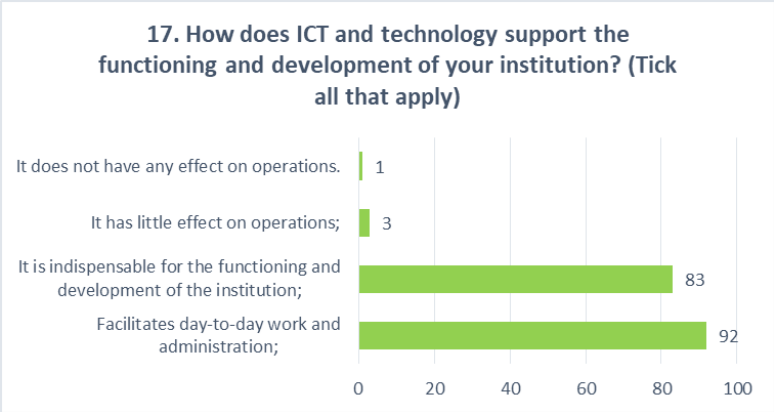
16. Do you use Information and Communication Technology (ICT) tools during your lessons? (Tick all that apply)

Laptop	102
Desktop computer	66
Smart card	45
Smartphone	48
Voting system	3
Printer	94
Scanner	76
Internet access / network access devices	97
None	1



17. How does ICT and technology support the functioning and development of your institution? (Tick all that apply)

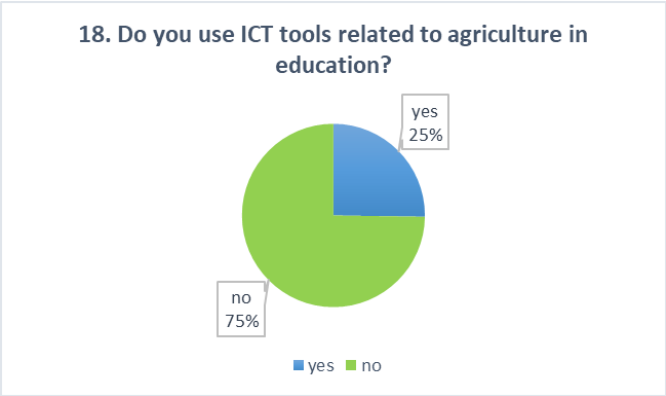
Facilitates day-to-day work and administration;	92
It is indispensable for the functioning and development of the institution;	83
It has little effect on operations;	3
It does not have any effect on operations.	1



Most teachers use laptops, printers, scanners, and the Internet, and think that using ICT tools is essential for the school to function properly.

18. Do you use ICT tools related to agriculture in education?

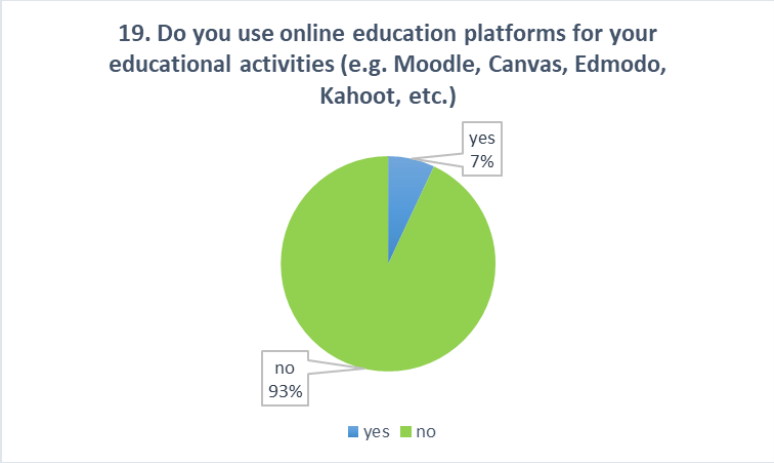
yes	28
no	83



Although there was a greater positive response to the previous question, it is surprising that **75%** of the responding **teachers do not use the ICT tool** associated with their profession **during their educational activities**. This is likely to indicate that lessons are usually done according to traditional methods and forms.

19. Do you use online education platforms for your educational activities (e.g. Moodle, Canvas, Edmodo, Kahoot, etc.)

yes	8
no	106

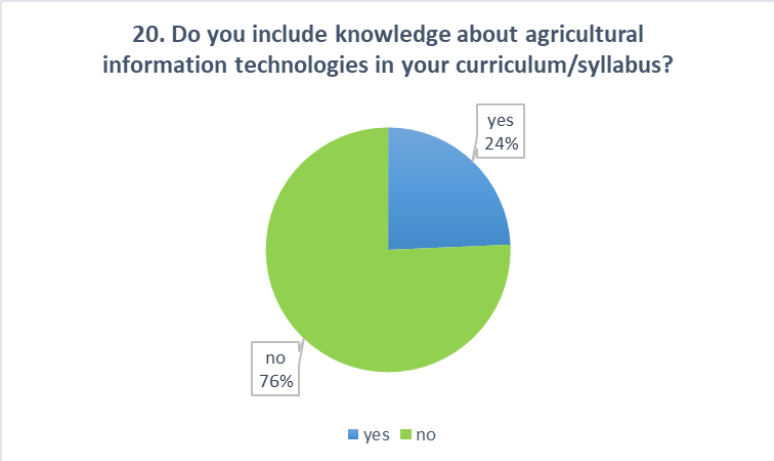


The **use of online education platforms** is still very low, **only 7%.** In the curriculum, it will be important to present the benefits, opportunities and the use of ICT tools and educational platforms.

