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MOOCs as part of the university curriculum: A case study

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Abstract: *Massive Open Online Courses (MOOCs) have been widely part of the educational landscape since 2012. Over the last decade, they have seen, on the one hand, a massive development associated with the emergence of platforms such as Coursera, edX, Udemy or FutureLearn. Still, at the same time, it has become clear that they cannot be considered as a substitute for traditional formal university education. At the Department of Information Studies and Library Science at Masaryk University, MOOCs are offered to students as part of a particular course in which they receive support and feedback. The learning is also linked to credits, which increases students' motivation to complete the course. The research will work with data from questionnaires in the first week and at the end of the course (n=18). The research will offer insights for running other similar courses based on the data. University support in terms of motivation and a sense of security is crucial. Students show high completion rates if they study the course as part of their curriculum. On the other hand, they name their inability to work well with time and organise their tasks as a significant barrier.*

Keywords: *MOOC; time management; tutoring; design process; university education; curriculum*

1. Introduction

Defining a MOOC takes work. Baggaley (2013) argues that it is a transformation of traditional distance education courses only in a more straightforward and more impersonal form - no teachers, no fees and many students in one course, which is also adapted to the methods of working with them. His overall view of the MOOC phenomenon is very sceptical. Zemsky (2014) faults them for being too atomistic and having little interconnectedness. Veletsianos and Shepherdson (2015) emphasise MOOCs' dynamic and open nature compared to other forms of education, while Hew and Cheung (2014) see MOOCs as a form of a relaxed e-learning environment. Badali et al. (2022) no longer define MOOCs and understand them as a type of learning implemented on specific e-learning platforms.

In general, it can be argued that more than 90% of those enrolled never complete the course (Eriksson et al., 2017; Narayanasamy & Elçi, 2020), but it depends on the specific metrics used to measure learning failure as well as the MOOC definition itself. Henderikx et al. (2017) even

put the failure rate between 90-98%. For example, this extreme value is consistent with the findings of Belanger and Thornton (2013) from Duke University, where the success rate was only 2%. As Cheng et al. (2022) state, exploring high dropout rates is one of the important research topics in the design of MOOCs. According to Badali et al. (2022), the retention rate of MOOCs is between 3% and 15% (Deshpande & Chukhlomin, 2017; Liyanagunawardena et al., 2013).

There may be several reasons for failure to study. On the one hand, the educational institution fails to meet the student's requirements (poor student performance). On the other hand, there can be a wide range of motivations for students not to complete the course, as their motivation is not the certificate but, for example, specific knowledge, experience or gain of specific information (Henderikx et al., 2017). However, a lack of motivation can also be a reason (Moor & Blackon, 2022; Maya-Jariego et al., 2020). This study also highlights that self-dropout is not a relevant metric of course success or quality, which should lead to attention to studying different learning pathways and motivations. Rather than tracking learner-independent metrics, a learner-centred design approach should be the focus of practical learning design. At the same time, the study indicates that interactivity and student engagement in the learning process are among the essential elements leading to retention.

As noted above, some approaches strongly link MOOCs with the platforms to run them. Specific studies of both empirical and theoretical kinds are then also often linked directly to them - examples include Coursera (Bates, 2019; Young, 2012; Knox et al., 2012), edX (Liang et al., 2016; Ferschke et al., 2015) or FutureLearn (Rizvi et al., 2020). The different platforms differ in their course design, the structuring of the learning environment and the actual interactions (Reutemann, 2016; Purkayastha & Sinha, 2021).

The underlying theoretical basis for the design of MOOC courses is connectivism (Downes, 2019; Boyatt et al., 2014), which is characterised by emphasising the role of the independent learner as part of a community that is dynamic and distant (Bell, 2011; Tschofen & Mackness, 2012). However, the theory has many critics (Baggaley, 2013). The whole concept of MOOCs can also face criticism, especially in the context of questionable openness (Wilery, 2007), but also value orientation (Bali & Sharma, 2017; Knox, 2016) or just inadequate interest and fashion (Collin & Saffari, 2015; Oswal, 2017).

The studies mentioned above suggest that specific learning competencies are needed for MOOC learning (Yu et al., 2017; Mee et al., 2018), often associated with the ability for self-regulated

or self-directed learning (Zhu et al., 2021; Albelbisi & Yusop, 2019). Our study will aim to analyse a pedagogical intervention that led to significant learning success in MOOCs for university students.

2. Methodology

The research study is seen as a case study. It is based on data analysis from a questionnaire created in Google Forms, which students filled in during the first two weeks of the study at the end of it (they are almost identical questionnaires). The study mainly compares the changes that occurred in the students. Thus, it does not view the data primarily quantitatively but as part of a broader qualitatively oriented whole.

The questionnaire was presented as voluntary but recommended, and strict anonymity was maintained during data processing. Thus, research does not compare the shifts of individual students during the semester but only observes the population's behaviour as a whole.

Research questions:

1. With what expectations do students start a MOOC course?
2. How do their feelings change during their studies?
3. What type of support do they need during the MOOC?

2.1. Course design

The course is taught in English under ISKM61 MOOC: learning online. It aims to support students in acquiring the skills needed to work independently with MOOCs. Conventional learning strategies and practices do not lead to successful progression through the course in the long term.

The study was divided into two parts. In the first, students had a choice of five short (3-5 weeks) MOOCs focused on general study skills or general competencies. These courses were chosen as relatively more accessible to support students' language and study competencies. The students chose this second course according to their preferences.

Each week, students had to write a short reflective journal in which they had to answer the following questions:

- What are you feeling?
- What did you learn?

- What progress have you made?
- What problems are you solving?

The diary aimed to support the reflective component of the learning process and, at the same time to keep a record of the learning process. Students were assigned a tutor who gave feedback on their entries each week or tried to advise or help them. Besides, there was an initial, interim and final meeting of the students and a group discussion.

The design of the course was systematic development of study competencies so that the graduates of the course could study on their own in the future without a tutor and social support. At the same time, research systematically tried to work to keep the study failure rate as low as possible. In designing the course, I have reflected on the findings that have shaped the various professional studies.

2.2. *Research sample*

A total of 20 students were enrolled in the course, of which 18 completed the initial questionnaire. Eighteen students also completed the course and consented to their responses to be used in the research. Two students have yet to respond to the initial consultation or submit a single entry in the electronic diary. Four students were international students, and 13 were LIS students. Nine identified as female, eight as male, and one student did not gender-identify. Our research takes the form of small-scale research (Munn & Drever, 1990; Layder, 2012), which does not consider a barrier given the nature of the sample.

The language barrier is often cited as one of the barriers to study. The attached graph (Figure 1) shows that most students were at the B2 level. Four students were admitted to a lower level. The current courses seem structured so that the B2 level is sufficient for learning. In the European university environment, this finding indicates that using MOOCs as part of university education is possible even where a substantial proportion of students still need to develop language competencies. MOOCs are a form of internationalisation in a broader sense (Badali et al., 2022; Troncarelli & Villarini, 2017).

Rate your level of English:

18 odpovědí

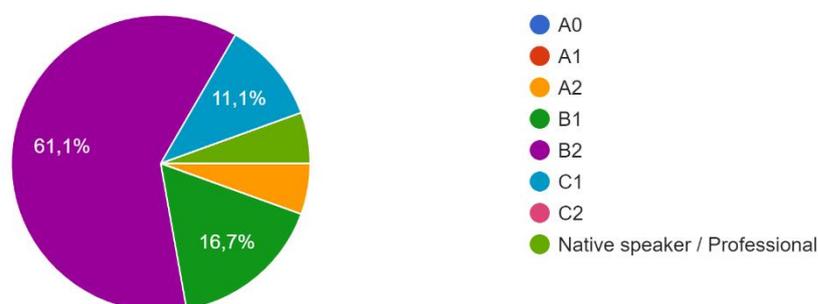


Figure 1: Students' self-assessment of language competence (n=18), according to the European Framework of Reference for Languages.

Regarding the previous experience with MOOCs, the research has worked with a relatively heterogeneous group. Some students reported that MOOCs were a familiar way of learning for them, some had experience with specific forms (Google Garage or courses at their home university) or had yet to complete the courses, but for most students, it was a new experience.

3. Results

The results will be structured according to the research questions. At the same time, given that our research is conceived as small-scale research, it will work with a broader qualitative and interpretive base connected with the knowledge of the context in which the research took place.

3.1. With what expectations do students start a MOOC course?

The specifics of the university course must frame the answer to this question. The motivation for credits and the university's internal regulations are evident in its case. Students have to complete the courses, and the condition for completing the ISKM61 MOOC: learning online was to study the MOOC. For some students, it was an optional course. For some, it was a compulsory course.

The first question was what students think when they hear the word MOOC. Findings were aware that, on the one hand, it is a difficult-to-define phenomenon. On the other hand, it is a socially known and discussed topic.

Students' perceptions of MOOCs are positive:

"They are online courses that are generally open to everybody. They enable people worldwide to attend classes and learn skills in fields that would not be otherwise possible for them."

They are fantastic tool for learning.

"MOOCs are very popular. I tried several during my studies and have mixed feelings about them. I like that I can organise my studying, but I need more motivation to finish the courses. I am also worried about whether I can learn more complicated issues through these courses."

"I think it is a good opportunity to learn for those with reduced conditions regarding their free time or ability to travel to school."

At the same time, the last two answers also clearly show a particular concern of the students about whether they will be able to cope with the study and whether it will be associated with any other problems. From the interviews with the students during the first meeting, this concern was partly offset by the fact that they had enrolled in a university course that could help them with any problems.

The second question was aimed directly at student motivation. In the previous answer, some students defined MOOCs as a tool to learn whatever they enjoy or as a means to achieve learning freedom. The question "Why do you want to study MOOC courses? What do you want to learn in them?" aims to name learning needs and goals.

For some students, there was an essential dimension of experimentation or seeking experience:

"I am not sure what I want to learn. I am here mostly for the experience."

"I find them interesting, and I like the concept. I would love to learn about technology in education and also something about data management."

"I want to try a new form of studying. I have always studied in a concrete course at my university, led by a concrete person. This form of studying will be new and challenging because I must organise my time well."

So for some students, it is not the content of the individual courses that is important but the search for experience with the form. What matters for some is that MOOCs can complement what is missing in the university curriculum of their home university or expand their knowledge portfolio to include subjects they need for job validation:

"I want to learn new skills that are not taught in my degree but are still relevant to me. I want to learn more about new technology and coding for my curiosity because I aspire to work in a library where these tools become increasingly used.

"I would like to use this opportunity to study data engineering in the Azure platforms, which will help me later."

The student's reflection after the end of the semester was interesting when they spoked about their motivations for further MOOC study, already outside the university course. Essentially all of them stated that they wanted to continue their studies:

"What I like about MOOCs is the ability to focus just on one topic, which I often do not see in formal education where I had to pick a study program and go through some classes that do not meet my interests."

"As it is organised to the multiple weeks, it is beneficial to plan your studying and not be overwhelmed with lots of information."

"I can decide when and how much I want to learn each week. Also, they are online, so I do not have to go to the university."

"They offer a great opportunity for learning topics I will not be able to learn on my own (or at school or university). Also, they allow me to study at my own pace in my free time, so there is no need to worry about being somewhere on time. It works well in my schedule (university/part-time work)."

The critical point is that students rate the MOOC format as beneficial for themselves based on reflection on their studies. This suggests that if a university can create the conditions for and support students' own MOOC learning, MOOCs can become part of the university curriculum and the individual student's learning environment. My curiosity and willingness to experiment turned into a positive acceptance of this kind of educational form based on experience.

3.2. How do their feelings change during their studies?

While the first question was primarily qualitative, the second looked at a quantitative comparison of the changes in feelings experienced by the students. Students voted on a five-point scale (I feel it strongly - I do not feel it) for five emotions that the literature describes as significant for MOOCs - anticipation, concern, stress, satisfaction and certainty. The students

conducted self-assessments, so analysing the individual bars in the graph is not easy as these are subjective statements. However, observing the trends that emerge in the data is essential.

What emotions do you associate with MOOCs:

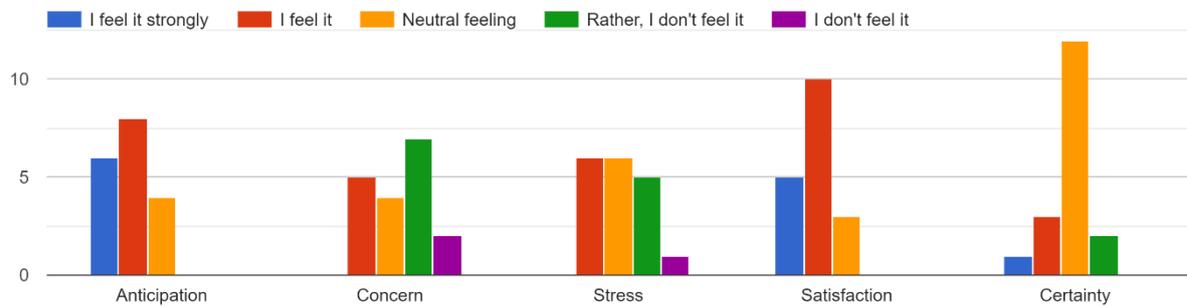


Figure 2: Pre-study data (n=18).

What emotions do you associate with MOOCs:



Figure 3: Post-course data (n=14).

The partial expectation shift shows that students have gained some experiences during the course that transform what they expect. In the context of the first research question, it can be said that they know what they can look forward to or expect after the course.

It can be considered a crucial shift in the parts of concern and stress. The course has quite fundamentally helped students to reduce fears and stress and create a sense of confidence (last column). Thus, one of the fundamental benefits that can be gained from implementing MOOCs in a university setting is the transfer of experience and the creation of a certain sense of inner security and self-confidence. The psychological aspect is essential, and the course supported it.

At the same time, it can also see the reinforcement of a sense of satisfaction. Only one student did not feel satisfied after the course. The data suggest that the study was relatively easy for the students and that they had to exceed their limits or capabilities, but it created a safe experiential space for them. The interviews also suggest that it is beneficial in terms of educational effect if an introductory university methods-oriented course is less demanding in terms of content and creates a space for students to gain good educational habits rather than stressing students with demands that may lead to partial failures. It should be remembered that, despite the three meetings within the semester and the journal writing each week, this is an online course in which motivation and social connections are lower than in a preessional course.

3.3. What type of support do they need during the MOOC?

As mentioned above, with some university support, students can gain experience with MOOCs and be successful in their studies. However, what kind of support is involved? Four factors emerged as necessary in our research. In Figure 4 and Figure 5, students chose between the first four options and could write in the others.

The ability to work with time seems crucial from the students' answers (and this topic was also the most frequently mentioned in the meetings). Online learning can be challenging because it can be procrastinated, has no fixed schedule and requires a high degree of self-regulation that students need to improve, or at least declare. Related to this is the relatively high influence of extrinsic motivation (in the case of our course, credits). In general, students perceive that working with time and motivation, which is extrinsic, is essential for completing the course.

The influence of the tutor is also relatively stable and highly rated. The idea that some materials on how to study would help students develop their study competencies is proving somewhat false. Their gradual decline between the pre- and post-course situation is evident, which can be attributed to both the increasing experience of the students and the lesser effectiveness of such learning resources.

What would you need in order to feel that you will study well in MOOC courses?

18 odpovědí

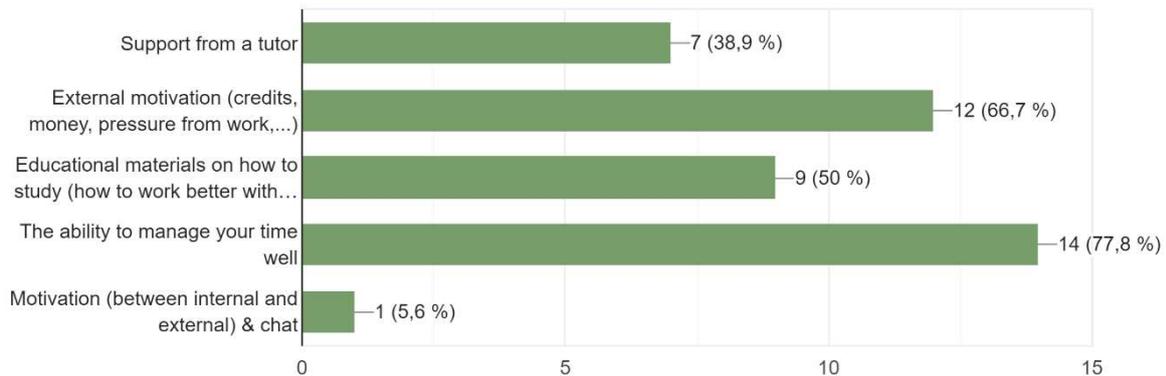


Figure 4: Expected support needs during the MOOC - before starting (n=18).

What would you need in order to feel that you will study well in MOOC courses?

14 odpovědí

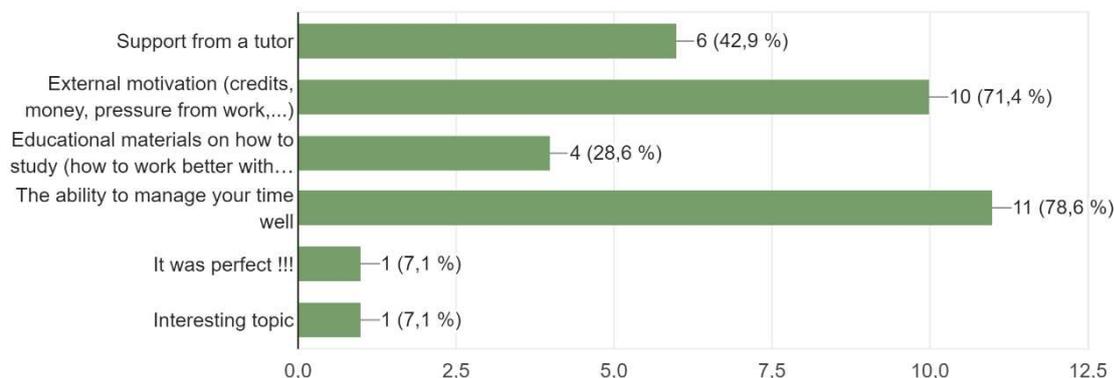


Figure 5: Expected support needs during the MOOC - at the end (n=14).

Students' comments before the beginning of the course will be directed to extrinsic motivation:

"I would love a certificate I can use in my job application; for example, I also need to work on my time management because I am the queen of procrastination."

Similarly, before the course began, students commented on their time management skills:

"Now, at the beginning of the semester, I need to set up time management and study routines. The hardest task for me is to combine work and study appropriately."

"I need deadlines, so I do not procrastinate too much + my motivation is work-related. I want to perform well."

"Better time organisation."

