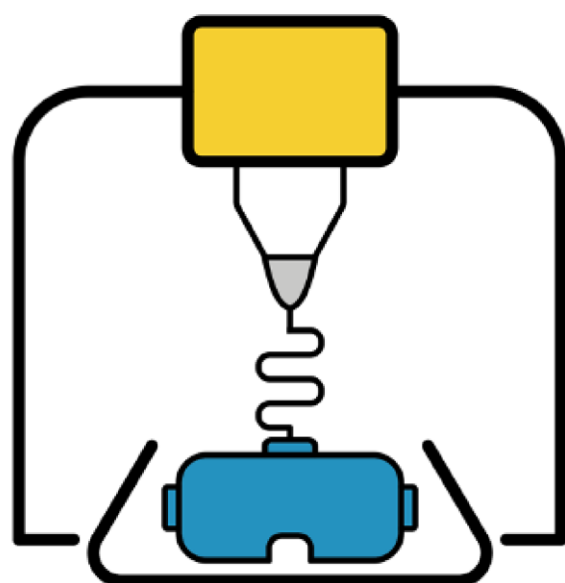


WORK PACKAGE 2

Research Report on the Needs of
Youth Regarding VR and RP



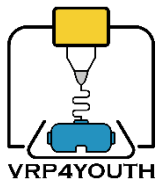
VRP4YOUTH

Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

Project Number: 2022-1-TR01-KA220-YOU-000089257

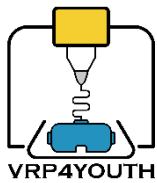


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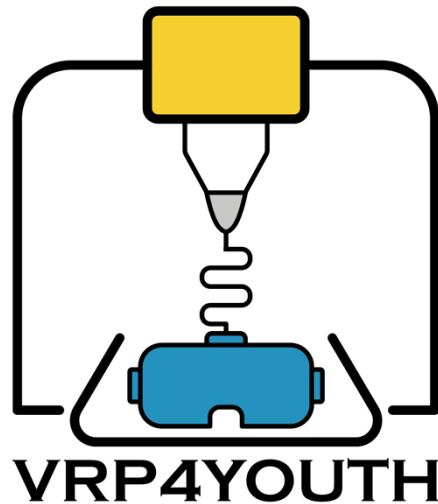


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Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)
2022-1-TR01-KA220-You-000089257
WP2 – Research Report on the Needs of Youth Regarding VR and RP



Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

Project Number: 2022-1-TR01-KA220-YOU-000089257

Work Package 2

Research Report on the Needs of Youth Regarding VR and RP

Partner

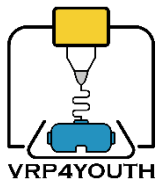
Gazi University



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WP2 FINAL REPORTING

- Work package 2 includes a research report on the needs of youth and skill mismatches regarding VR and RP affecting their employment in related industries.
- Primary research data will be collected from unemployed youth, academicians, and the representatives of related industries through surveys. The survey will analyze the level of education on these technologies for the development of unemployed youth with higher education degrees.
- In addition, focus group meetings will be held with unemployed youth, sector representatives and academicians.

1. Theoretical Background

Virtual Reality (VR) combines 3D near-eye displays and position tracking technologies to offer users a realistic simulation of a digital environment, thus providing a highly immersive experience. VR is widely used in various sectors in entertainment, especially video games, education in fields such as medicine or military, and business, such as virtual meetings. Typically, traditional VR systems use either VR headsets or multi-projection setups to mimic the user's physical presence in a virtual world. A person using VR equipment can explore the artificial world, move around in it and interact with virtual features or objects. This immersive effect is usually achieved with VR headsets with a head-mountable display equipped with a small screen placed in front of the user's eyes (Fig. 1) or specially designed rooms equipped with multiple large screens (Fig. 2). VR primarily involves audio and visual feedback, but other sensory and force feedback can also be incorporated using haptic technology.



Figure 1. VR headset (Ref: https://vr.space/wp-content/uploads/2021/12/IMG_1258-1024x683.jpg)



Figure 2. VR room (Ref:

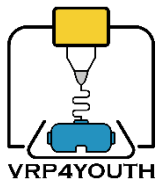
https://en.wikipedia.org/wiki/Virtual_reality#/media/File:CAVE_at_INL's_CAES_001.jpg)

Critical milestones in the evolution of VR technology mark its transformation from a mere concept and fantasy to a technology that is widely accessible across the globe. The development of VR has progressed significantly since Ivan Sutherland's "Sword of Damocles" headset was invented in 1968 (Sutherland, 1968). This bulky device was an early example of what the world of virtual reality would become in the future, presenting an image of a basic 3D room (Fig. 3). Just one year later, Myron Krueger advanced this technology with the VIDEOPLACE program, which allowed users to interact in a computerized environment. Further development of VR technology facilitated the creation of flight simulators, travel simulations and Sayre gloves that allow simulated hand and finger movements.