3.4 CURRENT STATEMENT OF USAGE OF ICT FOR AGRICULTURE VET EDUCATION

20. Do you include knowledge about agricultural information technologies in your curriculum/syllabus?

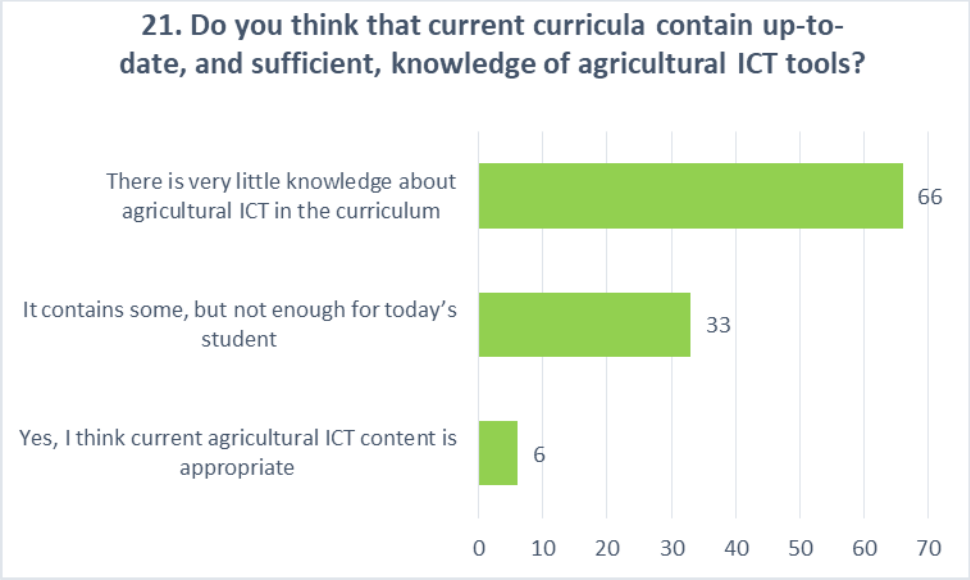
yes	27
no	84



A quarter of teachers teaching professional subjects indicated that **they would incorporate agronomic knowledge into the curriculum**. This is not too high rate, the reasons may be, incomplete knowledge, the lack of the lessons frame, teachers do not consider it is important.

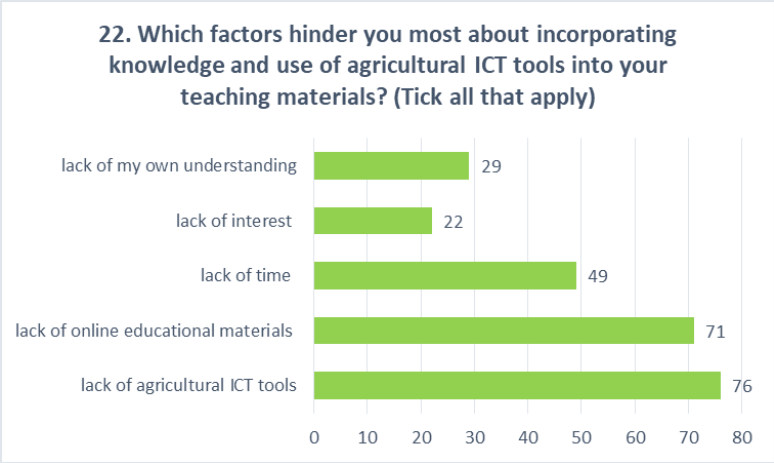
21. Do you think that current curricula contain up-to-date, and sufficient, knowledge of agricultural ICT tools?