After the course, they then highlight the following about their support needs:

"As a learner, external motivation has always greatly supported my learning (recognition at work, among friends, and family). Also, since the learner needs to be self-directed in MOOCs, I find it important to have good time management skills (know how to manage my time)."

"Better time-management."

"Maybe I will reach a point in my life where I can go through a MOOC without any external motivation - purely out of curiosity and enjoyment."

The last exciting example is that students perceive extrinsic motivation as something terrible that needs to be eliminated. Education is supposed to be for fun or to satiate an internal sense of duty or desire. This cultural narrative only benefits a few students and, on the contrary, burdens them in their studies. Interestingly - in contrast to the beginning of the course - there is a clear emphasis on the work of the tutor:

"Creating a specific setting to learn my classes can help. For instance, going to the library to learn instead of staying at home help me focus. Learning with others and a tutor who can give feedback also help with long-term motivation."

"The feedback from the tutor was great! She helped to motivate me. I wanted the tutor to refrain from writing me comments on the submission. As I said at the online meeting, the organisational chart with our progress was also great. Credits for completing a course are a nice bonus."

From our data, it seems that learning MOOCs is stressful for students, as expressed by one of the students when talking about the different forms compared to regular study:

"For me, MOOC needs to have interesting topics, and it has to keep being interesting throughout the course. I do not see joining a MOOC as a hard commitment, so I would not have any issue dropping out if it felt like I was not getting anything new."

An emphasis on completion, good time management, regulation or care from the tutor, and the notion that they should learn just for themselves. On the other hand, they acknowledge that

MOOCs are not an everyday learning experience and that they are different. This may be why a well-managed university-level learning experience can be so essential for further learning activities that MOOCs can become a regular part of the learning environment of individual students.

4. Discussion

White (2015) talks about the MOOC phenomenon as a problem for universities that may represent a competitor changing the educational landscape. Pelletier et al. (2022), in their Educase report, highlight that universities need to look for ways to transform their curricula to make them accessible to what was previously described as 'non-traditional' students. The authors point out that 'traditional' students are disappearing, and the whole university environment is becoming non-traditional. Therefore, looking for ways to dynamise it and add beneficial and meaningful formats to students is necessary. The data analysed shows that MOOCs can fulfil this role in higher education.

Regarding students' motivation or needs during the learning process, one can agree with Snyder (2012) that students find the possibility of atomic choice of educational content attractive. Milheim (2013) sees this phenomenon as a threat to the integrity of learning and scholarship. However, if MOOCs are part of university education, this is not a problem but a challenge. Many issues remain big, such as the need to monitor the quality of the courses or the protection of personal data (Milheim, 2013).

Cole and Timmerman (2015) articulate some concerns students may have during their studies - concerns about technology, communication, and the learning process. Our research also shows that fears are a big issue for learners and form a barrier to effective learning in MOOCs. From our results, the presence of a university course within which the learning occurs, or the support of societies or other tools, can help students overcome these fears. Zhou (2016) puts the concerns in the context of specific isolation or autonomy, a topic also addressed by our learning activity's design. Autonomy is not something that students automatically have in their studies, but it needs to be gradually developed in a safe environment.

For our study, the most challenging issue to deal with was time management (Inganah et al., 2023), which turns out to be a much broader and more global problem of the entire educational process in tertiary education with many implications for learning outcomes (Gulua & Kharadze, 2022; Khiat, 2022). Gant et al. (2022) consider time management and the support of educational institutions in its development as a prerequisite for successful MOOCs, which our data support.

Wei (2022) also arrives at similar results for younger students. Doo et al. (2023) point out that surprisingly few studies link self-directed learning or self-directed learning and MOOCs, but that the link between time management and success in studying MOOCs exists and is relatively strong. However, it needs to be considered with other dominant factors, such as metacognitive or social factors.

5. Conclusion

Our study offered a research-by-design approach view (Roggema, 2016; Pasqui, 2022). The motivations for why students should be able to study MOOCs as part of the curriculum are apparent - they are a way to improve the quality of the actual teaching at regional universities, they support the intercultural and internationalisation component of education, they are an educational phenomenon related to lifelong learning, and they are a cultural and social issue. This conviction corresponds to part of the requirements of the students themselves.

Supporting students through university education emerges as crucial in our research. University support is necessary for students' study safety, learning strategies, and especially extrinsic motivation. Studying a course is valuable for students to gain specific knowledge and skills, especially in developing learning skills and experience in this kind of education. In our research, promoting the ability to manage and organise time appears to be crucial, which seems to be a global phenomenon; on the contrary, the expected barrier in the form of language competence is described in the literature (Bralić & Divjak, 2026; Tahirsylaj et al., 2018) rarely appeared in the students' statements and realistically constituted a problem for one student of the whole course.

Therefore, the creation of similar courses forming a "wrapper" or "environment" for MOOC learning in a university environment can be recommended. It can be expected to enable students to achieve good results in MOOC learning. However, this statement does not mean that there are not several other issues that should be researched. It is essential to critically reflect on the benefits of MOOCs as forms of virtual mobility and, in particular, to analyse how to deal with the time management phenomenon discussed above in learning skills. At the same time, it should be kept in mind that our research was small-scale research and that to make generalisable judgments, more extensive quantitative research would need to be carried out, taking away from the specificities of one class in one particular year of study.

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Reference

- Albelbisi, N. A., & Yusop, F. D. (2019). Factors influencing learners' self-regulated learning skills in a massive open online course (MOOC) environment. *Turkish Online Journal of Distance Education*, 20(3), 1-16.
- Badali, M., Hatami, J., Banihashem, S. K., Rahimi, E., Noroozi, O., & Eslami, Z. (2022). The role of motivation in MOOCs' retention rates: a systematic literature review. *Research and Practice in Technology Enhanced Learning*, 17(1), 1-20.
- Baggaley, J. (2013). MOOC is rampant. *Distance education*, 34(3), 368-378.
- Bali, M. A., & Sharma, S. (2017). Envisioning post-colonial MOOCs: Critiques and ways forward. In *Massive Open Online Courses and Higher Education* (pp. 26-44). Routledge.
- Bates, T. (2019). What's right and what's wrong about Coursera-style MOOCs. *EdTech in the Wild*.
- Belanger, Y., & Thornton, J. (2013, February 5). *Bioelectricity: A quantitative approach: Duke University's first MOOC*. Durham, NC: Duke University. Retrieved from http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/6216/Duke_Bioelectricity_MOOC_Fall2012.pdf?sequence=1
- Bell, F. (2011). Connectivism: Its place in theory-informed research and innovation in technology-enabled learning. *International Review of Research in Open and Distributed Learning*, 12(3), 98-118.
- Boyatt, R., Joy, M., Rocks, C., & Sinclair, J. (2014). What (Use) is a MOOC?. In *The 2nd international workshop on learning technology for education in cloud* (pp. 133-145). Springer Netherlands.
- Bralić, A., & Divjak, B. (2016, October). Use of MOOCs in traditional classroom: blended learning approach. In *EDEN Conference Proceedings* (No. 2, pp. 34-43).
- Cole, A. W., & Timmerman, C. E. (2015). What do current college students think about MOOCs. *MERLOT Journal of Online Learning and Teaching*, 11(2), 188-201.

Collin, S., & Saffari, H. (2015). Le MOOC et le «hype»: analyse critique des discours médiatiques sur les MOOC. *Revue internationale des technologies en pédagogie universitaire*, 12(1-2), 124-137.

Deshpande, A., & Chukhlomin, V. (2017). What makes a good MOOC: A field study of factors impacting student motivation to learn. *American Journal of Distance Education*, 31(4), 275–293. <https://doi.org/10.1080/08923647.2017.1377513>*

Doo, M. Y., Zhu, M., & Bonk, C. J. (2023). Influence of self-directed learning on learning outcomes in MOOCs: A meta-analysis. *Distance Education*, 44(1), 86-105.

Downes, S. (2019). Recent work in connectivism. *European Journal of Open, Distance and E-Learning (EURODL)*, 22(2), 113-132.

Eriksson, T., Adawi, T., & Stöhr, C. (2017). “Time is the bottleneck”: A qualitative study exploring why learners drop out of MOOCs. *Journal of Computing in Higher Education*, 29(1), 133–146. <https://doi.org/10.1007/s12528-016-9127-8>

Ferschke, O., Yang, D., Tomar, G., & Rosé, C. P. (2015). Positive impact of collaborative chat participation in an edX MOOC. In *Artificial Intelligence in Education: 17th International Conference, AIED 2015, Madrid, Spain, June 22-26, 2015. Proceedings 17* (pp. 115-124). Springer International Publishing.

Finardi, K., & Tyler, J. (2015). The role of English and technology in the internationalization of education: insights from the analysis of MOOCs. In *EDULEARN15 Proceedings* (pp. 11-18). IATED.

Gan, T. Y., Yusop, F. D., & Chin, H. L. (2022). Development Of A Scale To Measure Students’learning Satisfaction And Self-Regulated Learning Strategies In Moocs. *Mojos: Malaysian Online Journal of Educational Sciences*, 10(3), 1-12.

Gulua, E., & Kharadze, N. (2022). Impact of time management on personal development of master’s degree students. *Humanities Today: Proceedings*, 1(1), 64-74.

Henderikx, M. A., Kreijns, K., & Kalz, M. (2017). Refining success and dropout in massive open online courses based on the intention–behavior gap. *Distance Education*, 38(3), 353-368.

Hew, K.F. and Cheung, W.S. (2014), “Students’ and instructors’ use of massive open online courses (MOOCs): motivations and challenges”, *Educational Research Review*, Vol. 12, pp. 45-58.

Cheng, J., Yuen, A. H., & Chiu, D. K. (2022). Systematic review of MOOC research in mainland China. *Library Hi Tech*, (ahead-of-print).

Inganah, S., Darmayanti, R., & Rizki, N. (2023). Problems, Solutions, and Expectations: 6C Integration of 21 st Century Education into Learning Mathematics. *JEMS: Jurnal Edukasi Matematika Dan Sains*, 11(1), 220-238.

Khiat, H. (2022). Using automated time management enablers to improve self-regulated learning. *Active Learning in Higher Education*, 23(1), 3-15.

Knox, J. (2016). Posthumanism and the MOOC: opening the subject of digital education. *Studies in Philosophy and Education*, 35, 305-320.

Knox, J., Bayne, S., Ross, J., Macleod, H., & Sinclair, C. (2012). MOOC Pedagogy: the challenges of developing for Coursera. *Association for Learning Technology (ALT) Online Newsletter*, (28).

Layder, D. (2012). *Doing excellent small-scale research*. Sage.

Liang, J., Yang, J., Wu, Y., Li, C., & Zheng, L. (2016, April). Big data application in education: dropout prediction in edX MOOCs. In *2016 IEEE second international conference on multimedia Big data (BigMM)* (pp. 440-443). IEEE.

Liyanagunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A systematic study of the published literature 2008–2012. *International Review of Research in Open and Distributed Learning*, 14, 202–227. <https://doi.org/10.19173/irrodl.v14i3.1455>

Maya-Jariego, I., Holgado, D., González-Tinoco, E., Castaño-Muñoz, J., & Punie, Y. (2020). Typology of motivation and learning intentions of users in MOOCs: the MOOCKNOWLEDGE study. *Educational technology research and development*, 68, 203-224.

Mee, C. K., binti Salam, S., & Sui, L. K. M. (2018). Undergraduate's perception on Massive Open Online Course (MOOC) Learning to foster employability skills and enhance learning experience. *International Journal of Advanced Computer Science and Applications*, 9(10).

Milheim, W. D. (2013). Massive open online courses (MOOCs): Current applications and future potential. *Educational Technology*, 38-42.

Moore, R. L., & Blackmon, S. J. (2022). From the Learner's perspective: A systematic review of MOOC learner experiences (2008–2021). *Computers & Education*, 104596.

Munn, P., & Drever, E. (1990). *Using Questionnaires in Small-Scale Research. A Teachers' Guide*. Scottish Council for Research in Education, 15 St. John Street, Edinburgh, EH8 8JR, Scotland, United Kingdom..

Narayanasamy, S. K., & Elçi, A. (2020). An effective prediction model for online course dropout rate. *International Journal of Distance Education Technologies (IJDET)*, 18(4), 94–110. <https://doi.org/10.4018/IJDET.2020100106>

Oswal, S. K. (2017). MOOCs in the Global Context. In *Handbook of Research on Writing and Composing in the Age of MOOCs* (pp. 39-55). IGI Global.

Pasqui, G. (2022). Afterword. Learning from Research by Design Approaches for a WEF-Sensitive Planning Culture. In *Territorial Development and Water-Energy-Food Nexus in the Global South: A Study for the Maputo Province, Mozambique* (pp. 255-259). Cham: Springer International Publishing.

Pelletier, K., McCormack, M., Reeves, J., Robert, J., Arbino, N., Dickson-Deane, C., ... & Stine, J. (2022). *2022 EDUCAUSE Horizon Report Teaching and Learning Edition* (pp. 1-58). EDUC22.

Purkayastha, N., & Sinha, M. K. (2021). Unstoppable study with MOOCs during covid 19 pandemic: a study. *Library Philosophy and Practice*, 4791.

Reutemann, J. (2016). Differences and Commonalities—A comparative report of video styles and course descriptions on edX, Coursera, Futurelearn and Iversity. *European Stakeholders Summit on experiences and best practices in and around MOOCs*.

Rizvi, S., Rienties, B., Rogaten, J., & Kizilcec, R. F. (2020). Investigating variation in learning processes in a FutureLearn MOOC. *Journal of computing in higher education*, 32, 162-181.

Roggema, R. (2016). Research by design: Proposition for a methodological approach. *Urban science*, 1(1), 2.

Snyder, M. D. (2012). Much ado about MOOCs. *Academe*, 98(6), p. 55.

Tahirsylaj, A., Mann, B., & Matson, J. (2018). Teaching creativity at scale: Overcoming language barriers in a MOOC. *International Journal of Innovation, Creativity and Change*, 4(2), 1-19.

Troncarelli, D., & Villarini, A. (2017). Internationalization of higher education and the use of MOOCs to improve second language proficiency: the MOVE-ME project. *Beyond the language classroom: researching MOOCs and other innovations*, 5-14.

Tschofen, C., & Mackness, J. (2012). Connectivism and dimensions of individual experience. *International Review of Research in Open and Distributed Learning*, 13(1), 124-143.

Veletsianos, G. and Shepherdson, P. (2015), “Who studies MOOCs? Interdisciplinarity in MOOC research and its changes over time”, *The International Review of Research in Open and Distributed Learning*, Vol. 16 No. 3, pp. 1-17.

Wei, T. (2022). *The experience of secondary students studying MOOCs: a case study of a teacher-student mentoring programme in Hong Kong* (Doctoral dissertation, University of Bristol).

White, S., Leon, M., & White, S. (2015, May). MOOCs Inside Universities. In *Proceedings of the 7th International Conference on Computer Supported Education* (pp. 109-115).

Wiley, D. (2007). Intro Open Ed Syllabus. Salt Lake City: University of Utah. Retrieved from http://web.archive.org/web/20130119201933/http://www.opencontent.org/wiki/index.php?title=Intro_Open_Ed_Syllabus

Young, J. R. (2012). Inside the Coursera contract: How an upstart company might profit from free courses. *The Chronicle of Higher Education*, 19(07), 2012.

Yu, H., Miao, C., Leung, C., & White, T. J. (2017). Towards AI-powered personalization in MOOC learning. *npj Science of Learning*, 2(1), 15.

Zemsky, R. (2014). With a MOOC MOOC here and a MOOC MOOC there, here a MOOC, there a MOOC, everywhere a MOOC MOOC. *The Journal of General Education*, 63(4), 237-243.

Zhou, M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. *Computers & Education*, 92, 194-203.

Zhu, M. (2021). Enhancing MOOC learners' skills for self-directed learning. *Distance Education*, 42(3), 441-460.

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The emergence of environmental education and sustainability education in the upper grades of primary school from the perspective of the students

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Abstract

The aim of the research is to assess the effectiveness of sustainability and environmental education among the upper secondary school students in Borsod-Abaúj-Zemplén and Heves County. The survey was done with the help of an online questionnaire, which included both open and closed questions, and used selective, scale and own opinion-based response. The aim was to map students' attitudes which are based on environmental education at school and at home. As a result of the survey, we managed to get a momentary picture of the level of environmental attitudes of the future generation in the upper elementary school, together with its missing elements. The number of participants was 187. Lexical knowledge is stronger than its realization in practice. Students are more interested in environmental problems and are also informed, but environmentally conscious actions are not necessarily part of their daily lives.

Keywords: *environmental education; sustainability; upper grades of elementary school*

Környezeti nevelés és fenntarthatóságra oktatás megjelenése az általános iskola felső tagozatain a diákok szemszögéből

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Absztrakt

A kutatás célja a fenntarthatóságra nevelés és a környezeti nevelés eredményességének felmérése az általános iskola felső tagozatos diákjainak körében Borsod-Abaúj-Zemplén és Heves megye területén. A felmérés online kérdőív segítségével történt, amelyben nyitott és zárt kérdések egyaránt voltak, alkalmaztunk szelektív, skála- és saját véleményen alapuló válaszlehetőségeket. Cél a diákok iskola által formált és az otthoni környezeti nevelési alapokon nyugvó attitűdjének feltérképezése volt. A felmérés eredményeként sikerült egy pillanatképet kapni az eljövendő generáció környezeti attitűdjének szintjéről az általános iskola felső

tagozatában, együttesen annak hiányzó elemeiről. A kitöltők száma 187 fő. A lexikális ismeretek erősebbek, mint a gyakorlatban való megvalósulás. A tanulókat inkább érdeklik a környezeti problémák és tájékozódnak is, de a mindennapi életüknek nem feltétlenül része a környezettudatos cselekvés.

Kulcsszavak: környezeti nevelés; fenntarthatóság; általános iskola felső tagozata

Introduction

In our research, we mainly wanted to address how and with what methods and tools sustainability education takes place in the upper grades of elementary school. We examined the implementation of this among teachers, parents, and students from several aspects. Because nowadays, the global destruction caused by environmental disasters is an increasingly pressing problem. The concept of climate change and its effects have become part of our everyday live. That is why we considered it is important to examine whether students are already being prepared at the lower secondary level, and whether their attention is drawn to the factors that surround them and seriously affect and influence their future.

Changes in the environment have long been dealt with by the countries and organizations of the world, for example: Club of Rome, UN Brundtland Report or Rio Declaration (Láng, 2003), whose decisions and guidelines have become decisive at the state level as well. Even the main message of the 1987 Brundtland report was to focus on sustainable development (Láng, 2003). In the National Basic Curriculum governing the life of schools in Hungary (Government Decree 5/2020 (I. 31.), 2020; Government Decree 110/2012. (VI. 4.), 2012; 202/2007. (VII. 31.) government decree, 2007) there is also a change in the emphasis on the emergence of environmental education. Due to the amendment of the Public Education Act in 2003, it became mandatory for schools to include the environmental education program in their pedagogical program, which permeates (can permeates) the everyday life and operation of the institutions (2003: LXI. tv. 2003).