Figure 3. Sword of Democles (Sutherland, 1968)

By the late 1980s, NASA developed VR technology to train astronauts, and this was enough for Nintendo to introduce the Power Glove and arcades to include VR in their gaming systems for the general public to enjoy. The launch of the Oculus Kickstarter in 2010 sparked the modern VR



revolution. The technology and its appeal continues to spread, with gaming platforms like PlayStation and Xbox developing VR systems and capabilities. Every day, new users are being welcomed into the world of virtual reality.

Rapid Prototyping (RP) is a set of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer-aided design (CAD) data (Fig. 4). The main purpose of rapid prototyping is to validate the form, fit, and function of product designs in a quick and cost-effective manner before going into full-scale production. The most common method of rapid prototyping is 3D printing, which works by adding layers of material to build a product, based on the 3D design data. This layer-by-layer construction process is also known as additive manufacturing.

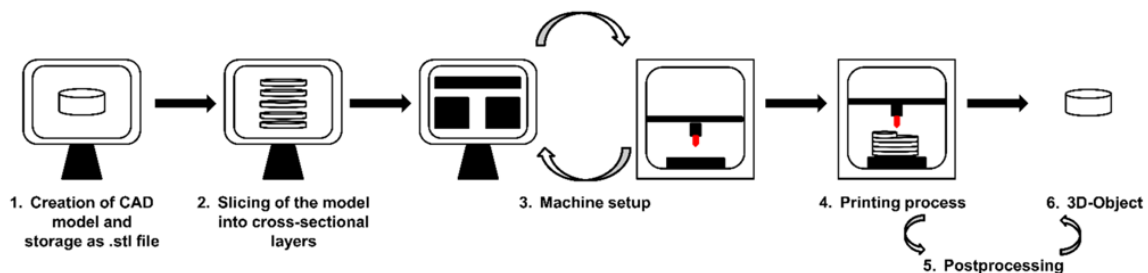


Figure 4. Rapid prototyping process (Ref: <https://www.pharmaexcipients.com/news/technologies-in-3d-printing/>)

RP has numerous advantages in product development. It accelerates the design process and allows for quick design changes based on user feedback, helping to reduce the cost and risk of errors in the production stage. It also allows for more creative and flexible designs, since complex geometric shapes can be created relatively easily with a 3D printer.

RP has made great strides since 1981, when Hideo Kodama laid the foundation for additive manufacturing using a photosensitive resin polymerized with UV light. 3D printing especially in recent years with rapid production, has found a wide spectrum of applications in the industry. The sectors that benefit greatly from 3D printing in industrial applications are the medical, aerospace, automotive, accessories, fashion and consumer products sectors. The usage area of the technology differs according to the sectoral application area. Due to the high personalization needs of the medical and health sector, 3D printing is one of the sectors where 3D printing is used especially in the production of end products. In this sector, 3D printing technology is used for the production of hearing aids, orthopedic insoles, prostheses, implants and dental treatment apparatus. Similarly, 3D printing is also used in the production of consumer products such as personal accessories, jewelry, glasses, headphones, phone cases, shoes and toys in the fashion sector. Optimization is very important in the design of complex components in the aerospace industry. For this reason, these complex shapes are produced by 3D printers that go beyond the narrow limits of traditional production. Eliminating the boundaries of RP is an important benefit that drives innovation in the aerospace industry (Fig. 5).



Figure 5. 3D printer taken into space by NASA (Ref:

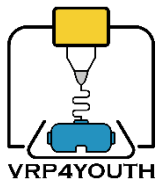
<https://www.theguardian.com/artanddesign/architecture-design-blog/2013/jul/30/nasa-3d-printer-space-station>)

A real industry experience includes evaluation of existing designs, creation of custom tools and partial design and production. VR and RP manage and realize all these processes. Virtual Reality (VR) integration with 3D printing could bring a revolutionary change in the way we design and manufacture objects. VR provides a unique way to design 3D objects in a virtual environment before sending these models to a 3D printer for production. This allows for a more intuitive and potentially more accurate design process.

