

***Analysis 1 – Technical and didactic
readiness of schools –
Upper Austria***



„Virtual Reality for Education Network" (VReduNet) is a project of the INTERREG VA Austria-Czech Republic program (Interreg ATCZ256).



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Introductory background information about the analysis

This analysis is part of the work mapping package (T2) according to the project plan:

The goal of the job mapping package is to create detailed analyzes that reflect the current situation regarding the use and readiness of people or institutions in the field of augmented and virtual reality. These are educational institutions and further education institutions, as well as institutions that train future teachers and small and medium-sized enterprises. A total of six regional analyzes are prepared on the Austrian and Czech sides, which are then compared with each other in three further comparative analyses.

These analyzes are carried out as part of activity T2.1, with the first analysis, according to the project plan, focusing on:

T2.1 Regional analyzes

3 regional analyzes will be developed:

1. Analysis of technical and didactic readiness for AR/VR in schools (what it is, how it works, identification of best practices, specification of the necessary technological equipment for the introduction of VR in teaching, financial expenses, financing options)

For this purpose, a comprehensive questionnaire was developed together with the project partners, which was translated into German (see Appendix 1).

The questionnaire was implemented in the form of an online questionnaire (<https://edusurvey.at/index.php/577454>; see Appendix 2), but the interviews were conducted by telephone.

The target group of the analysis

The school system in Upper Austria (see education statistics 2019 ¹) includes 373 schools. 118 of these schools are attended by students over the age of 15. These schools represent a potential target group for the survey according to the work plan.

However, due to the corona pandemic and the associated lockout phase with distance learning, shift teaching, classes or schools in quarantine and other adverse circumstances caused by the pandemic, it was understandably very, very difficult to get schools to participate in the survey.

Therefore, 80 schools were selected from the potentially possible schools, which – due to their orientation, e.g. higher professional schools, or due to their focus, e.g. secondary schools with a focus on informatics – should be more interested in the topic of VR/AR.

School principals were contacted in person, several times, and asked if they or a faculty colleague designated by them would participate in a brief telephone interview. In addition, representatives of the school inspectorate, organizations for teacher training and further teacher education, dual apprenticeships and two out-of-school education initiatives were interviewed.

In the period from March to July 2021, a total of 22 complete interviews took place with those interested in VR/AR from the field of education in Upper Austria, which form the basis of the analysis data.

Since the representative of the school inspectorate in Upper Austria (of course) has a very good overview of schools, their priorities and equipment, we would like to summarize the information he gave in the interview:

VR/AR is not widely used in schools (or even unknown to schools), except in technical schools that work very closely with industrial enterprises. This is also confirmed by the fact that mainly these schools participated in the survey. He also mentioned the fields of engineering with a focus on the automotive industry, civil engineering and automation technology, and robotics, where he named specific schools and projects focused on VR/AR.

As challenges for VR/AR in education, the representative of the school inspectorate identified the incredible speed of development of these technologies, as well as budgetary and personnel challenges for schools, which are tied to other initiatives and current projects of the Ministry of Education (the priority here is "Digital school" - see also infobox) .

According to the representative of the school inspectorate, the successful implementation of VR and AR in schools "stands and falls" with the qualifications of teachers.

¹ https://www.bmbwf.gv.at/dam/jcr:2e1922b4-d22f-44a9-803e-8a3cc39553e1/stat_tb_2019_bildung.xlsx

"Digital School" initiative²

The digital school is gradually being implemented by introducing the "eight-point plan" of digital education. With its specific objectives, it specifies further development steps for the comprehensive implementation of digitally supported teaching and learning and for the wide implementation of innovative forms of teaching and learning:

- All educators should be prepared for digitally supported teaching as part of the qualification offensive.
- Schools are encouraged to standardize their processes and reduce the number of learning management and communication systems in use, creating clear structures for digitally supported teaching and learning.
- The most important educational and administrative applications are to be unified and accessible through a single sign-on. This also improves communication between the school and legal representatives.
- The supply of innovative, high-quality and quality-assured educational media needs to be expanded so that teachers and students have the best possible services.
- Furthermore, the infrastructural framework for digitally supported education needs to be optimized. Federal schools will be connected to the optical network and all classrooms will have adequate WiFi .
- In order to ensure equal opportunities and modern learning, all secondary school students should have access to and be equipped with a digital device.