There may be several reasons for this, starting with the methodological approach of environmental education. Nahalka mentions two main groups of environmental educators in his study: On the one hand, those who consider the transfer of knowledge to be primary, and on the other hand, those who want to achieve results by changing environmental attitudes (Nahalka, 1997). In any case, as the research of Ütőné et al. highlighted, the emphasis is still on lexical knowledge in the textbooks and workbooks in use (Revákné et al., 2018). Kéri also draws attention to the fact that, based on surveys conducted among geography teachers, environmental protection is identified as one of the first topics to be expanded (Kéri, 2009). Environmental

education appears predominantly in science subjects, which highlights the unpreparedness for and methodological deficiencies in environmental education of teachers of nonscience subjects (Havas & Varga, 1999). Based on Havas's research, it also appears that interdisciplinary connection between subjects rarely appears in Hungarian schools (Havas, 2001a, 2001b). Another problem is the reduction of the number of lessons in science subjects or the lack of teachers teaching in this field (Homoki, 2021).

1. Literature review

The literature used was classified into two groups. One type, which provided a summary framework for the research, and the other type includes the literature that provided inspiration in the research methodology and the practical part of education (Falus & Ollé, 2008).

The work summarizing the past of environmental education describes in detail the concept of environmental education and its situation in Hungary. As the authors of the book also write: "Environmental education also includes the objectives of nature conservation education" (Chikán et al., 2015, p. 7), and according to them, we should not talk about environmental education, but about fostering, because it is a more comprehensive concept, which also considers the student's personality formation as a goal. In the book of Chikán, the pedagogy of sustainability is explained in several ways, according to which it is an educational method with which we try to make "environmental citizens" out of our students, and we also encourage them to behave responsibly for the sake of the future generation. We examined the main moments related to the historical development of environmental education in an international context, of course from a Hungarian perspective (Havas, 2001b; Láng, 2003; Moser & Pálmai, 1999). We believe that one country cannot solve the Earth's problems alone, a broad (global) cooperation is needed to solve them (Havas, 2001a). An example of this cooperation is the EU, as a system (although this raises several questions), which creates a unit that covers a large area, which makes it global (Havas, 2001a). Through the UN and the European Union, as an organization that goes beyond the country, our country also joined the sustainability program, which is how the Eco-School Program, and the Green Kindergarten Program came into being as Hungarian alternatives for implementing environmental education (Könczey, 2014). Through the forest school, we can introduce a more innovative and practical learning organization into public education, with which we can shape students' attitudes more strongly (Bilku, 2004). Providing a summary framework for all of this, we studied the publication of the National Sustainable Development Strategy published in 2007 (National Agency for Sustainable Development,

2007), in which everything that was already mentioned above appears, including Hungary in the international network and defining our country's own strategies.

We have studied how environmental education should be properly and expediently taught, what are the appropriate goals, principles and recommended methods that can be used to achieve success in this field. How should we apply these at different ages, and what are the requirements of environmental education that we should master (Kulman, 2018; Lükő, 2003; Victor, 1993). We would like to emphasize that environmental education cannot be applied only to the school system, because: "Environmental education therefore begins long before school age, of course it continues at all levels of the school, and what is at least as important: it does not end with the graduation" (Victor, 1993, p. 4). That is why in our survey we covered not only the school environment, but also the students' home environment and upbringing. Not all authors paint a positive picture of attitude formation, so Nahalka (1997) compares the principles of the "opposite" camps and tries to offer a solution by using constructive pedagogy, which can resolve the differences between the two camps and show the way how to teach in a unified way or raising children to be environmentally conscious. In addition to these, we also studied several specialist literatures dealing with pedagogical methodology, which, in addition to theoretical knowledge, also served as a foundation for later research methods (Fábián, 1993; Farsang, 2011; Hollik & Ósz, 2016; Makádi & Farkas, 2015; Teperics et al., 2015).

The works that gave us ideas on how to protect our environment and live an environmentally conscious way of life, while also informing about the problems affecting our environment by giving a global situation report, form a slightly intermediate category (Harriet, 2018; Janine, 2020). We used these works both for their literary foundation and for the compilation of the questionnaires. For the compilation and analysis of the questionnaire and the teaching of sustainability education and environmental education, we obtained useful information from the works of Varga and Havas (Havas, 2001b; Havas & Varga, 1999; Varga, 1999, 2006). They discuss the competencies and development of the teacher, the possibilities of external collaborations and the interdisciplinary approach, the American model and its transferability to the Hungarian education system. In our surveys, we were curious about the possibilities of interdisciplinarity, especially in the case of the subject of history and citizenship, since this is my other major (Horváth, 2006). We also found concrete examples of which geographical topics it is possible to focus on environmental protection (Havas & Varga, 1999; Kéri, 2009). Lehoczky's volume was a bridge between the theoretical background and the implementation of the research (Lehoczky, 1999). The book *School in nature, or the practice of environmental*

education, which very expediently presented the principles of environmental education, its possibilities at school and beyond.

2. Objective and hypotheses

In this study, we would like to present the results of the student survey. The sample number is 187 students.

The point of view of the students has been highlighted because; they are the reason why this teaching and life education process takes place. We wanted to know whether the students were aware of what we mean by sustainable development and environmental education, whether they were interested in various nature conservation problems, and whether they thought about the impact of humans on nature and the possibilities for nature conservation action. During our investigation, we discussed what tools are available to the institutions and how the support within the school is implemented. We assessed the presence of vocation/motivation in relation to the topic, as well as the applied methods and collaborations with other organizations. In addition to all of this, we also attempted to map non-science subjects and cross-subject concentration, as Havas also writes: "In order to educate for sustainability, one must understand the interrelationships and interdependence of man and the environment" (Havas, 2001b, p. 39).

Based on the objectives mentioned above, our hypotheses are the following:

1. We assume that the theoretical background of environmental education is more grounded than the practical implementation.
2. In our opinion, education for sustainability appears predominantly in the framework of natural science subjects, including natural science and geography.
3. The area of extracurricular programs and the application of diverse learning methods and work forms still shows little/ low variety.
4. The students are less or not really interested in the problems that threaten their environment, but at the same time they are afraid of the changing environmental effects.
5. They are not aware of the actual concept of sustainable development.
6. They are not sure how they can protect their environment.
7. Most of the responding students consider themselves and their families to be environmentally conscious.

3. Sample and method

As the method of the survey, we chose an online, written survey using the Google Forms platform, where the filling was done on a voluntary basis. There were 22 questions in the questionnaire, most of them multiple-choice, a few evaluating on a Likert scale, and a few open questions. To conduct a more thorough survey, we used open-ended questions. It was also necessary to unify and code them before performing the analysis. The answers to the questionnaire were evaluated using the Microsoft Excel program.

At the beginning of the questionnaire, the focus was on sociodemographic questions (e.g. place of residence, gender, type of student's school, etc.). After that, we moved on to issues related to environmental education and sustainable development. The questions mainly measure the students' awareness of the subject, as well as its appearance and forms in their everyday life (at home and school). The subjects of the survey were students in the upper grades (grades 5-8) of the elementary school. The aim was to include students studying in different maintained institutions in the sample, so accordingly we searched for partner schools in the counties of Heves and Borsod-Abaúj-Zemplén. The survey took place for about 2 months, with minor or major interruptions. Unfortunately, with several institutions, the process stopped at the initial (acquaintance) stage. There were several reasons for this, starting from tight school schedules, to lack of interest, to increased participation in surveys. The questionnaire was completed by 187 students. Most answers came from public schools (136 people; 72.7%), followed by church schools (36 people; 19.2%), 6 people from junior high schools (3.2%), 5 from alternative primary schools, while 4 answers were received from private/foundation elementary schools (2.1%).

The difference between the gender distribution is not substantial, almost 52% of the balance shifted in favor of boys. In the county distribution, we can already speak of much greater dominance. 62.6% of participants from Borsod-Abaúj-Zemplén county, 36% from Heves, 2% came from other counties (3 people). Regarding the status of the students' places of residence, it can be said that the majority of the students (56.7%) live in cities. Expanding this further, it emerged that among those who filled in, the Heves county residents were more likely to live in a village (72%), while in the case of Borsod residents, this shifted to a large proportion towards the city (80%) (Mezőkövesd). Examining the distribution of the sample by class and age group, the majority of respondents were fifth (30.5%) and eighth graders (30.5%), the sixth graders

were in the middle of the field (26.2%) and with the smallest proportion being seventh graders (12.8%).

4. Environmental education and sustainability education from the students' point of view - questionnaire evaluation

In the focus of the survey, we first asked whether the students had ever heard of the concept of sustainable development or environmental education (Table 1). Overall, yes was in the majority, 53% of respondents had heard of sustainable development, while 55% had heard of environmental education.

52.4% of students have heard about sustainable development, while 55% of students have some knowledge of environmental education. What we have to notice is that in the case of 6th graders, we only received meaningfully measurable data in BAZ County, as the number of participating 6th graders in Heves County is very few. There is greater success in conceptual knowledge and understanding of environmental education (Table 1). However, the final summary shows that the proportion of those who know the concept (55%) and those who do not (45%) is almost the same. If the types of educational institutions are also included in the analysis, then the tendency can be seen that in the case of public schools (since most of the respondents came from them, so they are the authorities) they know or do not know the concept of sustainable development in roughly equal proportions. A difference can be seen in the case of 8th grade students in Heves county, where there is a large majority of respondents who answered yes to the question (78%). In the case of environmental education (again only in public schools), there is a bigger difference in the case of 5th graders, according to statistics, they are more aware of this concept (69% answered yes) than their older peers (Table 1).

1. Table: Knowledge of the concepts of sustainability and environmental education among primary school years (people)

grade	concept	sustainability		environmental education		
		county	yes	no	yes	no
5.	Heves		7 (4%)	9 (5%)	12 (6%)	4 (2%)
	BAZ		19 (10%)	22 (12%)	24 (13%)	17 (9%)
6.	Heves		0 (0%)	5 (3%)	1 (0,5%)	4 (2%)
	BAZ		25 (13%)	19 (10%)	23 (12%)	21 (11%)
7.	Heves		7 (4%)	2 (1%)	5 (3%)	4 (2%)
	BAZ		5 (3%)	10 (5%)	11 (6%)	4 (2%)
8.	Heves		25 (13%)	15 (8%)	20 (11%)	20 (11%)
	BAZ		10 (5%)	7 (4%)	7 (4%)	10 (5%)
total	Heves		39 (21%)	31 (16%)	38 (20%)	32 (17%)
	BAZ		59 (32%)	58 (31%)	65 (35%)	52 (28%)

In the following question, we were interested in the students' opinions. We asked them to describe in one sentence what sustainable development and environmental education mean to them. It is interesting that in the previous question, whether they had ever heard of these concepts, most of them gave positive answer. However, this was not fully reflected in this question, since relatively many people answered with "I don't know" or perhaps did not write anything at all. Most of these types of answers came from students of public schools (11%). We received more complex answers mainly from students of church-run schools (at least 50% were able to explain the essence of the process in a compound way). This testifies that the students, although they have already heard of the concept of sustainable development and environmental education, do not know its meaning.

During the next two questions, we were interested in how closely the students follow the news about our environment and on which platforms they do so. We used a frequency scale (from 1 to 5, where 1 indicates not at all and 5 indicates continuous values). The majority indicated the middle (35.8%) and 4 (27.8%) frequencies, so they follow the news about the problems affecting our Earth with moderate attention. Students from Heves county have the most among those marking 1st, including 5th graders (25%) and 8th graders (12.5%). Among those who marked 5, fifth graders (73%) and sixth graders (68%) from Borsod were in the majority. In connection with this, we also asked them on which platforms or from whom they hear news about the problems affecting our Earth, where they could indicate several options (Figure 1).

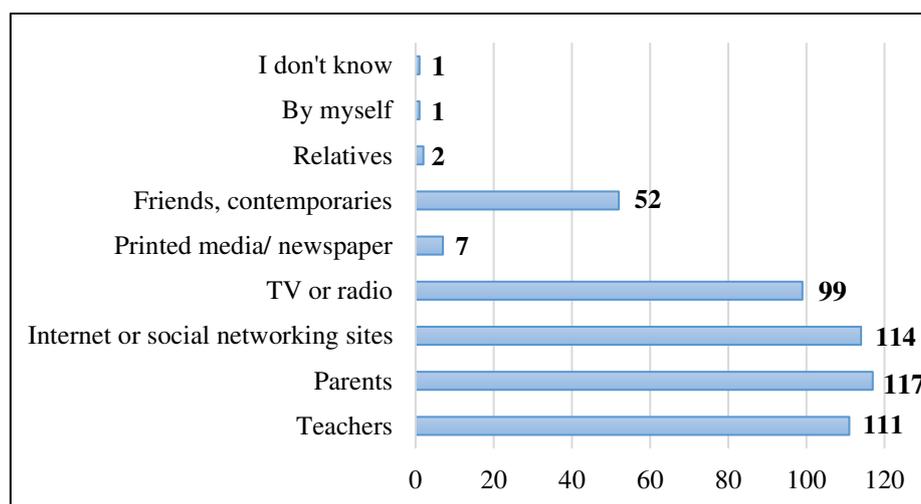


Figure 1: Platforms for monitoring environmental issues (people)

The overwhelming majority of students are informed by their parents about these questions (62.6%). Next comes head-to-head information from teachers and from the Internet or social media (in 59.4%). It is also worth mentioning the information obtained through TV or radio (52.9%), and those who indicate their friends and contemporaries as sources (27.8%). By

assigning the school types to the marked answers, it can be seen that students in the public school use more sources of information. Thus, the answers are scattered, but the majority get information from their parents, teachers and social media platforms (23%). For students in alternative institutions, in addition to those listed above, TV or radio also appears. In the case of students in church-maintained institutions, a parallel can be drawn with the responses of students in state-maintained schools. In the case of junior high school students, guidance from teachers appears to almost everyone. While in the case of students in foundation or private institutions, the parents were indicated by all students who completed the questionnaire.

In the next group of questions, we examined environmental awareness in the context of students and their school. First of all, we were curious about which subjects they hear about problems affecting our environment. Here, the overwhelming majority of natural science subjects lead the way (74.3%), although several answers could be marked. Then came the teacher's class (34.8%). The proportion of human subjects (21.9%) is also worth mentioning. The "worst" performers were art subjects (10.2%), IT/digital culture (9.6%) and physical education (9.1%). The subjects should be closely related, as sustainability is an ideal organizing principle for promoting integrated thinking (Havas, 2001b). The analysis, on the other hand, indicates that most subjects do not integrate environmental educations. Among the students of state institutions, the opinion regarding the appearance of environmentally conscious topics in human and real subjects is divided, approximately half to half. In the case of junior high school students, those attending alternative, private/foundation and church-maintained schools, the science subjects are absolutely authoritative (more than 50%). After that, we took the question further, and on a three-point scale (never-rarely-most of the time), we evaluated with the respondents how often they hear about topics related to the environment in the case of each subject.

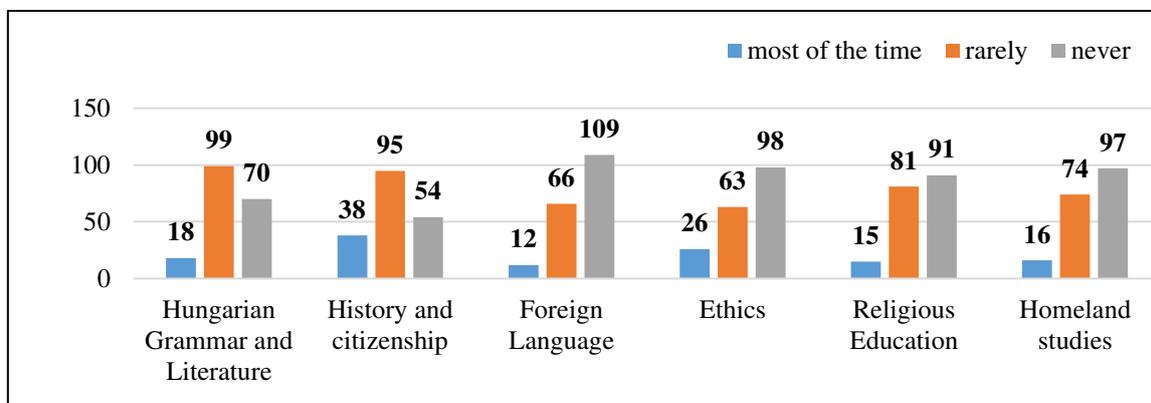


Figure 2: Appearance of environmental and global problems in human subjects (people)

In the human subjects, in the case of Hungarian (53%) and history (51%), “rarely” received the most answers (Figure 2). Even for foreign language (58%), ethics (52%), homeland studies (52%), never was the most common answer. The National Core Curriculum also expects History to incorporate environmental education and thereby connect people with society and nature (Horváth, 2006), however, looking at the answers, we can see that this has not been achieved.