Yes, I think current agricultural ICT content is appropriate	6
It contains some, but not enough for today's student	33
There is very little knowledge about agricultural ICT in the curriculum	66



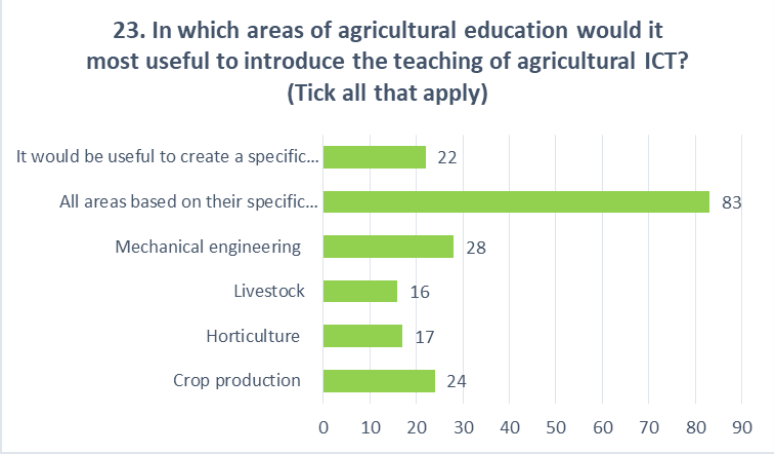
22. Which factors hinder you most about incorporating knowledge and use of agricultural ICT tools into your teaching materials? (Tick all that apply)

lack of agricultural ICT tools	76
lack of online educational materials	71
lack of time	49
lack of interest	22
lack of my own understanding	29



23. In which areas of agricultural education would it most useful to introduce the teaching of agricultural ICT? (Tick all that apply)

Crop production	24
Horticulture	17
Livestock	16
Mechanical engineering	28
All areas based on their specific characteristics	83
It would be useful to create a specific position competent in basic Agricultural ICT skills	22



A quarter of teachers teaching professional subjects indicated that they **incorporate agronomic knowledge into the curriculum**. This is not too high rate, the reasons may be, incomplete knowledge, the lack of the lessons frame or teachers do not consider it is important. Two third of teachers reported that the current

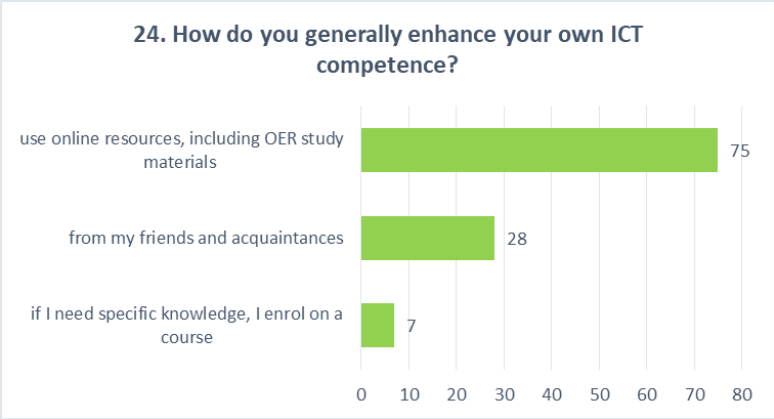
curriculum does not contain sufficient and up-to-date knowledge of agricultural ICT tools. Most of them believe that in all fields of agricultural education would be useful to teach agricultural ICT.

A **limiting factor** in educating the knowledge of agricultural **ICT tools and knowledge is the lack of tools and online materials, in the opinion of teachers.**

To sum up, the questionnaire shows that teachers consider it is important to teach agricultural ICT tools and they intend to teach them. The general ICT tools are usually available at schools, but there are no existing training materials and opportunities, online resources and demonstration tools.

24. How do you generally enhance your own ICT competence?

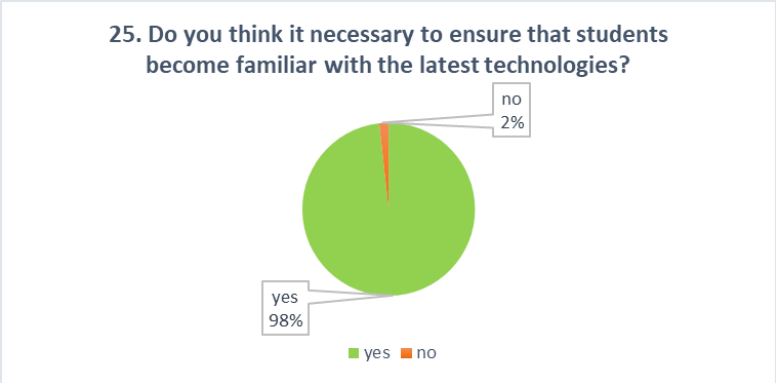
if I need specific knowledge, I enrol on a course	7
from my friends and acquaintances	28
use online resources, including OER study materials	75



65% of respondents are educating themselves online and only 6% of them enrol in a course if they want to improve their own ICT competence.
The aim of the project is to create an online, free learning material, that includes the description of state-of-the-art agrarian informatics techniques, agricultural policy strategies and after that the organization of a free course based on it.
Since we also plan to use OER resources in the curriculum, it's good news that most teachers are training themselves online with the help of OERs, so they have experience in using them.