To this end, the entire Austrian government has initiated an "eight-point plan for digital education" for which 250 million euros have been allocated.

Includes:

- Portal "Digital School" (PoDS)
PoDS offers students and teachers a unified platform with a single sign-on function for all basic applications in the daily life of the school.
- Uniform communication processes across all school locations
Principals are supported by the Federal Ministry of Education's "Distance Education Service Portal" to standardize and unify all the platforms they use in their school.
- Distance Learning MOOC
Teachers can participate in a Massive Open Online Course (MOOC) to prepare for teaching in a blended and distance learning environment.
- Eduthek 's compliance with the curriculum
As a digital platform, Eduthek provides practice materials for all types of schools and all subjects. In the future, all these resources will be aligned with the curriculum.
- Seal of Approval for Educational Apps
The Seal of Approval helps guardians, teachers and students choose innovative products, applications and services already available on the market.

- Expansion and modernization of the basic IT infrastructure of schools All federal schools will be connected to the optical network and appropriate WiFi will be available in all classrooms .
- Digital devices for pupils
In the 2021/22 school year, all pupils attending 5th and 6th grade received digital devices; from the 2022/23 school year, all pupils attending the 5th grade will receive a personal digital device.
- Digital devices for teachers
As part of the initiative mentioned above, which provides students with personal digital devices, the devices are also available to teachers working in the respective classes.

Selection of key questions

The original questionnaire, which was prepared and developed as part of the VReduNet project , contains more than 100 questions. The evaluation of all the questions of this questionnaire is part of the report as Appendix 3.

After going through the answers in cooperation with the project partners, those questions were selected that have the most informative value for comparative analyzes and are most beneficial for the project activities that build on them (networking activities or qualification measures).

² <https://digitaeschule.gv.at/ziele/> and https://digitaeschule.gv.at/wp-content/uploads/2020/10/201015-4_Folder_Digitale_Schule_DINlang_A4_BF.pdf



Question No. 1: Do you know the term "virtual reality/augmented reality" ?

A fundamental question focused on the main goals of the entire project. Before the interview, it was not clear which schools or school representatives were familiar with VR or AR technology.

The results show that all survey participants, who represented schools as well as school inspectorates, teacher training and school-related technology initiatives, are familiar with these concepts.

Are you familiar with the term "virtual reality/augmented reality"?	
Yes	22
No	0
In total	22



Question No. 2: Have you already had the opportunity to try it in practice?

The second question was focused on the respondents' practical experience. We wanted to find out how many of them had this technology in their hands and could practically try it out.

Have you already had the opportunity to try it in practice?	
Yes	20
No	2
In total	22

The results show that 91% of respondents already have hands-on experience with VR and/or AR.

Two respondents who have no experience with VR or AR work in secondary schools.



Question No. 3: Do you cooperate with any institution (school, company, etc.) that is equipped with AR/VR ?

Almost three-quarters of respondents (73%) already work with an institution that is equipped with VR or AR equipment. Most of the interviewed schools cooperate in the framework of practical teaching and projects with partner companies. There was also collaboration with Ars Electronica Center or with open technology laboratories.

Do you cooperate with an institution (school, company, etc.) that is equipped with AR/VR?	
No	6
Yes	16
In total	22



Question No. 4: If you do not cooperate with any institution (school, company, etc.) that is currently equipped with AR/VR, would you be interested in such cooperation?

The majority - 5 out of 6 (83%) - of respondents who have not yet cooperated with these institutions would be interested in cooperation.