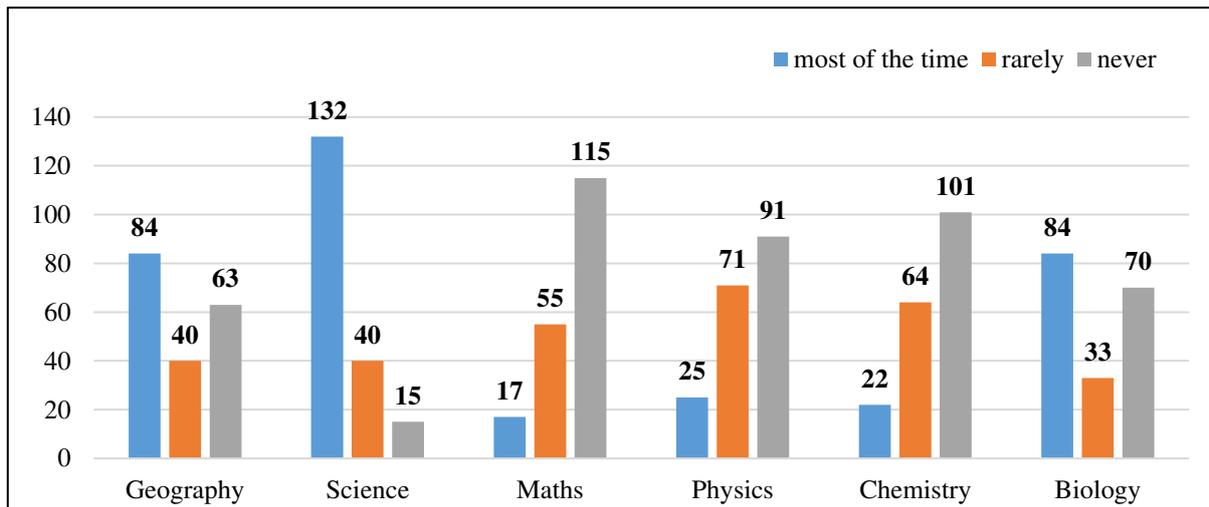


Figure 3: Appearance of environmental and global problems in real subjects (people)

Among the science subjects, students hear about environmental topics most often in natural sciences (70%), geography (45%) and biology (45%) classes (Figure 3), and among these, natural sciences also stands out, where phenomenon-based teaching takes place in an integrated manner. During the reforms of the last period, the subject of geography came out positively from the point of view of environmental education, which shows students the natural and economic phenomena of the Earth in its interactions and connections (Kéri, 2009). The analysis also shows that geography is in a good position in the transfer of environmental content, but at the same time, the other real subjects should also be added, so that the above-mentioned connections can be fully developed. According to the students' opinion, environmental content does not occur in mathematics (61%), physics (49%) and chemistry (54%) lessons, the answer ‘never’ received the most marks, even though the environmental content hides many opportunities for concentration. If we look back at the diagram (Figure 3), we can see that the assessment of geography is also quite mixed among students. Further surveys are needed not only regarding students' attitudes, but also whether content related to environmental education appears in geography textbooks (Kulman, 2018).

In the case of art subjects, according to the students, such content never appears (Figure 4). Technology seems to stand out, where the never (43%) and rarely (43%) responses are

balanced. It could be an important bridging subject from the point of view of environmental education (e.g., recycling), and NAT assigns it this role in the lower grades. As Lükő explains in his book, the ecological changes of the past 50 years are largely due to the development of technology. (Szűcs, 2021) In the case of physical education, the rate of never answers (67%) is exceptionally high. The students evaluated that topics related to the environment appear the least in this subject. In the case of class teacher classes and IT classes, the answers rarely and never are not far apart. All in all, this shows that not only are there deficiencies in the subject concentration, but that the environmental content was not properly incorporated at the subject level either.

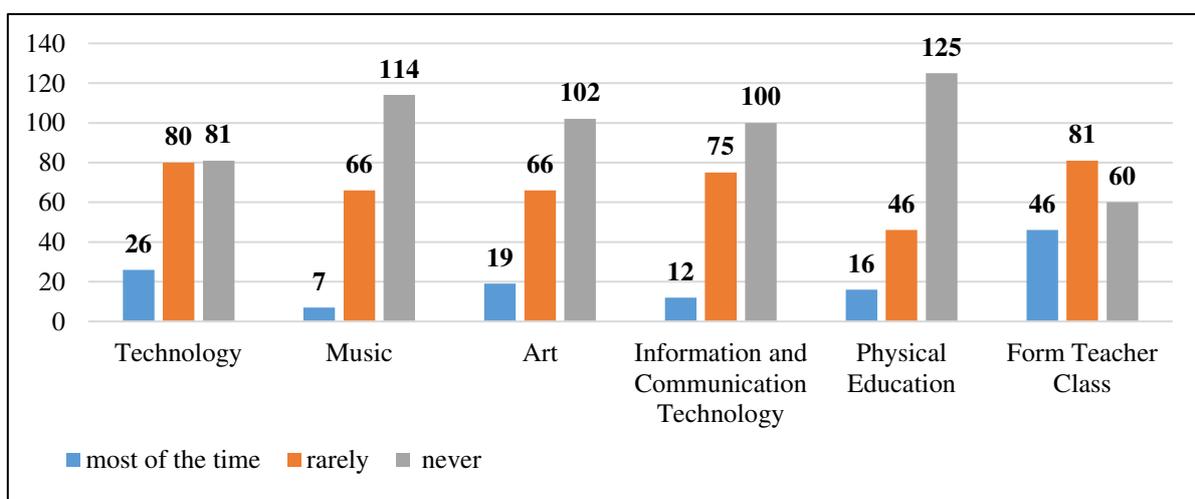


Figure 4: Appearance of environmental and global problems in the case of class teacher classes and skills subjects (people)

We also asked whether, in the opinion of the students, if they deal with environmental and global problems enough. According to the majority (77.5%), yes. Then this means that the appearance of the topic, its concentration on one or two subjects - which we saw in the previous question - satisfies this type of interest of the students. Among those who did not answer, students attending public institutions predominated (23% would like to hear more about the topic), but a more intense interest was also observed among students attending church schools (25%). Overall: girls (24%) were the ones for whom the priority of the topic was not appropriate.

We also asked about program options that deal with our environment outside of school or outside of teaching hours. In this case too, they were able to mark several answers. An outstanding majority of respondents indicated hiking (63.6%) as the most common school program related to the environment. Next, the environmental protection lectures (32.6%), the

sustainability week (30.5%) and the tree planting program (28.3%) are still highly ranked. It is unfortunate that, for example, the collection of paper and caps appeared in a small percentage of the answers (0.5%).

Table 2: Frequency of environmental school programs in different types of elementary schools (people)

Environmental programs	State-run elementary schools	Church schools	Junior high schools	Alternative schools	Private or foundation schools
Hiking	28 (20.5%)	21 (58%)	5 (83%)	3 (60%)	3 (75%)
Environmental protection lectures/exhibitions	14 (10%)	9 (25%)	1 (17%)	1 (20%)	0 (0%)
Sustainability week	19 (14%)	16 (44%)	1 (17%)	1 (20%)	0 (0%)
Tree planting program	18 (13%)	8 (22%)	3 (50%)	1 (20%)	1 (25%)
Forest school	13 (9.5%)	11 (30.5%)	1 (17%)	1 (20%)	1 (25%)
Presentations by national parks	10 (7%)	11 (30.5%)	1 (17%)	0 (0%)	0 (0%)
Others (e.g., garbage collection, selective waste collection)	2 (1.5%)	7 (19%)	0 (0%)	0 (0%)	0 (0%)
I don't know	3 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Analyzing the issue further (Table 2), it can be seen that the majority of students in public schools chose hiking (93%), the tree planting program (93%), environmental protection lectures (43%) and sustainability week (34%) as environmental programs. Compared to the public schools, all students of the church schools marked the lectures given by the national parks and the forest school as program options. Junior high school students also indicated a variety of answers, but these do not differ much from the programs of public elementary schools. In the case of students from private or foundation schools, more practical, active programs in the environment appeared, such as: hiking, tree planting or forest school. After the question of programs, we also asked how often the students could participate in these programs (Figure 5).

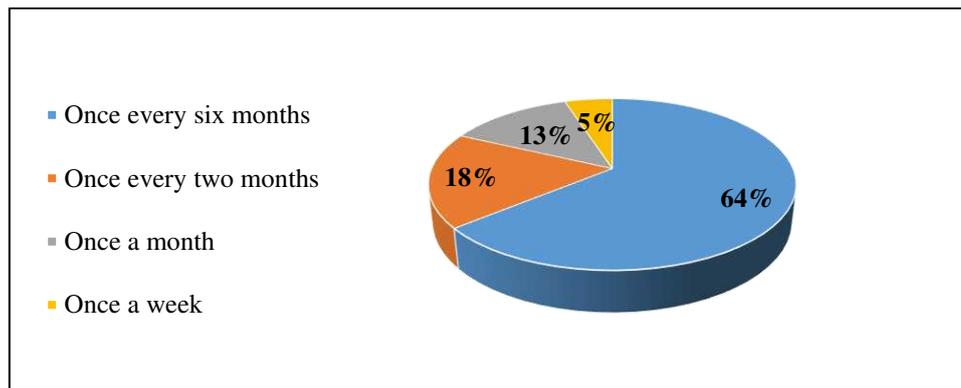


Figure 5: Frequency of programs related to environmental protection.

Unfortunately, the vast majority (64.2%) indicated one occasion per semester. This was followed by once every two months (17.6%), then once a month (12.8%), and finally once a week (5.3%). Examining the programs, school types and frequency together, it can be seen that the majority of students of public school participate in programs related to our environment once per semester (68%), although this also depends on the type of program, because, for example, the possibility of hiking is more frequent. Those attending alternative and private/foundation schools tend to have one (56%) program per semester. The responses of students from church schools are very mixed, but it can already be seen that several types of programs are implemented more often. In the case of junior high school students, in addition to the fact that the selection in the programs is quite colorful, their frequency can also be said to be the best compared to other types of schools. Overall, one program appeared more often every two months (33%), but weekly programs (33%) also appeared several times (these can also be organized in specialist study circles).

In the last question concerning schools, we asked whether the children would change anything about the established system. The answer "I don't know" was written by 7%, which can perhaps be said to be a general reaction even at such a young age. In many cases, the students answered that more plants should be planted (10%), but what we would like to highlight is that there were students who emphasized the importance of energy awareness, e.g., in the form of installing solar panels (1%) or establishing more bicycle storage (0.5%) facilities. Overall, it seems that the students mainly want programs that provide a close-up experience of nature, e.g.: studying outside in nature sometimes.

In the last group of questions, we were interested in what the students bring from the home environment in terms of environmental awareness. First, we asked how often students talk about the environment at home with their parents and family members (Figure 6).

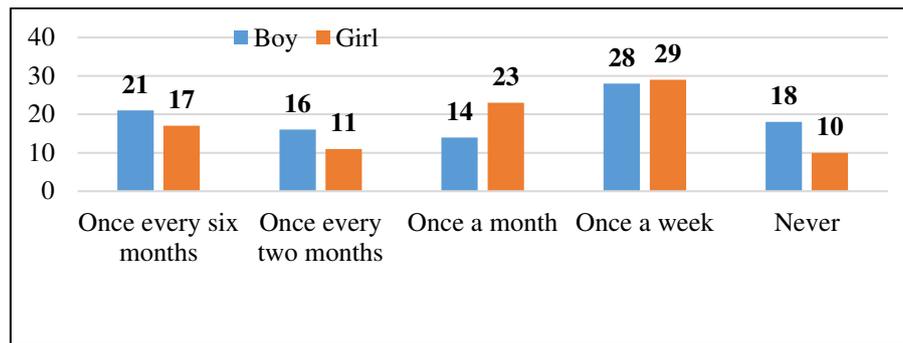


Figure 6: Frequency of family conversations about the environment (people)

Most of them talk about the actual topics at least once a week (30.5%). Interestingly, the second highest rate (20.3%) was given one occasion every six months, which means that the answers are extreme (Figure 6). The never answer is high 15%. The family background is also very decisive for environmental education. If an institution uses constructive pedagogy, it is already assumed that the child already has a certain knowledge that he brings from home, and this will direct his knowledge of school knowledge (Nahalka, 1997). Students of public schools talk most about weekly (29%) on environmental issues among their families. At the same time, they are in the highest proportion in their case, who have never (18%) or only once every six months (18%). Even students at church schools should be highlighted. This test group often talks about the environment, most of them at least once a week (31%) at the family table.

After family conversations, we wanted to know more about the programs. Children were able to add non-mentioned programs into the survey. With the overwhelming majority, hiking (71%) were marked by the most popular family program. The next in the line, however, "we don't organize such programs" was the answer (25.1%), so the field was quite split. Summarizing the answers, Borsodians were mainly characterized by hiking and watching the surroundings and documentaries, but organic gardening or balcony gardens are also a good number. The residents of Heves County voted for watching lectures and documentaries dealing with our environment. Based on the status of the residence, hiking appears for almost everyone in the village. But perhaps relatively few respondents mentioned gardening (23%) despite environmental conditions. In the case of the county seat and cities, mainly hiking, participation in exhibitions and documentaries were designated. Interestingly, the cultivation of organic gardening (15%) is also a large number of city dwellers.

In advance, we thought that selective waste collection is perhaps one of the most common activities in Hungary. In contrast, 14.4% of respondents admit that they do not select the waste selectively at all. By grouping waste types, most of the plastic are selectively collected (69%),

followed by paper (58.3%) and then green waste (compost) (34.8%). Colored and white glass and metal has been selectively collected by 20 and 26% of the responders.

Based on the questions and answers so far, we were curious how students appreciate themselves and their families as environmentally conscious. This could be evaluated on a scale of 1-5, where 1 was not at all, 5- the entirely environmentally conscious individual. Most respondents appreciated themselves (3) and their family (43.3%). But many appreciated themselves to 4 (31%), which marked the almost entirely environmentally conscious lifestyle. The lowest answers were 1 and 2, which means that the vast majority of respondents are unsure about their environmental awareness. In gender distribution, more boys marked (23%) of the environmental consciousness of 5 (8%). According to age group, 5th grade students considered themselves and their families mostly environmentally conscious (37%). While in the comparison of school types, children attending church schools were the highest proportion (28%). It was interesting to see that students who have never talked about environmental issues with their families have evaluated 5, but the reverse is also true because many have considered the environmental awareness of themselves and their families to be low, but they often speak at home at home environmental issues.

In the last part, we also examined what students do in practice to protect their environment. Most of them marked selective waste collection (77%), followed by plants' care and planting (58.8%), and the use of public transport or walking (46.55%) was still popular with respondents.

Drawing others' attention to environmental protection (34.2%) and using recycled or recyclable things (33.7%) appeared in a higher proportion. We were curious about those who previously gave themselves 5 for environmental awareness: What do they do for the environment in practice? As well as what the same means in the case of environmental awareness previously rated as 1. In the practical routine of persons and families rated 5, selective waste collection and the use of public transport or walking, as well as the use of recycled items appeared mainly. On the other hand, these routines also appear in the case of 1 or not at all environmentally conscious, except for recycled objects. So, there is no significant difference between those who are completely environmentally conscious and those who are not environmentally conscious at all. Of course, it is questionable how far the students were able to judge themselves objectively on the subject. Moreover, looking at the answers, there is no age difference. A 5th grader who rated himself /herself 5 for environmental awareness does no less than an 8th grader who may already have more knowledge in the subject area. It is interesting that solutions such as

showering instead of bathing or using your own linene bag did not appear among the own answers, which has also been measured by Kollarics et al and even though many forums draw attention to this nowadays (Kollarics et al., 2021). But the children did not mention energy-saving solutions, such as the use of renewable energy sources or the use of different energy-efficient boilers in the household.

After that, we asked one of the basic questions of environmental awareness, which means of transportation do students use to get to school on a daily basis (Figure 7), since transportation is one of the biggest energy consumers.

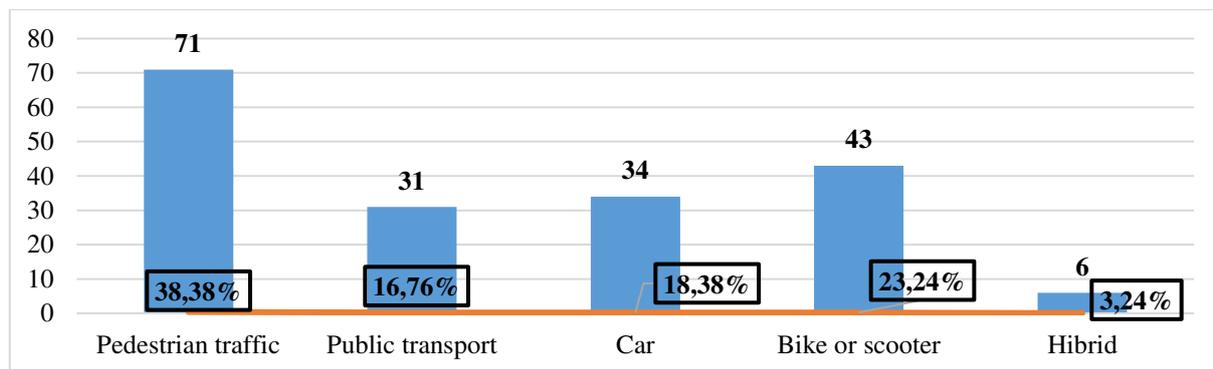


Figure 7: Means of transport used by students to get to school and home (people)

In advance, we expected that the largest number of people would travel by car or public transport. However, to our surprise, the majority (36.6%) of the respondents were pedestrians. On the second step of the podium (23.1%) are cyclists and scooter riders, followed only by those who go to school by car (18.3%), and in last place are those who travel by public transport (15.6%). We were curious to know that among those who consider themselves to be the most environmentally conscious, does environmentally conscious transport present in their lives? Among those who are completely environmentally conscious, only one respondent uses a car to get to school. At the same time, in the group of the least environmentally conscious people, the car does not appear at all as a means of everyday transport.

According to the status of the place of residence, it should be mentioned that the car (32%) appeared in most cases as a means of transport for city dwellers. At the same time, walking was also popular among them (39%).

In the last question, we asked our question with a little vision of our days and the future. We wanted to find out how much primary school-aged children (10-14 years old) are afraid of changing environmental effects and global warming. The results of our measurement show that the majority of respondents are moderately afraid (value 3 on a 5-point scale) of these processes

(41.7%), but then 4 (18.2%) and 5 (18, 2%) values follow. Our research also shows the feeling of uncertainty about our future, just as other scientific articles also point to this new phenomenon of climate anxiety. If we look by gender, boys and girls answered in the same proportion, only among those who answered one (so they are not worried at all) there are substantially more boy (15%) than girl (8%) respondents. Among those who considered themselves to be fully environmentally conscious in the previous question, the majority are moderately concerned about changing environmental effects or global warming. For those who rated their environmental awareness at the lowest level, this attitude is also reflected in the question about the future. This group only marked 1 or 2, so they are not at all or only slightly concerned about the effects of environmental changes.

5. Summary

If we return to the hypotheses set up at the beginning of the article and analyze the obtained results based on them, we can say the following. Among the hypotheses related to the school was that its theoretical background was more grounded in environmental education than practical. This turned out to be partially true, since quite a few environmental programs are implemented in schools, and they are rare. In the absence of these, it is quite difficult to educate students properly and comprehensively on environmental protection. However, we think it is only partially true, because these contents do not even appear in the majority of classes/subjects. This is also shown by the fact that most of the students could not even formulate the meaning of the requested concepts (approx. 44%), so not only the practical background, but also the theoretical background is incomplete. The next assumption was that there will be a predominance of natural science subjects, including natural science (71%) and geography (45%), in which sustainability education appears. This turned out to be completely true, even adding the subject of biology (45%). The humanities subjects were quite mixed, while the subjects of art, classroom management and physical education were far behind.

Regarding extracurricular activities, we thought in advance that those programs would still show a low variety. We would slightly modify this statement that extracurricular programs are flat and limited. Mainly a couple of environmental programs (e.g.: sustainability project week/theme week), which are present and repeated in different types of schools, even though the application of diverse methods can bring better results (Simonyi & Homoki, 2020). There is a lack of broad and creative solutions (they can be implemented at an external location, but also everyday routines), and there is a problem with the appropriate proportion of programs.