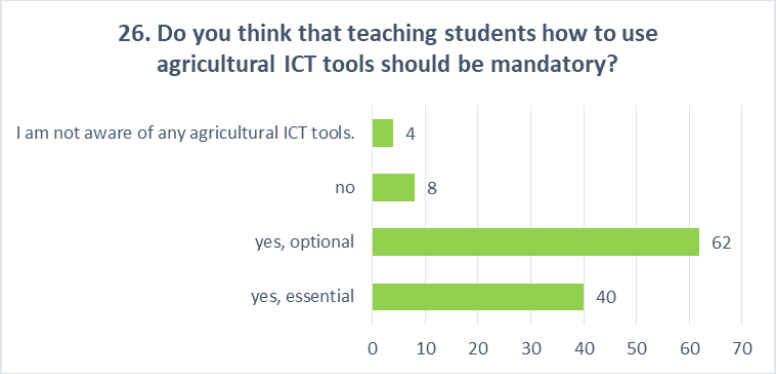
25. Do you think it necessary to ensure that students become familiar with the latest technologies?

yes	112
no	2



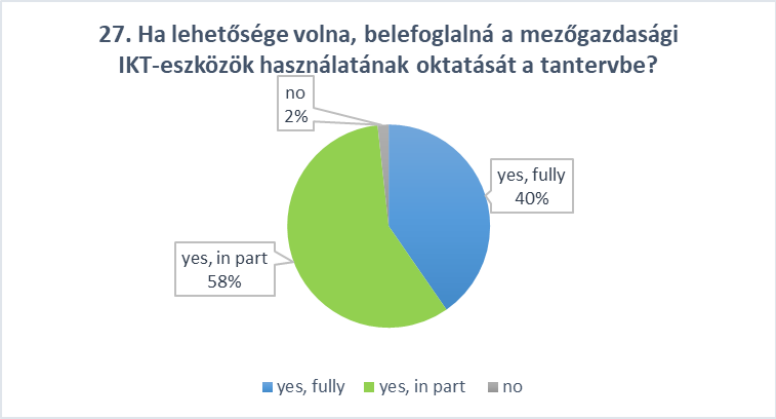
26. Do you think that teaching students how to use agricultural ICT tools should be mandatory?

yes, essential	40
yes, optional	62
no	8
I am not aware of any agricultural ICT tools.	4



27. If you had the opportunity, would you incorporate the teaching of agricultural ICT tools into your curriculum?

yes, fully	46
yes, in part	66
no	2

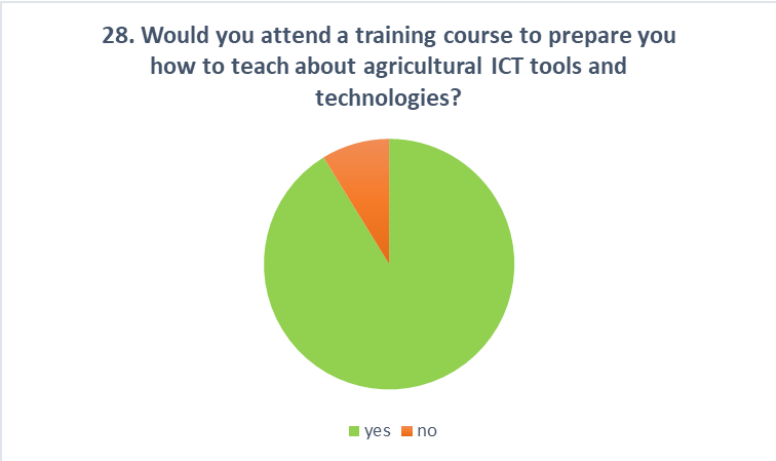


All teachers consider it **important for students to know the latest technology** when they leave school. Half of the respondents think that the teaching of agricultural ICT tools should be optional, within the free lesson frame.

It would be worth inquiring about the reason.
Looking at the full range of questions, the answer would probably be to reduce the number of teachers who would only partially introduce education in agricultural curricula to the curriculum by increasing the agronomic competencies of agricultural vocational teachers and to increase the number of teachers who would see a special profession as agronomic skills education.