The school that did not want to answer this question is a secondary vocational school: The respondent also reported that neither the teachers, nor the pupils, nor their parents are aware of any need, and therefore there is no interest in purchasing VR/AR equipment.

If you do not cooperate with any institution (school, company, etc.) that is currently equipped with AR/VR, would you be interested in such cooperation?	
Yes	5
Without an answer	1
In total	6



Question #5: If you were interested in further cooperation and networking, what would you expect from such cooperation?

5 out of 6 (83%) respondents would be interested in cooperation.

When asked what they expect from such cooperation, the interviewed school representatives answered:

Inputs on how VR/AR can be used in didactically meaningful ways.

Greater use in everyday working life

From a school perspective, it would be great if you could borrow things.

Presentation of the possibilities of use

Contact person for technical issues, exchange of experience and recommendations

This school feedback also provides an insight into what schools are currently experimenting with:

It would be good to work with an institution that has professional equipment, because few attempts are made in this direction in the school - more with students' mobile phones and, for example, Google Cardboard . But the whole thing is still quite cumbersome and not even physically pleasant!



Question #6: Are schools that already have VR/AR equipment interested in training?

Are schools equipped with AR/VR interested in educational activities?	
Yes	12
Without an answer	2
In total	14

The diagram above is a combination of the results of two queries. We specifically wanted to find out if the 14 schools that are already equipped with VR/AR are interested in further education.

The result shows that even schools that already have VR/AR equipment in their schools are largely (86%) interested in further education.

This means that both the group of schools that are not yet equipped and the group that is already equipped are interested in the activities planned in the project.



Question #7: How do schools that already use VR/AR rate the use of this technology in the future?

Are schools equipped with AR/VR interested in educational activities?	
More often than now	14
In total	14

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A network diagram in the top left corner showing several blue dots connected by thin blue lines, representing a network structure.

Conclusion

From the survey, or the fact that they did not answer it results in 3 groups of schools.

- Group 1: The first group of schools has no or no interest in the topic and - probably also - no or little experience with VR/AR and therefore did not participate in the survey.
- Group 2: The second group of schools has little experience with VR/AR but has no equipment in the school. Most of these schools are interested in working with institutions with VR/AR or are interested in this topic. However, these schools are not currently interested in purchasing VR or AR equipment as other priorities are currently more important, as can be seen from the explanation (see question 3 on page 19). As already described by the school inspectorate, there are currently infrastructural measures that are necessary in the framework of the "digital school" initiative.
- Group 3: The third group has deeper experience with AR/VR technology and is also equipped with this technology. They are also interested in further VR/AR training.

In general, it should be noted that VR/AR seems to be known, but too few examples of meaningful use are known, or the benefits and value for the educational system are still little widespread or not at all.

Comparison matrix between schools and companies in the Czech Republic and Austria.

This matrix consists of nine questions focused on multiple aspects of respondents' perception of AR/VR technology.

The results were analyzed based on the number and percentage of the entire sample.

	I definitely agree	I rather agree	I rather disagree	I definitely disagree	Not applicable
AR/VR opens up many new possibilities for the economy.	18	3	0	0	1
AR/VR opens up many new possibilities for education.	9	11	1	0	1
The use of VR/AR should be taught in schools.	7	11	3	0	1
The benefits of AR/VR outweigh the cost/effort.	7	9	1	2	3
AR/VR is too controversial for the health of its users.	0	4	8	5	5
AR/VR is relatively easy to use.	5	12	4	0	1
I have a general interest in VR/AR.	15	6	0	0	1
The main purpose of AR/VR is entertainment/gaming.	1	6	8	6	1
In the next three years, I will probably be using VR/AR in my work.	11	3	2	4	2
	I definitely agree	I rather agree	I rather disagree	I definitely disagree	Not applicable
AR/VR opens up many new possibilities for the economy.	81.8%	13.6%	0.0%	0.0%	4.5%
AR/VR opens up many new possibilities for education.	40.9%	50.0%	4.5%	0.0%	4.5%
The use of VR/AR should be taught in schools.	31.8%	50.0%	13.6%	0.0%	4.5%
The benefits of AR/VR outweigh the cost/effort.	31.8%	40.9%	4.5%	9.1%	13.6%
AR/VR is too controversial for the health of its users.	0.0%	18.2%	36.4%	22.7%	22.7%
AR/VR is relatively easy to use.	22.7%	54.55%	18.2%	0.0%	4.5%
I have a general interest in VR/AR.	68.2%	27.3%	0.0%	0.0%	4.5%
The main purpose of AR/VR is entertainment/gaming.	4.5%	27.3%	36.4%	27.3%	4.5%
In the next three years, I will probably be using VR/AR in my work.	50.0%	13.6%	9.1%	18.2%	9.1%