And finally, but most importantly, the hypothesis set up regarding the students. That is, we thought that they were less or not really interested in the problems that threaten their environment. This statement was proven wrong, as the students proved to be interested, 38% constantly follow this kind of news, and moreover, they are informed by several sources of information. The problem appears more in the lack of theoretical and practical foundation, which can limit the fulfillment of students. We also assumed that they are afraid of the changing environmental effects, in this case we got quite a mixed picture, perhaps also thanks to their young age. The majority (64%) are not or only moderately afraid of changing environmental effects, and only 36% are really afraid (rating 4, 5) of changing environmental effects and global warming.

We also assumed that they are not aware of the actual concept of sustainable development and are not sure how they can do to protect their environment. The first part of the hypothesis was proven when many people could not define what sustainable development or environmental education means (44%). The second part of the statement shows a more moderate picture. Students already use many different methods to protect their environment, but there is still room for improvement in this area. The majority of students consider themselves and their families to be environmentally conscious (47%). Most of the respondents indicated better values in relation to this question (ratings of 4, 5), but at the same time, there is some dissonance, as some contradictions are visible in the other questions that open the topic.

Analyzing the answers, we got quite a mixed picture of the environmental behavior, perception and lifestyle of today's youth and the future generation. Many of them already have an open mind and try to live their everyday life consciously despite their young age, while the other half of their contemporaries may not have reached the maturity level where these questions determine their everyday life. In many cases, we received very striking and diverse answers, opinions that there is still room for improvement for the programs related to the school and home environment. Neither the parents nor the institutions have yet reached the limits of their creativity, but at the same time, a solid foundation is already visible from both sides, and this, with appropriate developments, could add a lot to the more environmentally conscious society of the future. Here, it is perhaps important to highlight that, in addition to the tasks of the school, much more emphasis should be placed on the attitude formation of the parents in order to achieve a stronger attitude formation of the students.

Bibliography

- 5/2020. (I. 31.) govt. decree. (2020). 110/2012 on the publication, introduction, and application of the National Core Curriculum. (VI. 4.) On the amendment of the Government Decree. Hungarian Gazette, 17, 290–446.
- 110/2012. (VI. 4.) Government decree. (2012). On the publication, introduction, and application of the National Core Curriculum. Hungarian Gazette, 66, 10635–10847.<http://www.kozlonyok.hu/nkonline/MKPDF/hiteles/mk12066.pdf> (2023.05.10.)
- 202/2007. (VII. 31.) govt. decree. (2007). 243/2003 on the publication, introduction, and application of the National Core Curriculum. (XII. 17.) On the amendment of the Government Decree. Hungarian Gazette, 102, 7640–7795.
- 2003: LXI. TV. (2003). LXXIX of 1993 on public education. on amending the law. Hungarian Gazette, 85, 6856–6893.
- Bilku, R. (2004). Erdei iskola. In *Lépések az ökoiskola felé* (pp. 71–78). Országos Közoktatási Intézet.
<https://ofi.oh.gov.hu/tudastar/lepesek-okoiskola-fele/bilku-rolandne-erdei> (2023.05.10.)
- Chikán, É., Fernengel, A., Fodor, E., Kéri, A., Schróth, Á., & Szászné, H. J. (2015). *Környezettan szakmódszertan környezettan szakos tanárjelöltek részére*. Eötvös Loránd Tudományegyetem.
https://oszkdk.oszk.hu/storage/00/01/58/94/dd/1/Kornyezettan_szakmodszertani_jegyzet.pdf (2023.05.10.)
- Fábián Z. (1993). *A pedagógiai kutatások módszerei és logikája—Kutatásmódszertan*. Nemzeti Tankönyvkiadó.

- Falus, I., & Ollé, J. (2008). *Az empirikus kutatások gyakorlata: Adatfeldolgozás és statisztikai elemzés*. Nemzeti Tankönyvkiadó.
- Farsang, A. (2011). *Földrajztanítás korszerűen*. SZTE TTIK Földrajzi és Földtani Tanszékcsoport.
- Harriet, D. (2018). *Little Green Book -Live sustainably!* Gingko.
- Havas, P. (2001a). A fenntarthatóság pedagógiai elemei. *Új Pedagógiai Szemle*, 51(9), 3–15.
- Havas, P. (2001b). A fenntarthatóság pedagógiája II. *Új Pedagógiai Szemle*, 51(10), 39–50.
- Havas, P., & Varga, A. (1999). Pedagógusok a környezeti nevelésről. *Új Pedagógiai Szemle*, 49(5), 96–104.
- Hollik, I., & Ósz, R. (2016). *Bevezetés a pedagógiai kutatásmódszertanba*. Typotop.
- Homoki E. (2021). *A környezetismeret tantárgy a NAT 2020 alapján, elvesztegetett évek* (pp. 137–144). Pázmány Péter Katolikus Egyetem; Szaktudás Kiadó Ház. <http://real.mtak.hu/134030/> (2023.05.10.)
- Horváth, D. (2006). Környezeti nevelési lehetőségek a történelemtanításban. *Új Pedagógiai Szemle*, 56(5), 79–91.
- Janine, E. (2020). *100 things you can do for Earth*. Central Kiadói Csoport.
- Kéri, A. (2009). *A környezeti nevelés lehetőségei a földrajzoktatásban*. Oktatási Hivatal. <https://ofi.oh.gov.hu/sites/default/files/ofipast/2009/11/foldrajz.pdf> (2023.05.10.)
- Kollarics T., Molnár K., & Hartl É. (2021). Fenntarthatósággal kapcsolatos ismeretek és viselkedésminták feltárása. *Journal of Applied Technical and Educational Sciences*, 11(1), 111–139. <https://doi.org/10.24368/JATES.V11I1.226> (2023.05.10.)

Könczey, R. (2014). A Fenntarthatóságra Nevelés Évtizede. *Új Köznevelés*, 2014(10), 44–44.

<https://folyoiratok.oh.gov.hu/uj-kozneveles/a-fenntarthatosagra-neveles-evtizede>

(2023.05.10.)

Kulman, K. (2018). A környezeti szempontok megjelenése a földrajz tantárgy tartalmi szabályozó dokumentumaiban. In G. Pintér, H. Zsiborács, & Sz. Csányi, *Arccal vagy háttal a jövőnek?* (pp. 547–553). Pannon Egyetem Georgikon Kar.

Láng I. (2003). Környezetvédelem – fenntartható fejlődés | Environmental Protection – Sustainable Development. In Hitseker M. & Szilágyi Z. (Eds.), *Mindentudás Egyeteme* (Vol. 1, pp. 147–158). Kossuth Kiadó.

<http://real-eod.mtak.hu/1027/>

(2023.05.10.)

Lehoczky, J. (1999). *Iskola a természetben, avagy a környezeti nevelés gyakorlata*. RAABE.

Lükő, I. (2003). *Környezetpedagógia*. Nemzeti Tankönyvkiadó.

Makádi, M., & Farkas, B. P. (2015). *Tevékenykedtető módszerek a földrajztanításban*. ELTE.

<http://geogo.elte.hu/segedanyagok/tankonyvek/>

download/23_5952d67a6cbd707c35a6fe74fc5042ac (2023.05.10.)

Moser, M., & Pálmai, Gy. (1999). *A környezetvédelem alapjai*. Nemzeti Tankönyvkiadó.

Nahalka, I. (1997). Tanítható-e a környezetvédelem? *Új Pedagógiai Szemle*, 47(4), 125–132.

Nemzeti Fejlesztési Ügynökség. (2007). *Nemzeti Fenntartható Fejlődési Stratégia*. Magyar Köztársaság Kormánya.

[http://www.nefmi.gov.hu/letolt/felsoo/fejlesztes/4_3_1_nemz_fenntfejl_strat_080402.](http://www.nefmi.gov.hu/letolt/felsoo/fejlesztes/4_3_1_nemz_fenntfejl_strat_080402.pdf)

[pdf](http://www.nefmi.gov.hu/letolt/felsoo/fejlesztes/4_3_1_nemz_fenntfejl_strat_080402.pdf) (2023.05.10.)

Revákné, I. M., Visi, J. Ü., Bartha, I., Kovács, E., & Teperics, K. (2018). A hazai környezet-, természetismeret és földrajz tankönyvek szerepe az energiatudatosságra nevelésben.

Journal of Applied Technical and Educational Sciences, 8(3), 7–28.

<https://doi.org/10.24368/JATES.V8I3.45> (2023.05.10.)

Simonyi S. R., & Homoki E. (2020). Comparative analysis of the methods of teaching geography in different types of schools. *Journal of Applied Technical and Educational Sciences*, 10(3), Article 3.

<http://doi.org/10.24368/jates.v10i3.187>

(2023.05.10.)

Szűcs B. (2021). Recenzió a Környezeti és technika-technológia szakmódszertan - Módszertannal a fenntarthatóságért című tankönyvről (szerkesztője: Dr. habil Lükő István). *Journal of Applied Technical and Educational Sciences*, 11(1), 175–181.

<https://doi.org/10.24368/JATES.V11I1.244> (2023.05.10.)

Teperics, K., Sütő, L., Homoki, E., Németh, G., & Sáriné Gál, E. (2015). *Földrajtanítás:*

Válogatott módszertani fejezetek. Debreceni Egyetemi Kiadó.

Varga, A. (1999). Az eredményes környezeti nevelés lehetséges útja: Összehasonlító vizsgálat a ‘Természettudományokkal Európán keresztül’ program kapcsán. *Új Pedagógiai Szemle*, 49(9), 111–116.

Varga, A. (2006). Diákok környezeti attitűdjei. *Iskolakultúra: Pedagógusok Szakmai-Tudományos Folyóirata*, 16(9), 58–64.

Victor, A. (1993). A környezeti nevelés rendszere. *Iskolakultúra: Pedagógusok Szakmai-Tudományos Folyóirata*, 3(24), 3–23.

Short professional biography

Brigitta Szászi is the teacher of Mezőkövesdi Primary School, majoring in geography, history and civics, and daycare educator. She completed her higher education at Károly Eszterházy University, where she obtained his degree in 2021. Currently, she is investigating the effectiveness and integration of sustainable development and environmental education among upper elementary school students. She is interested in the subject as a geography teacher and as an individual. Among her short-term goals is to enter the Doctoral School of Education at Károly Eszterházy Catholic University and start his academic studies.

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The relations between secondary vocational wildlife management training and the labour market in the dual education system

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Abstract: Hungary has a long history of training professional hunters and the quality of wildlife management is world-renowned. In my work, I used databases of professional organisations and questionnaire surveys to investigate the factors determining the training of professional hunters at the secondary level and the labour market conditions. Comparing the training conditions of neighbouring countries and Germany, it is clear that the training of professional hunters takes place in the highest number of institutions, with the longest, 5-year training period in Hungary. In the previous decades, Hungary has seen an increase in the number of training institutions, which has clearly led to an overeducation compared to the number of workplaces. The age distribution of active professional hunters shows that graduated professionals do not appear in the labour market. This is mainly due to the poor financial and moral standing of professionals. The feedback from those exercising the hunting rights is that it is difficult to find suitable professionals, while they are open to providing internships and participating in vocational training. The intention of employers and employees, the framework curriculum introduced in 2020, and the government's Vocational Training 4.0 strategy open up a new dimension in quality, dual secondary vocational training in wildlife management.

Keywords: vocational training; dual training; professional hunters; unique education; overeducation; hunter training abroad

1. Introduction

Hungary's wildlife management is world-famous. In the first half of the 20th century, Hungary's wildlife management was still known mainly for its huge small game harvest. The most famous small game hunting areas were Tótmegyer and Pusztaszer. Due to the artificial transformation of habitats, the predominance of big game species was observed. Our country undisputedly has a prominent place in the world ranking of the C.I.C. trophy (C.I.C., 2023). In the case of red deer, five of the top ten world record specimens were bagged in Hungary. For fallow deer, the

proportion is the same. The two highest-scoring fallow bucks in the world were bagged in the Gúth forestry area. Of the five strongest roebucks in the world ranking, 3 are Hungarian. The world record for tuskers is also held by a Hungarian specimen (C.I.C. 2023). The diverse Hungarian habitats, combined with the excellent genetics of the Hungarian wildlife population, are of unique value. Its maintenance and protection can only be ensured by trained professionals, and therefore their quality education must be a priority task of agricultural policy.

An analysis of the sector's financial data over the last ten years shows that revenues have slightly exceeded expenditure (Fig. 1.). The profit for the sector varied between €2 million and €11 million between 2011 and 2021. The largest share of revenues is generated by domestic and foreign hired hunting and its services and by revenues from the shot game (OVA, 2011-2021). The economic result of hired hunting is linked to vocational training and practice, as professional hunters are the ones who, through professionally based planning, habitat development, and game protection, raise the game that they will be able to bag with hunting guests in even more than ten years. Revenues from domestic and foreign hired hunting account for 38 per cent of total revenues over 10 years on average. The salary costs of almost 3,000 professional hunters account for 27 per cent of expenditure.

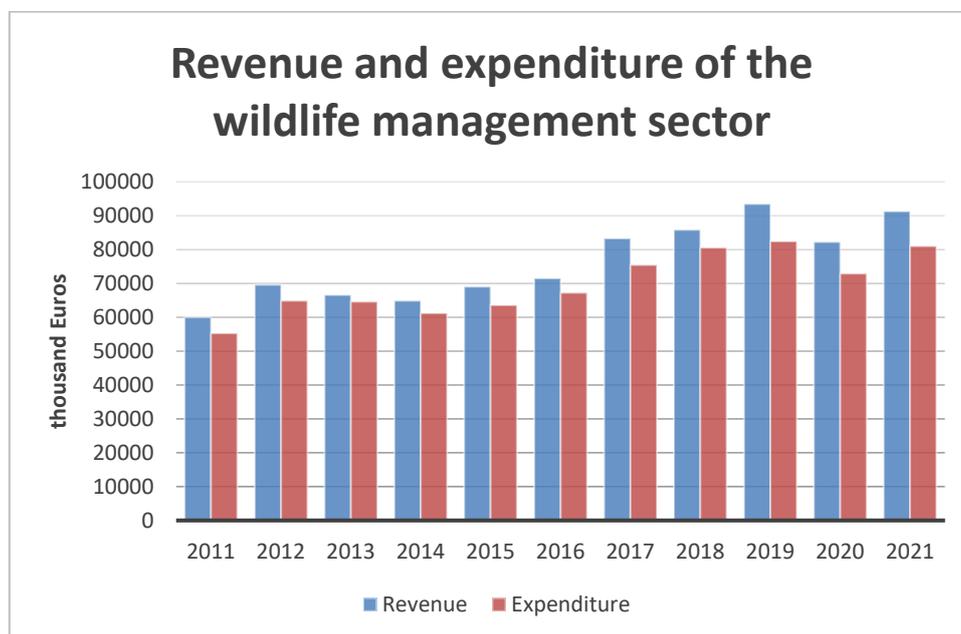


Fig. 1. Revenue and expenditure of the wildlife management sector between 2011- 2021

In Euro (National Game Management Database (OVA))

Quality wildlife management is based on the high-quality training of professionals. Only dedicated professionals with the appropriate theoretical and practical knowledge can ensure the future of the sector. Their training, education, and professional appreciation is a strategic issue.

The internationally recognized achievements of the wildlife management sector undeniably depend on expertise, which is in line with the fact that the development of hunting professionals in Hungary dates back to the Middle Ages. Forestry and hunting professionals were trained in parallel and common institutions with a close connection between the forest and the big game. Both professions were included in the first real vocational school established in 1806, known as the "Forest and Hunting School". Later on, hunting studies were constantly present and strengthened from decade to decade in the training of forest guards. Ten years after the establishment of the first secondary forestry school, in 1893, the training of professional hunters was separated by organizing courses for gamekeepers.

As an instructor of Hungary's oldest secondary school for training professional hunters and as a member of the Expert Committee for Education of the Hungarian Hunters' National Chamber, I consider that maintaining the quality of education and adapting it to the 21st-century requirements are my most important tasks. To this end, my research has focused on the most important characteristics, interrelations, and problems of vocational training in wildlife management and the labour market. The following questions arose:

- What impact the framework curricula of the last 10 years have had on the professional content of secondary wildlife management education, and how they have influenced the possibility of deepening professional knowledge and finding a job in the profession?
- Can those exercising hunting rights, as employers find professionals of suitable quality and quantity?
- Could professional hunters and those exercising hunting rights, as employers be involved in practical training?

For the competitiveness of the sector, it is also essential to have an overview of the main characteristics of the training of professionals in competing countries in the hunting market, and the study, therefore, focuses on secondary wildlife management education in neighbouring countries and Germany.

2. Sources and method

- 1) Through source analysis I will present the most important points in the development of gamekeeper training in Hungary.
- 2) In order to explore the specificities of gamekeeper training outside Hungary and to assess our domestic training in an international context, I sent a questionnaire to the hunting

associations of neighbouring countries (Austria, Slovakia, Romania, Serbia, and Slovenia) and Germany.

3) I identified institutions providing training in forestry and wildlife management based on the database of the Herman Otto Institute (HOI), the national body responsible for professional examinations. Based on the number of worksheets requested, I determined the number of professionals who applied for the examination between 2015 and 2023.

4) With the help of the Ministry of Agriculture (AM), I conducted a 35-question survey among those exercising hunting rights, as employers. The questions covered several areas. These included an assessment of the labour market situation, the employer's professional expectations towards the professional hunter, and the possibility of involving those exercising hunting rights in the vocational training. I used a multiple-choice option and a five-point Likert scale for the responses.

5) I determined the age of gamekeepers based on the data on active professional hunters kept by the Hungarian Hunters' National Chamber (OMVK). I conducted a survey of 42 questions among active professionals. The primary aim of this survey was to examine the extent to which professional hunters are satisfied with the training provided by their former institution, with particular emphasis on practical training. In addition, I examined to what extent and under what conditions professionals could be involved in vocational secondary education.

6) As a member of the OMVK Expert Committee for Education, I was able to use the TÁRKI survey carried out by the Hungarian Hunters' National Chamber in 2006, to which 37% of active professional hunters responded.

7) In order to examine the situation in vocational training institutions, I carried out a questionnaire survey among teachers and principals working in sectoral education. I received replies from 22 teachers and 8 principals of ten institutions, including the eight with the longest history. In this study, I used the results regarding the ratio of employment and further education. In addition, I also got an idea of what, according to colleagues, are the main reasons why professionals in the profession leave their careers.