28. Would you attend a training course to prepare you how to teach about agricultural ICT tools and technologies?

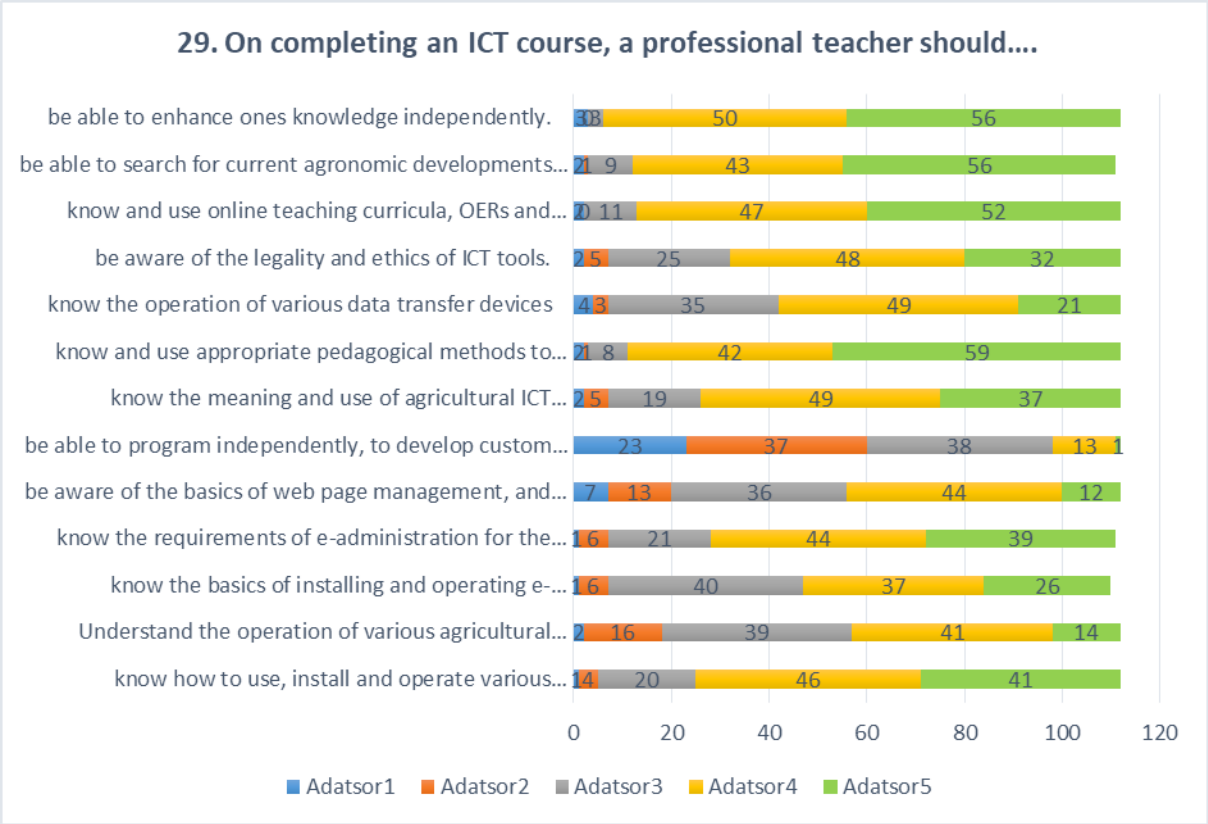
yes	104
no	10



29. Rank the importance (1: not important at all; 5: very important.) of the professional knowledge, skills, other competencies in the table below which you consider important during ICT training.

On completing an ICT course, a professional teacher should....	1	2	3	4	5
know how to use, install and operate various agricultural software tools	1	4	20	46	41
Understand the operation of various agricultural hardware devices and the basics of their maintenance	2	16	39	41	14
know the basics of installing and operating e-agriculture detectors	1	6	40	37	26
know the requirements of e-administration for the enterprise (applications, returns, data services).	1	6	21	44	39
be aware of the basics of web page management, and in using general content management and administration features.	7	13	36	44	12
be able to program independently, to develop custom softwre that meets the specific needs of a company.	23	37	38	13	1
know the meaning and use of agricultural ICT terminology - the basic definitions and terms.	2	5	19	49	37
know and use appropriate pedagogical methods to teach the basic knowledge of agricultural ICT to students.	2	1	8	42	59
know the operation of various data transfer devices	4	3	35	49	21
be aware of the legality and ethics of ICT tools.	2	5	25	48	32

know and use online teaching curricula, OERs and assessments.	2	0	11	47	52
be able to search for current agronomic developments and descriptions.	2	1	9	43	56
be able to enhance ones knowledge independently.	3	0	3	50	56



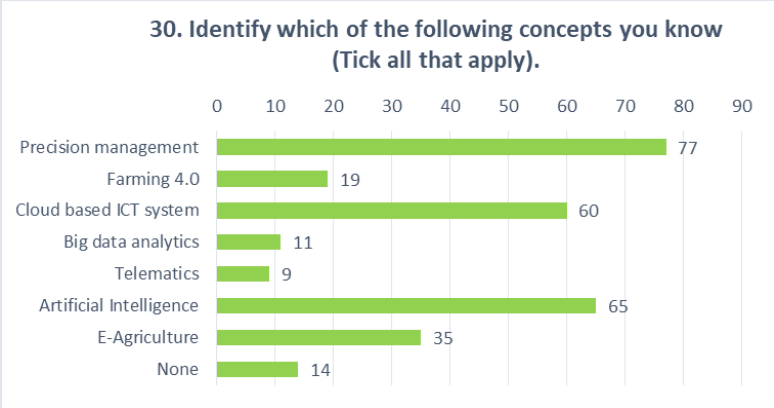
The answers to questions 28 and 29 **clearly highlight the need for further training on this subject**. Teachers have a clear idea of what they expect from the course: They would like to take part in further training on new methods based on the use of online learning materials, with new knowledge, where they can clearly develop their professional knowledge and agricultural ICT competencies.