Other selected key questions from schools that already have VR/AR equipment:

Question #6: Is your school equipped with AR/VR technology?

Is your school equipped with AR/VR technology?	
Yes	14
No	8
In total	22

64% of educational institutions that participated in the survey already have VR and/or AR equipment in their facilities.

Question #7: What AR/VR equipment do you currently have?

The list of headsets based on the survey shows that very few and mostly individual devices are bought, and that no brand or product has yet become a favorite.

Sets of several devices for the whole class are not available in practice.

Equipment type	Number of kits	Dedicated PC
Oculus Rift	8	Yes
HTC Vive	1	Yes
VR glasses (unknown brand)	1	Yes
Oculus	1	Yes
HTC Vive	1	Yes
Microsoft Hololens	1	Yes
Oculus Rift	1	Yes
Oculus Quest	2	No
Gear VR	6	No
Oculus Rift	1	No
HTC Vive	1	No
VR glasses (unknown brand)	1	No
AR/Kinect- System	1	Yes



Question #8: Are you satisfied with the equipment you are using? Is its performance enough for you? Is the number of devices sufficient? Is there any room for improvement?

- Yes, the devices work great! When planning further purchases, the school currently wants to consciously orient itself to where the journey connected with VR will go - in the future, the establishment of a laboratory of the future is planned.
- The technology is still in its infancy, there is still room for improvement - further training is important and definitely comes first (before buying more/better equipment).
- Basically, we are satisfied - but there is still room for improvement. Good graphics cards would certainly be important (AR/VR have high demands, suitable graphics cards cost around 2,000 euros)
- Headsets are currently sufficient.
- For current use (in the context of the project) it is sufficient.
- Of course, more would be better, the limits are mainly determined by the budget.
- It's fine on its own - but more devices would be great! Wish: More HoloLens .
- It's ok, there are enough of them.
- Currently the number is sufficient, more is always possible :-) For deep space development, it would be nice to have a test environment, but it is not necessary.
- Projects that would verify effectiveness (how often and for how long and with what effect) would be important.
- Suitable for media workshop requirements; the computer itself should be more powerful.
- We're satisfied. The logical successor of the existing device Oculus Go -> Oculus Quest 2
- Quest 2 has proven itself because it can be used flexibly. Because it is also independent!

The answers are mostly positive, the schools are permanently satisfied with the devices. Of course, more equipment would be nice, but for budget reasons it is not possible. However, this technology is not yet "fully developed" and is currently used selectively and on a project-by-project basis.



Question #9: How much money did your school spend on AR/VR equipment and how did your school secure the necessary budget? Has there been any financial support for the purchase of AR/VR equipment?

including computers 15,000 euro
about 600/700 euro
about 2500 euros
he doesn't know anymore
about 20,000 including computers
about 8000 euros
about 700 euros
4200 euros
The current equipment is only on loan - so no cost; further use is still open...

- Vocational or technical colleges already have adequate budgets with which to purchase this hardware. For other schools, it is much more difficult because the hardware is not directly linked to any of the subjects taught.
- The acquisitions were made either as part of financing projects...
- ... or were funded by partner companies or sponsors ...
- ... or through the school's alumni association.