3. Results and discussion

3.1. The formation of vocational wildlife management training in Hungary

Hunting is clearly one of the oldest human activities. In the society of hunters, education for the next generation has always been of great importance. This responsible task is passed from generation to generation. In addition to hunting, our nature-related predecessors had already realized the importance of protecting and caring for wildlife already in the Middle Ages. At the same time, written references to the work of hunting professionals are found in contemporary sources, the earliest from the 13th century. The hunter ispán or count, who was responsible for the management of hunters, played an important role in the social order, and the inhabitants of villages engaged in hunting received great privileges from our kings (Kőhalmy, 2003).

From 1729, hunting appeared as a branch and the need for school-based vocational training evolved during this period in the field of forestry and hunting (Act XXII of 1729). In the 19th century the "Forest and Hunting School", founded by Count György Festetich and operating with the Georgicon in Keszthely from 1806 to 1848, began to teach both professions. In parallel with the forest guard training, having greater importance from the point of view of the economy, the teaching of hunting-related skills was constantly present. The separation of the two professions can be dated from 1893. From this point, the professional hunters had to take a separate exam and candidates made an oath (Kollwentz, 1995).

In the middle of the 19th century, the profession prioritized the importance of professional training. Compared to the situation nowadays, there had been more intensive public communication on how to train the best quality professional staff, as these articles were published monthly in the Forestry Pages (Erdészeti Lapok) on the importance of vocational training. As early as 1863, Antal Hideghéthy outlined a school image in seven points that would be truly valid in the dual system of nowadays (Hideghéthy, 1863).

In the school system in today's sense, the training of professional hunters started in Hungary in 1959 in the area of the State Farm of Balatonnagyberki but in 1966, due to poor training conditions, secondary vocational training in wildlife management was moved to its real place and opened its doors in Szombathely (Bögöti, 2018).

In the following decades, several other institutions also started to offer secondary vocational training in wildlife management. In 1964 Dr. István Bertóti, the eminent professional in Hungary's wildlife management, on October 4th during the National Association of Hungarian

Hunters' (MAVOSZ) board meeting declared that none of the Western and socialist countries have such a versatile and multi-faceted professional hunter training than in Hungary. "In terms of training professional hunters, we take a prominent place, we have separate schools, and we train professional hunters." (Gál, 1964, p. 5.).

3.2. Training of professional hunters in neighbouring countries

Hunting culture has different traditions in many countries on our continent. Hungary's hunting customs and professional approach have developed in close interaction with the traditions of the German, Austrian, and Slovakian regions. In my research, I tried to get to know the practice of professional hunter education abroad, mainly in the German-speaking areas. In addition, I investigated the frameworks in which professional hunter education, with a special focus on secondary vocational training in wildlife management, is implemented in the Carpathian Basin in different countries. For my work, I contacted hunting associations, hunting chambers, and actively working wildlife professionals in each country (Beer; Németh; Pál; Schachenhoffer; Tósaki; Wolff, 2020). I prepared a twelve-point questionnaire, the logic of which helped to reveal the fundamental differences.

Table 1 clearly shows the differences in the training and employment of professional hunters. Only Hungary has five years of training for professional hunters in the form of a secondary technical school. In the German-speaking areas (Austria, Germany), professionals trained for the profession of gamekeeper are trained in a three-year dual training system. Also in these two countries and in Hungary, there is a separation between professional hunter and forester training at the secondary level. At the moment there are 16 different vocational schools offering professional hunter training in Hungary compared to 2-2 respectively in Germany and Austria. In Germany with its quadruple land size only 20 students graduate each year in this field.

Table 1. The characteristics of the training and employment of professional hunters in some priority countries

	Hungary	Germany	Austria	Slovakia	Romania	Serbia	Slovenia
Requirements of employing a professional hunter	Required, for each 4000 hectares	Not required, only on national hunting grounds	Not required, only over 2500 hectares	Not required, they have volunteer professional hunters	Required, one for every hunting club	Required, one for every hunting club	Required, on the 12 national hunting grounds and after every 2000 hectares
Minimum qualification requirements	5-year vocational school	3-year school training	3-year school training	A few day-long training	No requirements	No requirements	Gamekeeper training
Size of the country (km ²)	93 030	357 340	83 871	49 035	238 397	88 361	20 271
Size of the hunting grounds (ha)	6500	895	115	2365	11050	5400	4500
Number of those exercising hunting rights	1440 ¹	40 000	12 500	1880	2133	227 ²	420 ³
Number of professional hunters	2990	1000	550	No data available	2700	1800	100
Separate vocational-level training for professional hunters and foresters	Yes	Yes	Yes	Only forester vocational school and professional hunter training	Only forester vocational school and hunter training	Forester and responsible professional hunter training, anyone can be a professional hunter	Only forester vocational school and gamekeeper training
Number of schools offering vocational training for professional hunters	16	2	2	0 (only forester schools)	0 (only forester schools)	0 (one school for responsible professional hunters)	0
Number of professional hunter graduates each year	Varied 2018–19: 92. it will increase.	20	15–20				

¹ OVA, 2020² associations and many hunting clubs within those³ nonprofessional gamekeepers

3.3. The age distribution and educational level of the active gamekeepers in Hungary

Regarding the outcome of vocational training, I examined the proportion of new entrants entering the labour market. Based on a comparison of the 2006 TÁRKI survey commissioned by the Hungarian Hunters' National Chamber (OMVK) and the 2019 database of the OMVK, the number of young people working in the profession has clearly decreased among the professional hunters, while the proportion of older active colleagues has increased significantly. In 2006, more than a third of professional hunters participated in the study. In the sample (n=1103), the proportion of people between the ages of 20 and 29 was 19 per cent, and the proportion of people over 60 was 2.9 per cent. According to the OMVK database (n=2991), the proportion of young and old people has been reversed by 2019. The proportion of those under the age of 29 decreased to 8 per cent, while the proportion of those over 60 increased to 21.1 per cent (Fig. 2.). Thus, the importance of the education of young professionals and vocational training is clearly increasing.

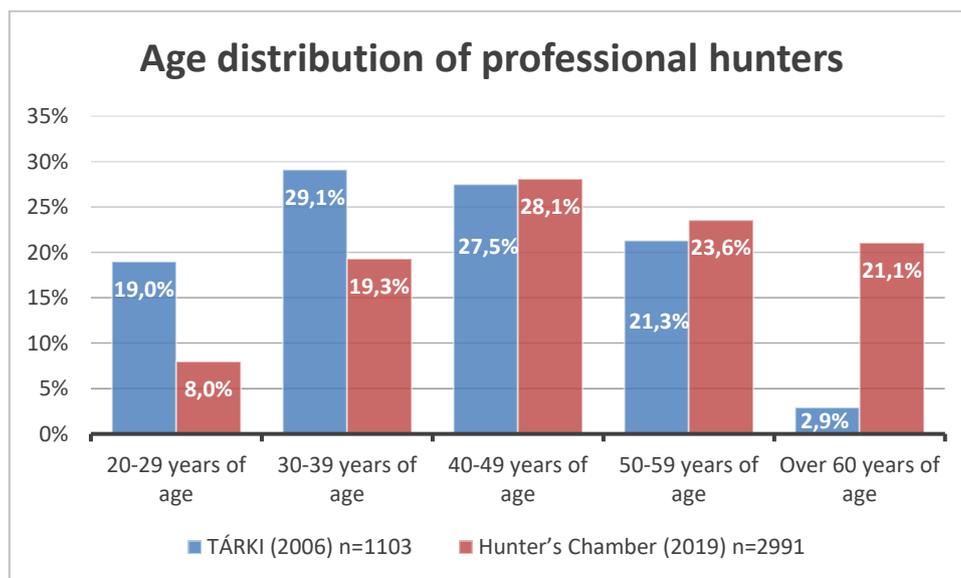


Fig. 2. Percentage distribution of ages according to the 2019 database of the Hunter's Chamber and the 2006 TÁRKI survey

The responses of the professional hunters (n=298) who participated in my survey in 2019 show that 25.8% of them have a higher education qualification and 74.2% have a secondary education qualification. Among secondary education qualifications, 19.2% have a forestry technician qualification, 12.1% have a forestry and wildlife management technician qualification, and 68.7% have a wildlife management technician qualification. It can therefore be concluded that

the majority of the active professional hunters in the sample have graduated from a secondary school of wildlife management (Fig. 3.).

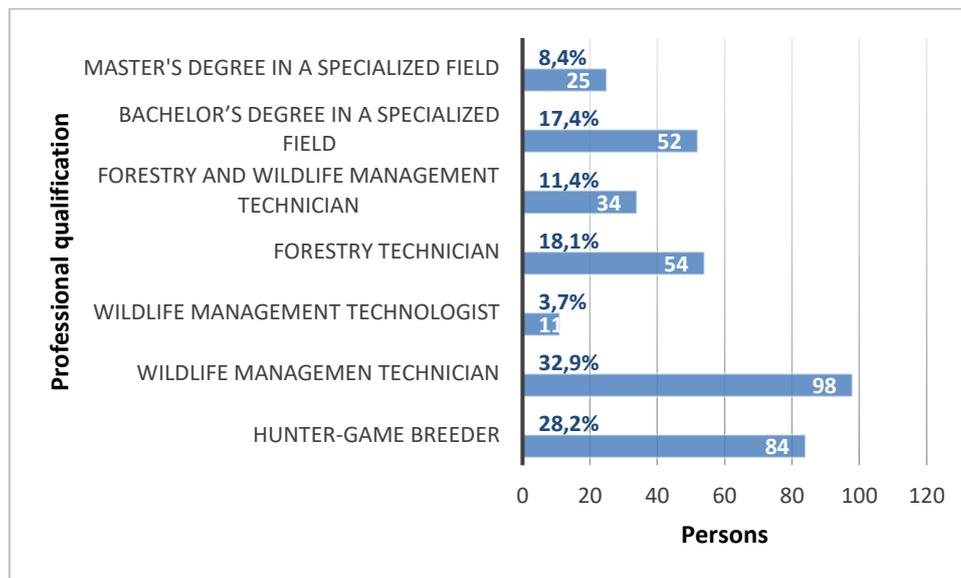


Fig. 3. Professional qualifications of responding professional hunters (n=298) in 2019

3.4. Study of the relationship between framework curricula and dual training

The quality of secondary vocational training in wildlife management is fundamentally determined by the central framework curricula and its legal framework. Between 2006 and 2020, five different curricula were used to train professional hunters. Between 2013 and 2020 this represented 4 changes and marked a drift in the sectoral vocational training. In a study I started in 2019, I researched what proportion of employers, active professionals, and teacher colleagues with decades of experience working in vocational training were involved in the development of individual expectations. Four of the 173 employers who responded, three of the 298 professional hunters, and three of the 22 teachers who responded, working in 10 schools, were consulted in the development of a central framework curriculum (Bögöti, 2019). I conducted a document analysis to study the number of hours each framework curriculum provides for the teaching of professional content (Fig. 4.).

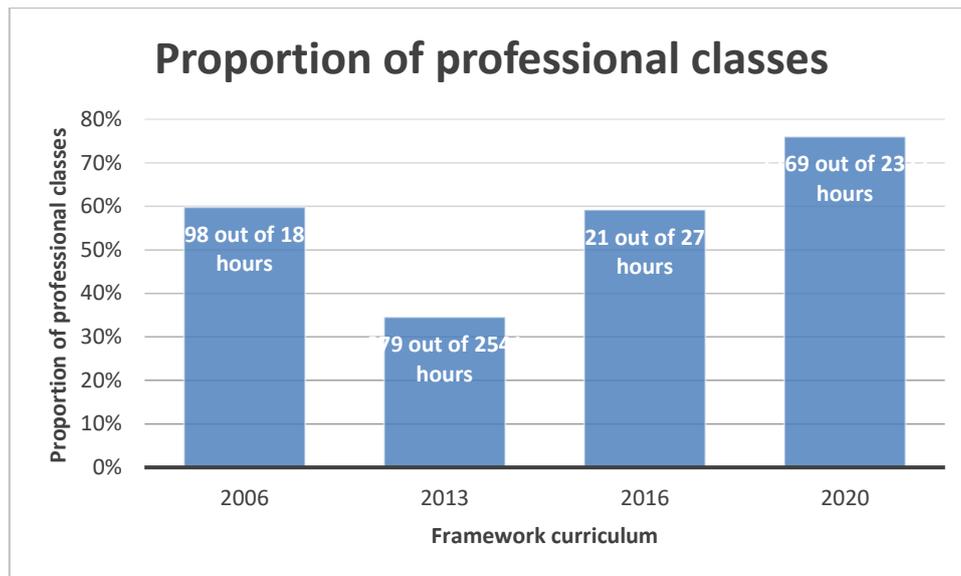


Fig. 4. Professional classes related to wildlife management and their proportion in the framework curricula between 2006-2020

A framework curriculum was also published in 2018, but its number of professional classes was the same as in 2016. Based on the document analysis, I have clearly shown that the framework curriculum in force from 2020 onwards, based on the curricula issued between 2006 and 2020, provides the highest number and proportion of classes for subjects related to wildlife management. Another advantage is that each institution can decide on the proportion of theory and practice within each subject. This clearly facilitates the implementation of dual training. The dual partners can train not only during the summer internships but also during the school year, as it is possible to freely vary the number of practical classes and organize full-day internships in a given subject area.

In 2013, the merging of forestry and wildlife management training had a clear negative impact on the teaching of forestry and wildlife management-related subjects. An examination of the training curricula showed that the merger of the two professions had a negative impact on the professional content, as the same amount of time was available for teaching the two professions together as for teaching one profession.

3.5. Number of professionals who graduated

According to Act LV of 1996, those exercising hunting rights are obliged to employ one professional hunter for every 4,000 ha started. The professional hunter position can be held by a forestry technician or a wildlife management technician with secondary education. From the Herman Otto Institute (HOI) dataset, I was able to track the institutions' written exam

applications from 2015, thus determining the number of students who have graduated. According to this data, the number of candidates for the exam has developed as follows over the last nine years (Fig. 5.).

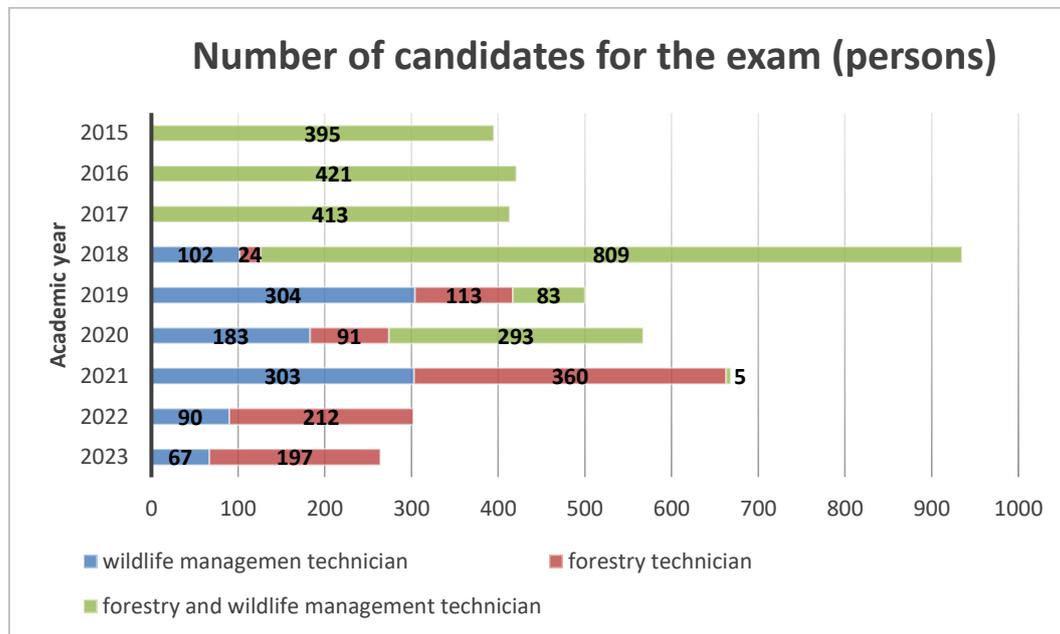


Fig. 5. Number of candidates for the exam by profession between 2015 and 2023

Based on the online register of the Innovative Training Support Centre (IKK) (31 August 2020) in 12 counties of Hungary, 16 places were open for enrolment in the listed professions. In terms of the number of institutions teaching the listed professions, the 2019/20 academic year was the most prominent. In the 9 years under study, a total of 2,640 forestry and wildlife technicians, 997 forestry technicians, and 828 wildlife technicians applied for the vocational examinations. The merger of the two professions was very successful among the candidates. This popularity was exploited by the institutions. Some of these schools had no history of training, no teaching staff, and no material conditions for teaching. In 2018, a total of 809 forestry and wildlife technicians applied for the professional exams.

3.6. Employment, further education

In 2019, I asked the heads of the eight institutions with the longest training histories to provide me with data on the further education and employment of their graduates. As the schools have a career tracking system, the principals and form master colleagues can provide the most accurate data in this regard. Across eight schools, the average rate of continuing studies in higher education ranged from 5 to 30 per cent. On average, 12.25 per cent of graduates continue their studies in higher education. According to the principals of five traditional forestry schools,

43% of graduates are now foresters. Data from six schools, including the two oldest institutions training professional hunters, show that 19.16 per cent of graduates are now professional hunters.

In terms of the number of graduates, the proportion of graduates taking up further education and career starters is very low. Meanwhile, the wildlife management sector reports a shortage of staff. Only verbal information on the number of unfilled professional hunter posts is available from the government agencies registering professional hunters. The reason for this is that without a professional hunter, the hunting rights of those exercising these rights would have to be suspended, which is not currently the case. According to verbal information, there are currently hundreds of professional hunter posts unfilled in Hungary, despite an impressive overeducation.

Articles on the shortage of professionals also appear regularly in the two leading professional journals. Tibor Farkas, one of our country's renowned practitioners, put his experiences at the national level on paper in the pages of *Vadászlap*. He considers it sad that when Hungary hosts the jubilee World Hunting Exhibition in recognition of the sector's achievements, it cannot solve the personnel issues related to wildlife management. According to the author, there is a mismatch between labour supply and demand. "It is becoming increasingly difficult to find able, good professional hunters. Someone who can take the management of the hunting ground on his shoulders." (Farkas, 2019). In December 2020, Vilmos Fodermayer, professional hunter vice-president of the OMVK, wrote the followings in an article published in the columns of *Nimród*: "Based on feedback from those exercising the hunting rights, it has become increasingly difficult to find professional hunters for vacant positions in recent years; it is perhaps not an exaggeration to say that there is a shortage of professionals nationwide." (Fodermayer, 2020). In my study in 2019, the main reason for leaving the profession was low wages, according to employers, professional hunters, and specialized teacher colleagues. Professional hunters also highlighted the treatment by management, the denial of privileges, and the lack of a sense of vocation (Fig. 6.).