3.5 TEACHERS' KNOWLEDGE ON AGRICULTURE 4.0

In the next and final part of the survey, teachers were able to measure their knowledge and knowledge through specific terms used in agricultural information.

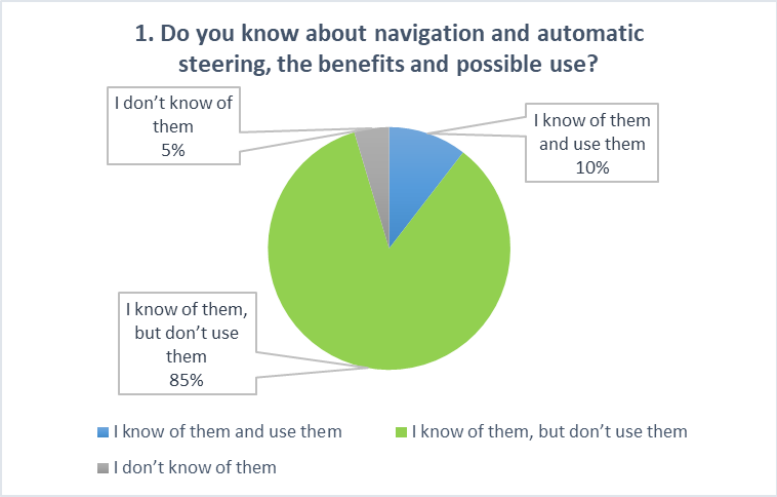
30. Identify which of the following concepts you know (Tick all that apply).

Precision management	77
Farming 4.0	19
Cloud based ICT system	60
Big data analytics	11
Telematics	9
Artificial Intelligence	65
E-Agriculture	35
None	14



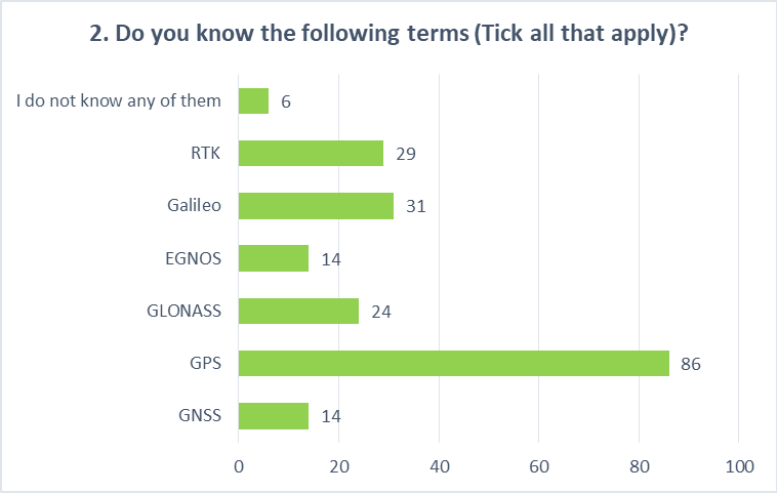
1. Do you know about navigation and automatic steering, the benefits and possible use?

I know of them and use them	9
I know of them, but don't use them	73
I don't know of them	4



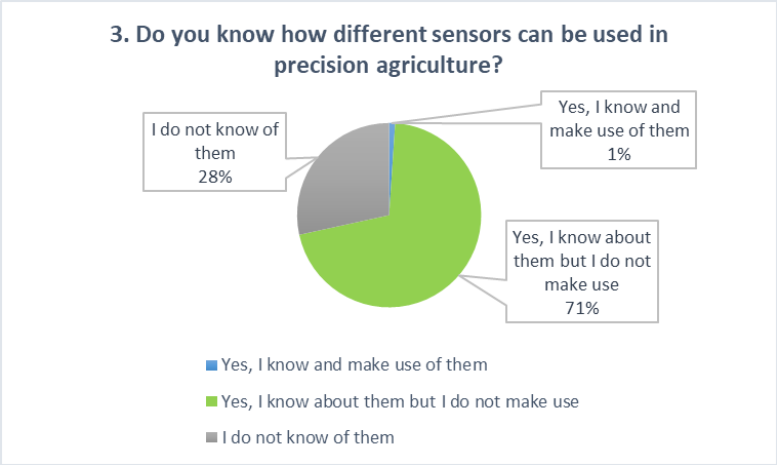
2. Do you know the following terms (Tick all that apply)?