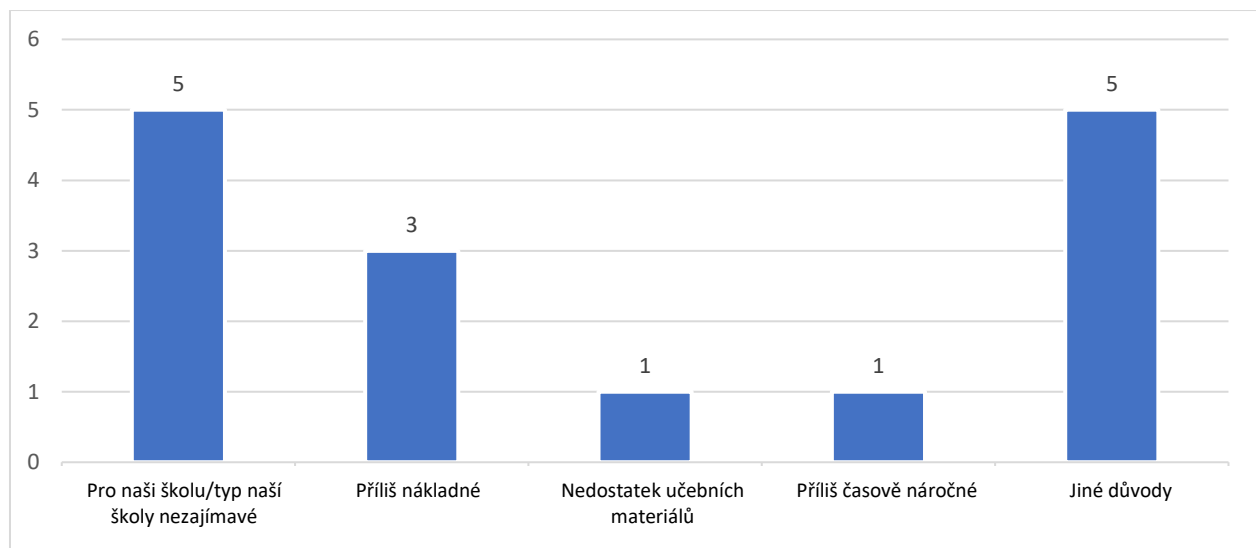
Again, the results vary widely. There are budget reserves in the technical schools where these purchases can be placed, but other technical purchases must also be financed from them. It depends on the schools how they get the necessary funds to buy the equipment and what kind of sponsors and supporters they find.

Another key question from schools without VR/AR equipment:

Question #3: Reasons given by non-VR/AR schools for not acquiring devices in the near future

Schools that do not yet have VR/AR equipment were asked if they plan to purchase one in the near future. Seven of the eight schools responded that they did not plan to do so.

We asked for specific reasons and were told as follows (multiple answers were possible):



The following responses were given as "other reasons":

- *Schools currently have different themes and priorities: infrastructure, broadband, WiFi ; Vocational schools do not appear at all in the digital eight-point plan, but they also need digital support; busy due to many different responsibilities.*
- *The money should first be invested in other infrastructural measures, such as currently expanding broadband internet.*
- *Zero didactic added value for our software development topic, concepts are more theoretical, no software development benefit*
- *It's technically too underdeveloped at the moment - it's still too early in terms of scope and other topics (Laptops/corona initiative) are even more important at the moment!*
- *Teachers may know that they want to present (for example) the heart in an innovative way when teaching biology, but they are not familiar with AR/VR – they just don't have the subject in their head!*
- *Currently, there are other "construction sites" in the school: the laptop/tablet offensive (see <https://digitaleschule.gv.at/>) means that the school will have to spend a lot of money (WiFi , network, electricity, ...) and because it is a private school, it has almost no support. Perhaps the purchase of smart boards is also planned, which will also require the development of new teaching concepts!*