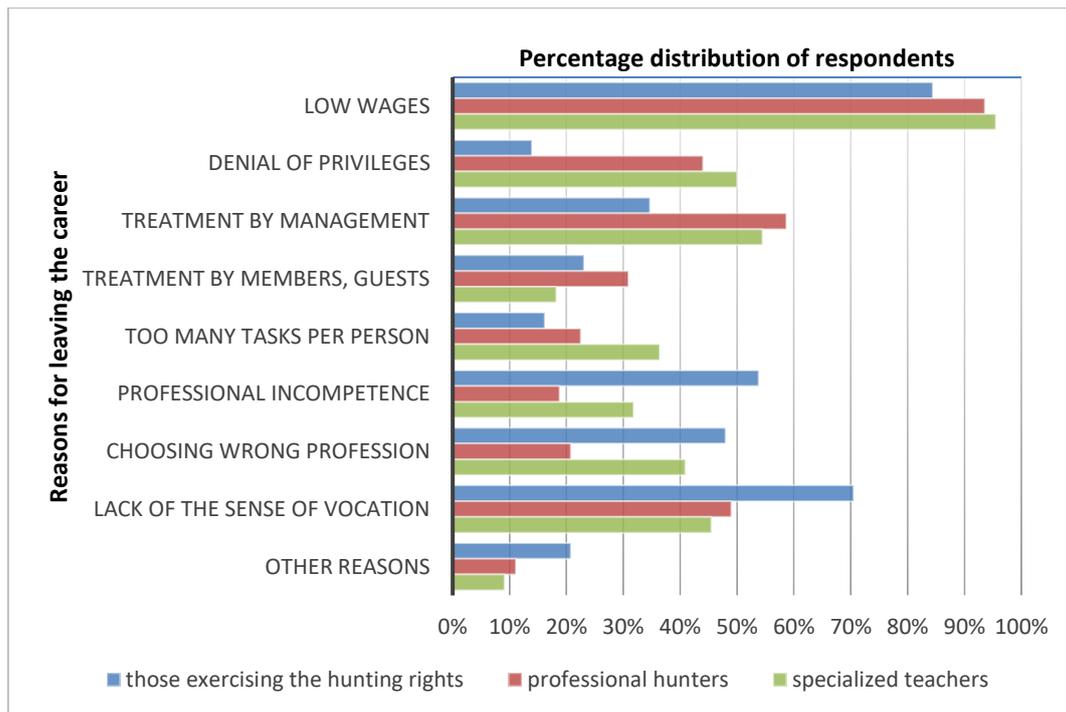


Fig. 6. Percentage distribution of the main reasons for leaving the hunting profession, according to the opinions of those exercising hunting rights, professional hunters, and specialized teachers in 2019

This is confirmed by the results published by the Hungarian Hunters' National Chamber in March 2023. 48% of active professional hunters answered the questions of the representative body. The gross salary of 31.7 per cent of the respondents is between 663-793 Euros. A further 36.63% of respondents have a gross salary of less than this. In 2022, the average gross salary in Hungary was €1,326, according to the data of the Hungarian Central Statistical Office (KSH). This means that more than 68% of professional hunters will receive up to half of the average salary in Hungary. 52.6% of respondents feel that their work is not valued morally. A quarter of professional hunters, participating in the study, plan to leave the profession. (Berger and Agyaki, 2023). Since 2022, the Hungarian Hunters' National Chamber website has published the recommended wage grid for professional hunters. According to this, the recommended starting salary is 854 Euro gross with secondary education qualification (OMVK, 2023).

3.7. The opportunities offered by dual vocational training

I have adapted the training system outlined in the Vocational Training 4.0 document, issued by the Hungarian government (Government decision no. 1168/2019. (III.28.)), to the sector and created a model of dual secondary vocational training in wildlife management. From the point of view of vocational education, the most significant and forward-looking change compared to

the way the institutions have been operating so far is the inclusion of those exercising hunting rights as dual partners and professional hunters as instructors in the system. The other elements of the system were already part of the training. (Fig. 7.)

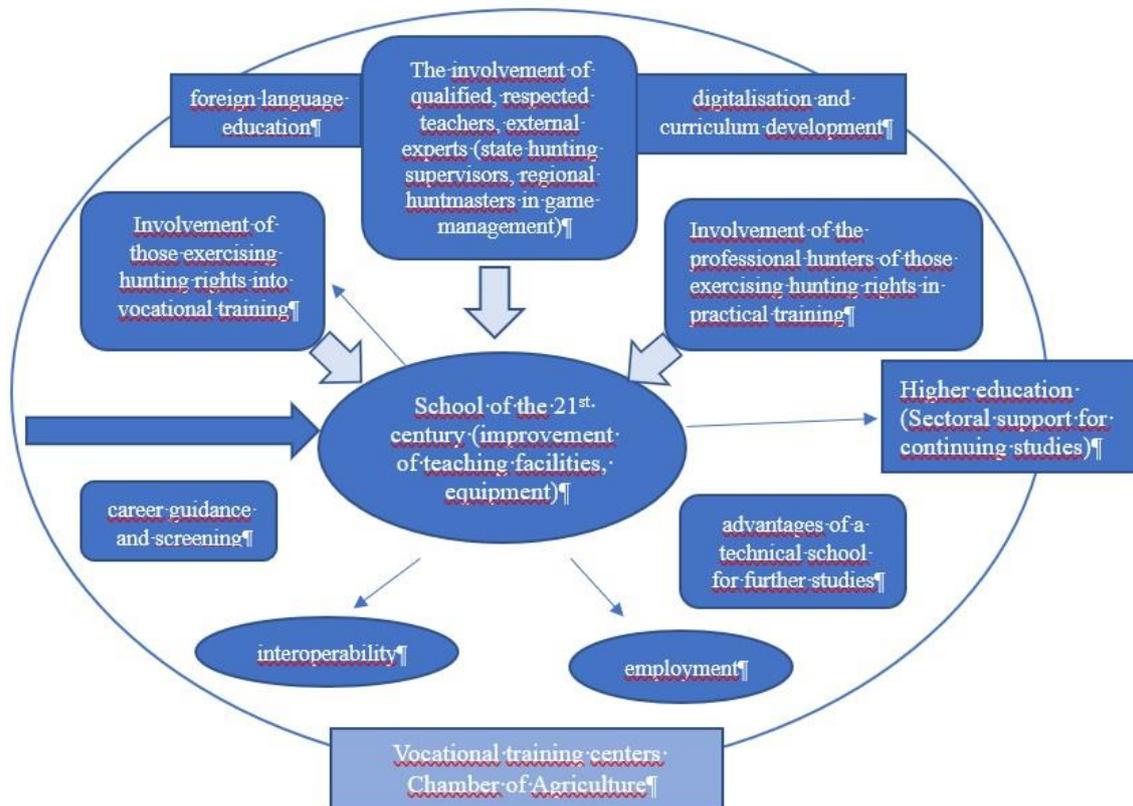


Fig. 7. The model of secondary vocational training in wildlife management in dual training

This academic year, students enrolled in 2021-2022 will be the first to experience the dual vocational training system in the field of practical training. They must complete their compulsory four-week summer internship between 3 July and 31 August.

Before the introduction of dual training, I used a questionnaire to survey employers and active professional hunters on their views on practical training in the hunting ground. I used a 5-point Likert scale for the answers to each question.

Almost two-thirds (69.4%) of the responding employers, as potential dual partners, would consider it an excellent idea and according to one-third, it is a good idea for the students of professional hunter training to complete their professional internships in hunting grounds with different characteristics. At the same time, 85% of those exercising hunting rights would fully support that the students learn theory in school and practice exclusively on the hunting grounds with active gamekeepers. The questionnaires show that 71.1% of the respondents exercising

hunting rights have not been involved at all, and 12.1% have only been involved in teaching students at a secondary vocational institution during summer internships. According to employers, a quarter (28.28%) of the vocational skills can be demonstrated in the context of summer internships. Practical work in the hunting ground throughout the year would therefore be necessary.

89.6% of those exercising hunting rights have not yet received an invitation from an educational institution to participate in the practical training of students in wildlife management, although 69.4% of respondents would like to participate in vocational training.

52% of employers believe that from the age of 16, students could effectively help the work of professional hunters. A fifth of those exercising hunting rights could employ students five days a week, nearly a third (28.9%) could employ them three days a week, and 35.3% two days a week.

A high proportion of those exercising hunting rights could provide accommodation (28.3%), daily hot meals (41%), and hunting opportunities (83.2%) for the students.

To summarize the results, I identified 93 parties exercising hunting rights in the sample as potential dual partners, all of whom would be willing to participate in the training of professional hunters even if the students had to be paid a salary. Of these, only seven said that they had been contacted formally by an educational institution to help with the practical training of professional hunters. Four of them had already worked with professional hunter students in summer internships.

Of the 93 priority parties exercising hunting rights, 30 exploit small game hunting grounds, 36 big game hunting grounds, and 27 in mixed game hunting grounds. This ratio is excellent for the demonstration and teaching of practical work. Three of them are state forestries, the rest are hunting associations.

Eighty-two employers (88.17%) of the potential dual partners believe that a gamekeeper student, from the age of 16 or even earlier, could help a professional hunter. The remaining parties exercising hunting rights would consider students from the age of 17 or 18 to be suitable for this task.

Looking at the responses of professional hunters as potential instructors, 67.5 per cent of the respondents have not yet been involved at all in the school-based education of professional hunter students. There were only two respondents in the sample who were involved in the training of gamekeeper students on a daily basis and three respondents who were involved on

a monthly basis. 63.4% of the surveyed gamekeeper colleagues would definitely like to be involved in the education of gamekeeper students. If there were a separate salary for this, this percentage would rise to 72.8%. In particular, 55% of respondents would also take a short pedagogical course to be able to teach. 74.5% of the active professional hunters surveyed support the idea that professional hunter students should spend their practical training in hunting grounds with different conditions. At the same time, 84.6% think it would be a good idea for students to learn theory in school and practice exclusively with active professional hunters.

The vast majority of the professional hunters who responded, 81 of them, said that a gamekeeper could work with 2 students at a time.

This means that there are 118 people in the sample ($n=298$) who would be willing to participate in the practical training of students preparing to become professional hunters without a salary, even after participating in a short pedagogical course. If two students are assigned to each of them, it can be stated that, based on an examination of 9.96% of the active professional hunter population, there are 118 active gamekeepers who could provide the practical training of at least 236 students preparing to become professional hunters.

4. Conclusions and recommendations

Vocational training in wildlife management has a long history in Hungary. Secondary vocational training in wildlife management is unique in international comparison, in terms of the number of institutions offering the qualification, the duration of the training, and the high number of professional courses.

The age analysis of the active gamekeeper population clearly shows that the proportion of career starters and young professionals is decreasing, while the number of workers over 60 is increasing significantly. Therefore, ensuring the supply of new entrants is a priority for the future.

The drift in vocational training was indicated by the fact that the framework curriculum for the training of professional hunters was changed five times between 2006 and 2020 and four times between 2013 and 2020. These were drawn up with minimal consultation of active professionals and teacher colleagues working in the sector's education. In 2013, the merging of secondary wildlife management and forestry training clearly reduced the number and proportion of professional classes devoted to wildlife management. Studying both professions at the same time was very attractive for those wishing to continue their studies. Many secondary schools

have taken advantage of this. Between 2015 and 2023, a total of 2640 professionals applied for the exam who can hold the post of a professional hunter. Currently, there are less than 3,000 professional hunter positions in Hungary. In 2020, 16 institutions in 12 counties of Hungary trained forestry and wildlife technicians. According to data provided by the heads of the institutions, the rate of further education and employment as professional hunters is low. It can be seen that, in addition to the significant overeducation, the number of graduates who do not enter the labour market, do not continue their studies in higher education, and leave the profession is very high. The reasons for this, according to the unanimous opinion of employers, professional hunters, and professional trainers, can be traced back to a lack of financial appreciation. Moral appreciation is also predominant, while employers believe that there is a lack of a sense of vocation. More than half of professional hunters receive half or less than the average salary in Hungary. The framework curriculum, introduced in 2020, provides the highest number and proportion of classes of vocational content. This, combined with the opportunities offered by dual vocational training, should ensure high-quality vocational training in the future. In my research, I have shown that those exercising hunting rights and active professional hunters support that gamekeeper students learn alongside active professional hunters in hunting grounds with different characteristics.

The potential dual partners meet the requirements both in terms of their conditions and their willingness to pay wages. 93 parties exercising hunting rights, as employers and 118 professional hunters would like to participate in the practical training of gamekeeper students.

In order to reduce the drop-out rate of active professional hunters and trained wildlife management specialists, the financial and moral appreciation of professional staff must be improved. Students and their parents applying to secondary school should be given credible information not only about the educational conditions of the school but also about the employment opportunities and future prospects. An admission procedure should be developed in which the competencies required for the profession are assessed. The aim is to attract young people who are genuinely committed to the profession, interested in it, and physically fit for it. The real needs of the labour market must be assessed. Secondary wildlife management vocational training institutions should be rated on the basis of their training outcomes and teaching conditions. The aim should be to train small classes or groups of students, with theoretical training based on the most up-to-date literature and with practical training with the best dual partners.

The future of the wildlife management sector is represented by a small number of highly qualified professional hunters, whose motivational financial appreciation is adjusted to the level required in the real labour market, and trained according to the expectations of employers and the profession.

In the future, the awareness-raising work of individual organisations can play a major role in supplying new entrants. Together with some of my colleagues, we have launched the national youth programme "Get to know the hunters", for which we have also elaborated an educational manual. We also publish a hunting magazine for children with national distribution. The Hungarian Hunters' National Chamber regards this educational and awareness-raising activity as a priority project, the aim of which is to familiarise children of pre-school and primary school age with the essence, ethical background, and professionalism of hunting in an experiential way, under the care of qualified and reliable experts. A similar activity, but covering all professions, is carried out by the Hungarian Chamber of Agriculture, which organises career guidance days for primary school pupils. Our vocational training institute introduces 2-300 children a year to nature-related professions, including the career of professional hunters.

The programmes are a major contribution to raising a generation that accepts the importance of wildlife management and that has a high rate of interest in this activity, either as sport hunters or as professional hunters.

References

Agyaki G., Berger A. (2023): Hiteles statisztika. (Authentic statistic). *Nimród* (3): 39. (in Hungarian)

Bögöti G. (2018): A középfokú vadgazdálkodási szakképzés hatékonyságát segítő módszerek és azok eredményei a Herman Ottó Szakgimnáziumban. (Methods of helping the efficiency of vocational level wildlife management training and their effect in the Herman Ottó Technical School) *Tanulmánykötet Mészáros Károly tiszteletére 2018*. Soproni Egyetem Kiadó, Sopron, pp. 53–58. (in Hungarian)

Bögöti G. (2019): A duális szakképzés lehetőségei a középfokú vadgazdálkodási szakképzésben. (The potential of dual vocational training in secondary vocational training in wildlife management.) In: Lett B., Gál J., Horváth S., Molnár K., Schiberna E., Strark M. (szerk.): *Tanulmánykötet Mészáros Károly tiszteletére 2019*. Soproni Egyetem Kiadó, Sopron. ISSN: 2631-1534 : p. 103-109. (in Hungarian)

Farkas T. (2019): Olyan, mint a délibáb. (Like a mirage.) Magyar Vadászlap 28 (7) (in Hungarian)

Fodermayer V. (2020): Vitafórum. (Discussion forum.) Nimród (12): 67. (in Hungarian)

Gál Z. (1964): Vadörképzés. (Education of professional hunters.) Magyar Vadász 17 (11): 5 (in Hungarian)

Hideghéthy A. (1863): Az országos mező- és erdőgazdaság tanügy érdekében. (In the interest of the national agricultural and forestry education.) Erdészeti Lapok 2 (2): 33–60 (in Hungarian)

Kollwenz Ö. (1995): Az alsó-és középfokú vadászati szakoktatás története. (The history of elementary and high-school level hunter training.) Erdészettörténeti közlemények 19: 5–26. (in Hungarian)

Kóhalmy T. (2003): Vadászattörténet. (The History of Hunting.) Egyetemi jegyzet, Sopron pp. 13–14. (in Hungarian)

TÁRKI (Institute for Social Research) (2006): A hivatásos vadászok munka- és életkörülményei. Kérdőíves felmérés a vadászkamara megbízásából. (Work and life conditions of professional hunters. Questionnaire commissioned by the Hungarian Hunters' National Chamber) (in Hungarian)

Laws and regulations

1729. évi XXII. törvénycikk a vadászat és madarászat szabályozásáról. (Article of law No. XXII. of 1729 on the regulation of hunting and birding) (in Hungarian) URL: <https://net.jogtar.hu/ezer-ev-torveny?docid=72900022.TV&searchUrl=/ezer-ev-torvenyei%3Fpagenum%3D24>

1996. évi LV. törvény a vad védelméről, a vadgazdálkodásról, valamint a vadásatról. (Law No. LV. of 1996 on the protection, management and hunting of wildlife] (in Hungarian) URL: 1996. évi LV. törvény a vad védelméről, a vadgazdálkodásról, valamint a vadásatról - Hatályos Jogszabályok Gyűjteménye (jogtar.hu)

1168/2019. (III.28) Kormányhatározat Szakképzés 4.0 A szakképzés és a felnőttképzés megújításának középtávú szakmapolitikai stratégiája. (Government decision no. 1168/2019. (III.28.), Vocational Training 4.0 A medium-term policy strategy for the renewal of vocational education and adult training.) URL: <https://net.jogtar.hu/jogszabaly?docid=A19H1168.KOR&txtreferer=00000001>

Data sources

Beer A. (2020): Adatközlés a szlovén vadászszövetség adatbázisa alapján (Data from Slovenia's Hunters' National Chamber)

Herman Ottó Intézet (Herman Otto Institute): Adatbázisa az írásbeli tételigénylésekről (2015–2023) (Database of worksheets requested from HOI)

Innovatív Képzéstámogató Központ (Innovative Training Support Centre) (2020.08.31.): Szakképző iskolák. Online adatbázis. (Vocational schools. Online database.) (in Hungarian) URL: <https://szakkepzes.ikk.hu/2019#intezmenyek>

International Council for game and wildlife conservation (C.IC.) (2023.04.10.): Trófea világranglista. (World ranking of the C.I.C. trophy) URL: <http://www.cic-wildlife.org/>

Németh Gy. (2020): Adatközlés a szlovák vadászszövetség adatbázisa alapján (Data from Slovakia's Hunters' National Chamber)

Pál Á. (2020): Adatközlés a román vadászszövetség adatbázisa alapján (Data from Romania's Hunters' National Chamber)

Országos Magyar Vadászkamara (OMVK) (Hungarian Hunters' National Chamber): Adatbázis a hivatásos vadászokról (2019) Database of professional hunters