GNSS	14
GPS	86
GLONASS	24
EGNOS	14
Galileo	31
RTK	29
I do not know any of them	6



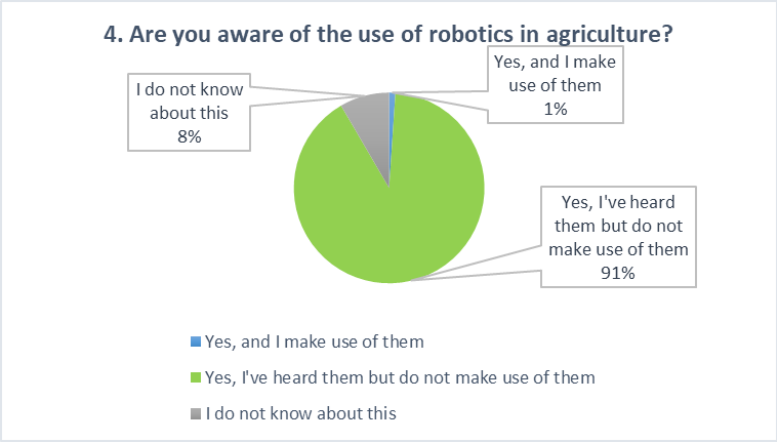
3. Do you know how different sensors can be used in precision agriculture?

Yes, I know and make use of them	1
Yes, I know about them but I do not make use	67
I do not know of them	27



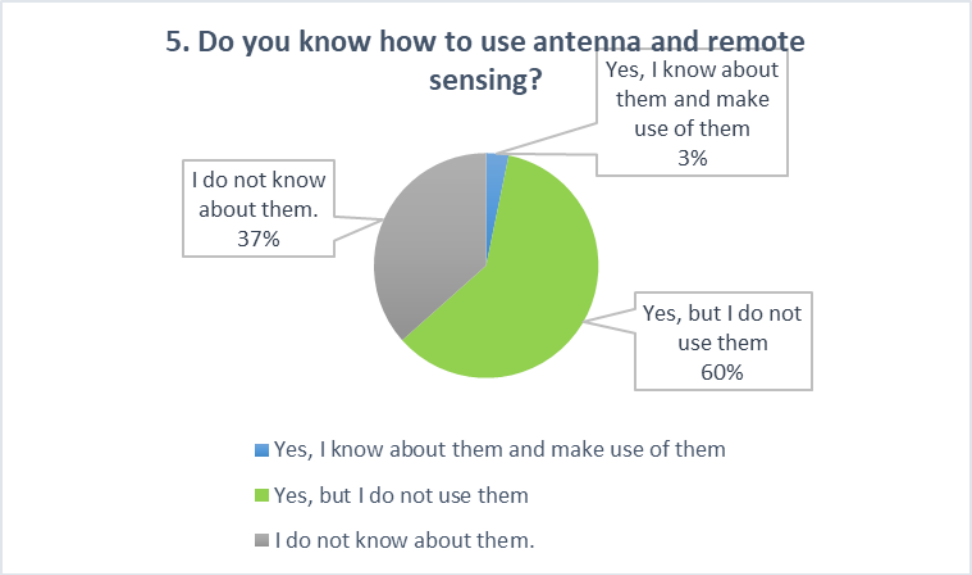
4. Are you aware of the use of robotics in agriculture?

Yes, and I make use of them	1
Yes, I've heard them but do not make use of them	86
I do not know about this	8



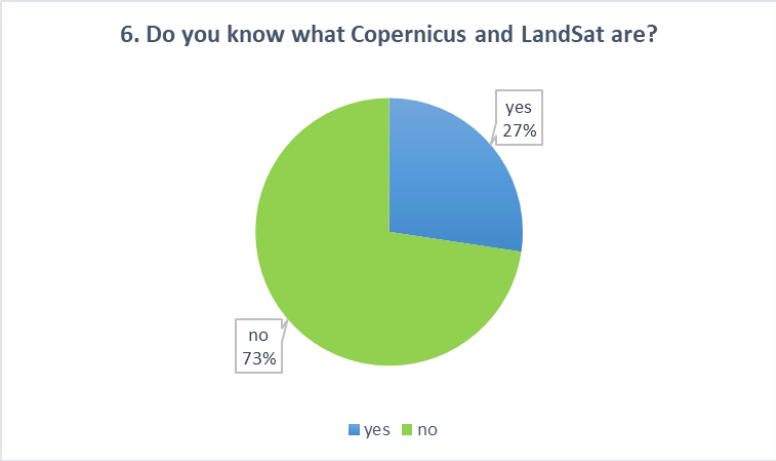
5. Do you know how to use antenna and remote sensing?

Yes, I know about them and make use of them	3
Yes, but I do not use them	56
I do not know about them.	34



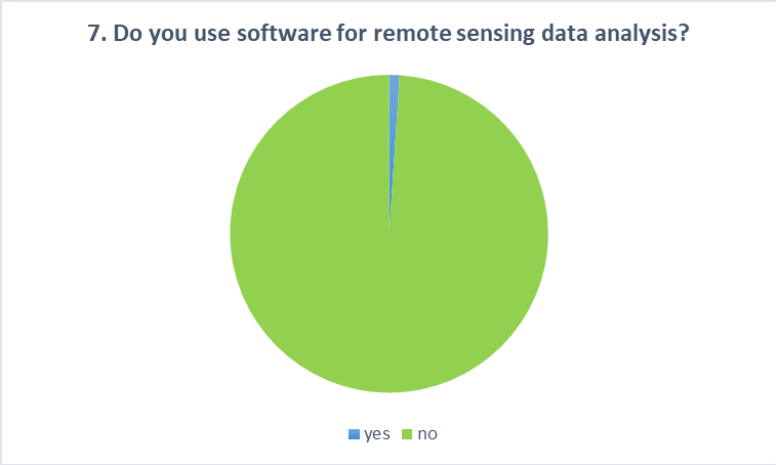
6. Do you know what Copernicus and LandSat are?

yes	26
no	69



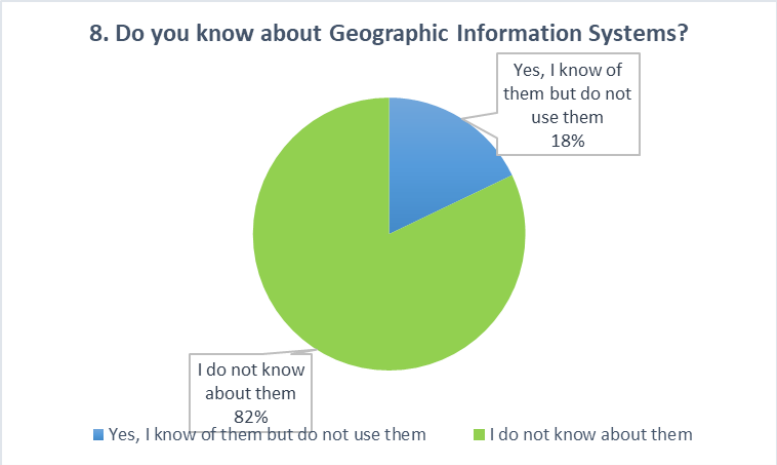
7. Do you use software for remote sensing data analysis?

yes	1
no	93



8. Do you know about Geographic Information Systems?

Yes, I know of them but do not use them	17
I do not know about them	78



About **two thirds of teachers have basic knowledge** of some of the Agriculture 4.0 features, such as Precision management, GPS, sensors, robotics, antenna and remote sensing, **but are not used in practice**, they have just heard about them.
This is surprising because they have shown a high percentage of their business experience in their field of expertise, but they do not seem to have used these tools yet.

Copernicus and LandSat, software for remote sensing data analysis, Geographic Information Systems are currently **very little known and used by teachers in Hungary**.

4 CONSLUSIONS

The result of the questionnaire fully supports the fact that the **vast majority of teachers have already heard** about agricultural ICT tools and agriculture 4.0, but **they are not using them**, even though they have business experience in their own field of expertise. It was also cleared, that the **current curriculum does not contain up-to-date knowledge about e-agriculture and related technologies,** but teachers also feel that this is important. The vocational English language teaching is not fully realized, mostly teacher teach general English.

The planned Module 3 in the Agritech 4.0 project offers solution to these shortcomings. "Digital Systems within Agriculture 4.0" module will introduce the most widely used systems and tools.

The result of the questionnaire in IO1 (ICT skills demands of the agricultural labor market) highlights the fact that **Hungarian national agriculture is characterized by the size of the small and medium-sized farms**, but the share of micro-farms is also significant. In the design of the curriculum, it is worth taking into account the tools and systems that can be used well in farms of this size.

Almost the **half** (45%) **of the** professional **teachers know**, but **do not use** the Common Agricultural Policy (CAP) and the Agricultural Knowledge Information System (AKIS) is only used by the 9% of the teachers and **63%** of them **have never heard** of the Agricultural Knowledge Innovation System.

These results demonstrate the need for the planned Module 2 as well. "European Strategies and initiatives of e-Agriculture" module gives an overview of innovations in agriculture education, European and national initiatives, and trends in the agricultural sector.

Most teachers use laptops, printers, scanners, and the Internet, and think that using ICT tools is essential for their workplace to function properly, but **teachers do not use the ICT tool** associated with their profession **during their teaching. Using online education platforms for their educational activities is not typical.**

From the creative teaching methods, **the project method and the problem-based methods are known** and applied in a larger proportion, but for the time being, education in the Hungarian **agricultural vocational schools seems more traditional.**

This results from the survey reinforce our plan in the Agritech 4.0 project that the first module for teachers is needed. "Reinventing agricultural education" module gives an insight into innovative teaching methods, with a focus on online learning.

The survey also shows that, teachers are open to such a training regardless of age and qualifications and find it unique.

The starting project assumption (the H0 hypothesis) is that there is a significant requirement for the provision of ICT training in these fields, was strongly justified on the basis of Hungarian survey results.

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