Országos Magyar Vadászkamara (OMVK) (Hungarian Hunters' National Chamber): Bértábla ajánlás a hivatásos vadászok számára. (Wage scale recommendation for professional hunters.) (2023.04.10.) URL: <https://www.omvk.hu/hir/uj-bertabla-ajanlas-a-hivatasos-vadaszok-szamara>

Országos Vadgazdálkodási Adattár (OVA) (National Game Management Database): Adatbázis a vadászatra jogosultakról (2020) Database of the hunting grounds of Hungary URL: <http://www.ova.info.hu/ujvgtajak.html>

Országos Vadgazdálkodási Adattár (OVA) (National Game Management Database): Pénzügyi adatok 2011-2021 között. (Financial data between 2011 and 2021.) URL: <http://www.ova.info.hu/vgstat.html>

Schachenhoffer K. (2020): Adatközlés az osztrák vadászszövetség adatbázisa alapján (Data from Austria's Hunters' National Chamber)

Tósaki K. (2020): Adatközlés a szerb vadászszövetség adatbázisa alapján (Data from Serbia's Hunters' National Chamber)

Wolff H. (2020): Adatközlés a német vadászszövetség adatbázisa alapján (Data from Germany's Hunters' National Chamber)

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Augmented and virtual reality technologies as the future sales' channel in the furniture industry

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Abstract: *The furniture industry represents an important industry branch worldwide with a continuous demand. However, using advanced technologies in furniture design can take the industry to new heights by meeting the expectations of the users. The main focus of this paper is to highlight the importance of incorporating new future technologies in furniture design which meet user expectations more effectively. Integrating the augmented reality (AR) and virtual reality (VR) technologies in this process can create compelling results and exceptional experiences for customers, leading to increased business and customer satisfaction. AR and VR technologies allow us to bring furniture designs virtually into our homes, enabling us to see how it fits into the room's environment in real-time and at a real scale. This technology not only enhances the user experience but also allows accurate sales and maximum customer satisfaction.*

Keywords: *AR; VR; future technologies; furniture market; design methods; industrial design; modelling;*

1. Introduction

The furniture industry is an evergreen market all over the world with a persistent demand, as people need in their surroundings furniture for both aesthetic and functional purposes. The last decade saw a boom in the furniture market. As human living standards have risen and technology has developed rapidly, there has been an increase in demand, which can not necessarily be met by mass-produced products, especially in terms of quality and customization. This growth has also led to an increasing need for added value. Many studies support the predominant importance of user centred design. Furthermore the user can also participates in the design process led by expert designers, where its opinions are considered (Norman, 1986). The main advantage of this approach is to ensure that the product will fit like augmented reality (AR) and virtual reality (VR) present new opportunities for the furniture industry. These technologies allow customers to visualize furniture in their homes before

making a purchase, which helps them make more informed decisions (Fleury et al. 2022). These technologies also allow designers to create personalized and unique products that meet the specific needs and preferences of individual customers. AR and VR technologies represent a promising future for the furniture industry as they provide new sales channels and enhance the design process. With the continued development and integration of these technologies, the furniture industry can meet the increasing demand for personalized and high-quality furniture while providing customers with a unique and engaging shopping experience. The main objective of this paper is to present the benefits of AR and VR technologies as future sales channels in the furniture industry.

1. Background

Drafting was still done by hand until relatively recently and prototypes in clay or heavy paper were mostly used to experience industrial design objects or architectures in three dimensions (Bertol, Foell, 1997). In furniture industry the full-scale functional prototyping has become widespread allowing to perform stability, strength and durability tests on the prototypes. One of the key developments in the computer graphic field was made by Ivan Sutherland (1962) in his PhD thesis, called “Sketchpad: a Man-Machine Graphical Communication System”. Considered by many a foundational work for modern computer graphics, the program uses drawing as a novel communication medium for the computer (Schodek, Bechtold, Griggs, Kao, Steinberg, 2005). Rozmus et al. found that using virtual reality in the design process enhances and expands the possibilities of working with virtual representations of the designed objects, complementing traditional 3D models. A process based on VR has been described by them for the design of underground routes in the coal mining industry (Rozmus et al. 2021). Fleury et al. proposed an innovative four steps process of furniture design based on VR technology. The steps were brainstorming, 3D scanning of the room, idea sketching in VR, 3D modelling and visualisation of the result in VR (Fleury et al. 2022). Prabhakaram et al. performed tests to ascertain primarily the impact of the application of interactive virtual reality on delivering furniture design selection and coordination tasks. This study proposes a step change in the way furniture design is communicated and coordinated through an immersive virtual experience (Prabhakaram et al. 2021). VR gives the impression of being completely inside a 3D interactive environment, while AR places virtual elements in the context of the user’s environment (Das, 2023). VR and AR technology was not so widely available in the beginning. The early models were created for the military to test fighter aircrafts without significant material damage and

without taking off. A major advance came in 1992 with Louis Rosenberg's complex Virtual Fixtures AR system for the US Air Force (Interaction Design Foundation, 2023). Thanks to technological advancements, these are now available to ordinary people even in their homes, mainly in the form of online and offline games. They are so widespread that we can reach them with an object that we carry in our pockets every day.

2. Description of technologies

Buying furniture is often a significant investment and we can't expect the customers to make an instant decision if they don't know how the product will look in their home. By using AR and VR technologies, shoppers can see how the selected furniture will fit in their room; likelihood of returns reduces and customer satisfaction increases.

2.1. VR technology

VR technology creates a fully immersive digital environment, allowing shoppers to experience furniture in a virtual showroom (see Fig 1.). It allows customers to explore different products and configurations, and even change colours and textures in real time. This technology offers a more immersive and interactive experience than traditional shopping methods do, making customers more likely to buy. This kind of virtual experience also requires customers to have special glasses, which are quite expensive. However, there are applications which can transform a smartphone into a virtual reality headset. After downloading the appropriate phone application, we can assemble the entire device with the help of our phone. All we need for this usage is a frame made of cardboard, in which we place the phone.



Fig 1. Image produced with VR technology (Vas, 2022)

2.2. AR technology

Augmented reality has science-fiction roots dating to 1901. However, Thomas Caudell described this term as a technology only in 1990 while helping Boeing workers to visualise intricate aircraft systems (Interaction Design Foundation, 2023). AR technology is the integration of digital information with the physical environment, allowing customers to see and interact with virtual objects in the real world. Augmented reality systems combine digital information and the real world in such a way that the user experiences them as one (Gudlavalleti et al., 2022). AR technology can be used to create 3D furniture models that can be superimposed on images or videos of the customer's living space (see Fig 2.). This technology allows customers to see how the furniture will look in their home before they buy it, eliminating the need for physical showrooms or store visits.



Fig 2. The difference between a 3D visualisation and an AR image (Nagy, 2022)

3. Application

In order to use these technologies, it is necessary to draw the furniture in 3D, and create a 3D visualisation model. In the traditional design, the last step of the process is 3D modelling, from which a prototype can be made. By using new technologies, traditional design can be extended by a further step (added value to the presentation of the design), where the customer can not only see the visual design of the furniture, but also get information about its placement in space furthermore, in his/her respective home. Cornerstone of our activity is the design software packages, allowing us to carry out designs with appropriate quality. Programs are required to be able to create walkable 3D models. Our choice is Solidworks that allows 3D concept modelling of furniture. SketchUp, or Trimble SketchUP as it is officially called, is a 3D modeller program, which is already widely used in several different areas. It has a huge user base in architecture, mechanical engineering, and even in the fields of film and video games. It is popular for its ease of use and unique customization due to its factors which are called plug-ins. Other advantages include an online data storage library, which is available under the name

3D Warehouse. In addition to the fact that traditional design tasks can be performed in Sketchup, the program has a built-in AR viewing platform. The SketchUp Viewer for Mobile app offers augmented reality (AR) viewing capabilities enabling us to view our 3D models within the context of our existing physical space (see Fig 3.). With AR, a designer can iterate faster on designs by letting customers experience the models in 3D, and communicate his/her ideas more effectively.

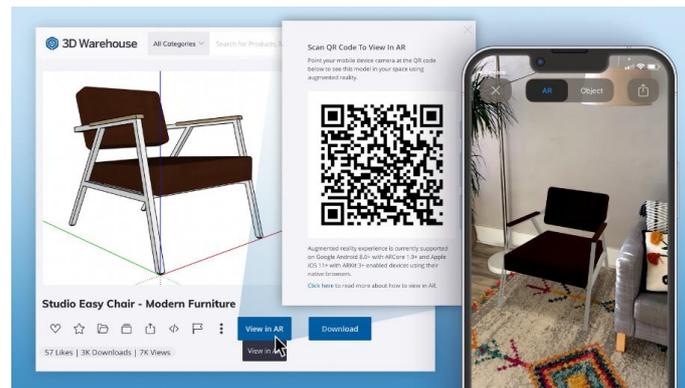


Fig 3. SketchUp: AR viewing via a QR code (Sketchup Team, 2022)

“The biggest problem an architect has is getting from the screen into physical space,” said architect Greg Lynn. SketchUp Viewer enables architects to fully immerse themselves and experience their ideas through 1:1 holographic scale models or AR models. SketchUp Viewer - Lynn states - “brings designs to life by bridging the gap between 2D, 3D and physical space.” Possessing a remote collaboration capability, the mixed-reality technology is set to transform the design process, empowering architects to more effectively visualise, present ideas and manage complex projects in real time (Addo-Atuah, 2018). This trend is also being applied to the furniture industry, with furniture being moved into physical space (see Fig 6.). IKEA is an example of this. IKEA has already launched an augmented reality (AR) application that allows users to test IKEA's products in real time through Apple iOS 11's ARKit technology. Dubbed IKEA Place, the iPhone- and iPad-compatible free application features realistically-rendered, true-to-scale 3D products. "The app automatically scales products, based on room dimensions, with 98 percent accuracy," noted a press release by the company (see Fig 4.). In order to visualise a product within a space, the application scans the expanse of a room through an iPhone or an iPad camera (Ayoubi, 2017).

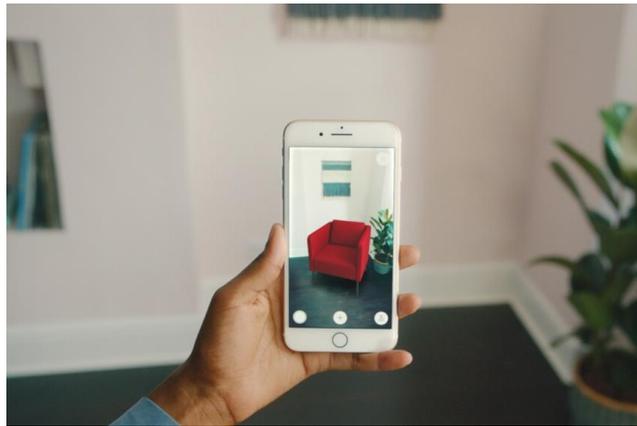


Fig 4. Courtesy Inter IKEA Systems (Ayoubi, 2017)

Virtual reality (VR) is also becoming more and more important in the construction industry, after devices that truly implement VR in a life-like manner have been put on the market in recent years. By adding the Oculus Rift, HTC Vive and Samsung Gear headsets, the user can enter any 3D simulation and feel as if he is really standing in the designed space (see Fig 5.). During such a tour, you can get an architectural plan accepted, or even sell an apartment much more convincingly, then relying only on plans and photographs.



Fig 5. An expected view of projected virtual reality contents
(Khan, Ahsan and Hussain, 2017)

This solution was also used by WING and Market during the press tour of the new Telekom headquarters, not only the giant office building under construction version, but also the completed version could be viewed - the latter with the help of VR (Szabó, 2018). The main advantage of the mixed use of VR and AR for us is that the two technologies work together to project an accurate image for our customers. In VR, the customer can walk through the product, experience the dimensions and the exact placements, can test the opening direction and operation, while in AR he/she can see the exact proportions and position of the placed model and the combined effect of colours and shapes in space. Using VR and AR, scale models can

be created that accurately illustrate function and style, which can be shaped and moulded in the further steps of the design process based on new requests and expectations. Multiple designs and layouts can be pre-designed as required (Nagy, 2022).



Fig 6. Realistic product presentation to customers based on a feature-rich interface
(Florentino et al., 2022)

Today, we can't even imagine our lives without our smartphones: has phone, alarm clock, it is a music player, connects to the social media, contains all of our favourite applications. Our lives are in our pockets and we can access them at the touch of a button. According to Statista data, the number of smartphone users is projected to increase from 3.6 billion in 2020 to approximately 4.3 billion by 2023, and smartphone adoption may also grow at a rapid rate. More than 50% of all Internet traffic comes from smartphones and tablets. By 2025, 72% of the users will access the Internet exclusively via smartphones – estimates Leftronic. With these numbers in mind, it becomes clear that focusing on mobile phone and the web can provide a significant competitive advantage over our competitors. People love using augmented reality—over 90% of Americans use or would use AR to shop. Research by Interactions Consumer Experience Marketing shows that furniture is the most popular purchase item with augmented reality (60%), followed by apparel (55%) and food (39%) (Retail Perceptions Report, 2017). The furniture industry is an incredibly visual industry and customers welcome any effort to bridge the gap between the online and in-store shopping experience. With this in mind, it is clear that VR and AR has a huge influence on the decision-making process in the furniture industry (see Fig 7.).



Fig 7. Viral marketing at the Duna Kapu Square in Győr (Nagy, 2022)

4. Results, conclusions

In conclusion, AR and VR technologies have the potential to revolutionise the furniture industry by creating new sales channels and enhancing customer experiences. One of the main benefits of AR and VR technologies in the furniture industry is the ability to reduce returns, the other is to reach customers who may not have access to physical store for example, customers in rural areas or those with limited mobility may not have easy access to stores. AR and VR technologies allow these customers to explore and purchase furniture from the comfort of their own homes. AR and VR technologies can also provide valuable data to furniture companies. By tracking customer behaviour and preferences, companies can gain insights into which products are popular and which configurations are most frequently chosen. This data can be used to improve product design and marketing strategies. As these technologies continue to develop and become more accessible, we can expect to see more furniture companies incorporating AR and VR into their sales strategies. The use of AR and VR technologies in the furniture industry means that the product will fully meet the expectations of the users. By using new technologies, traditional design can be extended with an added value of design presentation, where the customer can not only see the visual design of the furniture, but also get information about its spatial placement and its virtual placement in their own home. For us, the main advantage of using VR and AR together is that the two technologies work together to project an accurate image to the customer. All in all this allows for successful sales transactions for all parties involved and maximum customer satisfaction.

References

Addo-Atuah, K. (2018). Step Inside Your Architectural Models Using Augmented Reality. Online resource. <https://architizer.com/blog/author/kweku-addo-atuah/>

- Ayoubi, A. IKEA Launches Augmented Reality Application. Architect. Online resource. <https://www.architectmagazine.com/technology/ikea-launches-augmented-reality-application>, 2023.04.17
- Bertol, D., Foell, D.(1997). *Designing Digital Space: An Architect's Guide to Virtual Reality*, Wiley, 368 p. ISBN: 0471146625
- Das, Soumyajit (2023): An Article On: Augmented Reality Contrast to Ergonomic Design. Online resource. <https://doi.org/10.6084/m9.figshare.22134869.v1>
- Fleury,S., Nollet,A., Chaniaud, N., Poussard, B., Blanchard, P. and Richir, S. (2022). Virtual Reality as a tool for furniture design. 2022 International Conference on Cyberworlds (CW), Kanazawa, Japan, 218-219. doi: 10.1109/CW55638.2022.00051
- Florentino, M., Ricci, M., Evangelista, A., Manghisi, M.V. and Uva, A.E. (2022). A Multy-Sensory In-Store Virtual Reality Customer Journey for Retailing: A Field Study in a Furniture Flagship Store. *Future Internet*, 14 (812): 381. doi: 10.3390/fi14120381
- Gudlavalleti, R., Pandey, A., Malviya, M., Gandhi, S., Kasar, M. (2022). A Comparative Study of Interior Designing Using Markerless Augmented Reality. *IJIRT*, 9 (2), 470-474. <https://ijirt.org/Article?manuscript=155976>
- Interaction Design Foundation (2023). AR's Place in the World of Extended Reality. Online resource. <https://www.interaction-design.org/literature/topics/augmented-reality>. 2023.04.17
- Nagy, V. (2022).Marketing planning for a new furniture business based on VR and AR technology. University of Sopron. Sopron. 84 p. (in Hungarian). <http://diploma.uni-sopron.hu/id/eprint/9633>
- Norman, D.A. (1986). *User-Centered System Design: New Perspectives on Human-computer Interaction*. In: Norman, D.A. and Draper, S.W., Eds., *Cognitive Engineering*, Lawrence Erlbaum Associates, Hillsdale, 31-61.
- Prabhakaran et al. (2021). The effectiveness of interactive virtual reality for furniture, fixture and equipment design communication: an empirical study. *Engineering, Construction and Architectural Management*, 28 (5), 1440-1467. doi: 10.1108/ECAM-04-2020-0235
- Retail Perceptions (2017). What Shoppers Want from Retail Technology. Online resource. <http://www.retailperceptions.com/2017/05/what-shoppers-want-from-retail-technology/>. 2023.04.17
- Rozmus, M., Tokarczyk,J., Mishalak,D., Dudek,M.,Szewerda, K., Rotkegel,M., Lamot,A. and Roser, J. (2021). Application of 3DScanning, Computer Simulations and Virtual Reality in the Redesigning Process of Selected Areas of Underground Transportation Routes in Coal Mining Industry. *Energies*, 14 (9), 2589. 1-21. <https://doi.org/10.3390/en14092589>
- Schodek, D., Bechthold, M., Griggs, J.K., Kao, K., Steinberg, M. (2004). *Digital Design and Manufacturing: CAD/CAM Applications in Architecture and Design*. Google Books, Wiley, 6 Dec. 2004, https://books.google.com/books/about/Digital_Design_and_Manufacturing_CAD_CAM.html?id=UZpjQgAACAAJ.

Sketchup Team (2022). 3D Warehouse AR View: See your models in a whole new dimension. Online resource. <https://blog.sketchup.com/products/3d-warehouse-ar-view-see-your-models-in-a-whole-new-dimension>. 2023.04.17

Szabó, Á. (2018). Milyen technológiai újítások várnak az építőiparra 2018-ban? Magyar Építőik. Online resource. <https://magyarepitok.hu/iparagi-hirek/2018/02/milyen-technologiai-ujitasok-varnak-az-epitoiparra-2018-ban>. 2023.04.17

Vas, Zs. (2022): RP-Pano_konyha. Online resource. <https://kuula.co/profile/ImagineInteriorDesign>. 2022.04.1

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