Here are a few ways VR and 3D printing could work together:

1. **VR Modeling:** Designers can create 3D models in a VR environment using special VR design software. These models can then be exported as a file that can be read by a 3D printer. This can make the design process more intuitive and flexible.
2. **Interactive Prototyping:** Designers can virtually interact with the prototype model in the VR environment before it is physically printed. This could allow for better understanding of the design and potentially catch design flaws early on.
3. **Customer Experience:** VR can be used to present 3D designs to customers or clients in a more immersive way before the product is actually printed. This can give customers a better idea of the final product and allow for feedback before the physical prototyping stage.
4. **Education and Training:** VR integrated with 3D printing could be a powerful tool for education and training. For example, medical students could use VR to design custom prosthetics or other medical devices and then print their designs using a 3D printer.

However, there are challenges associated with integrating VR and 3D printing, such as the high costs of VR equipment, the steep learning curve associated with VR design software, and the potential physical discomfort some people experience when using VR.



2. RP and VR Affecting Youth's Employment in Your Country and Related Industries

2.1. Current state of VR and RP in Turkey

The use of rapid prototyping technology in Turkey has become widespread in the last 20 years. In Turkey, the first medical skull implant design, manufacture and application of surgery, Cadem Inc. in 2003 and was carried out with cooperation from the American Hospital opr.dr.sacit karademir. Implant design was performed with tactile sensory 3D modeling system using CT data of the skull and the model was obtained using 3D printer. This technology, which is used effectively in the field of jewelry, has been used in defense industry and aircraft industry. Dental use in the field of health has started to become widespread in recent years, and in the medical sense, the Medical Design Management Center (METÜM), which is established only within the body of GATA, has lost the parts of the bone structures such as skulls, chest and jaws due to accidents or gunshots. can be worn on the patient's body. Since there is no place outside this center, medical products are mostly imported from abroad.

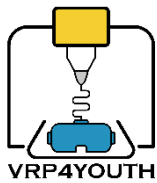
RP has been gradually gaining ground in Turkey. This technology has been used in many, including manufacturing, medical, automotive, design and construction. Various companies have started to offer 3D printing services, and there's a growing community of makers and enthusiasts. Turkish universities have also been researching and adopting 3D printing technology, particularly in engineering and design programs.

Similar to global trends, VR technology in Turkey has been primarily driven by the gaming industry, but it has also started to find applications in other sectors. Education, engineering, healthcare, and real estate are among the sectors where VR is used to provide immersive experiences or simulate real-world situations for training purposes. Additionally, there's a growing interest in using VR for tourism, where it can offer virtual tours of historical sites and museums.

Some Turkish universities have introduced courses or programs related to VR and 3D printing. These courses often fall under departments such as computer science, engineering, or design. They typically include aspects like VR programming, 3D modeling, user interface design, and the principles of 3D printing.

Many universities worldwide had started to incorporate courses related to RP and VR into their curriculum, especially in computer science, game development, engineering and digital design departments. Students are typically taught how to develop VR applications, create 3D models, script in various programming languages, and understand the principles of user experience and interaction in virtual environments.

In Turkey, as a developing country with a strong interest in technology, it's reasonable to assume that similar curriculum developments have occurred, although the specifics would depend on individual universities and programs. Regarding the skills and abilities of unemployed youth in Turkey, digital literacy and fluency in the use of technology are typically strong among younger populations worldwide. Unemployed youth who are digitally savvy might already possess basic skills that can be relevant in the RP and VR industries, such as programming, 3D modeling, and digital content creation.



In addition, the government, NGOs, and private sector organizations in many countries often provide training programs to help unemployed youth develop in-demand skills, including those relevant to emerging industries like RP and VR.

2.2. Current state of VR and RP in leading European countries

In Europe, VR technology is widely used in various fields such as the gaming industry, education, healthcare, real estate and tourism. This technology enables users to have realistic and interactive experiences. VR is used to create surgical simulations in medical education, virtual tours of buildings in architecture and construction, and interactive design, production and assembly simulations in engineering. 3D printing technology is also being applied in many sectors such as medicine, automotive, aerospace and manufacturing. For example, 3D printing enables the production of customized prostheses and implants, and is used in the automotive and aerospace industry to produce complex parts quickly and at low cost.

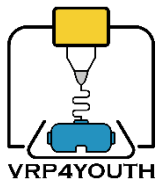
Europe, especially Germany and the UK, has made significant progress in VR and 3D printing technologies. Universities in these countries offer courses and research on VR and 3D printing and are investing heavily in these technologies. The UK has been a hotbed for VR and RP, with London being one of the major hubs for VR companies globally. The country has seen the application of VR in various sectors such as healthcare, education, architecture, and entertainment. In healthcare, VR is being used for pain management and rehabilitation. In education, it's being used to create immersive learning experiences.

Germany is another leader in VR and RP, particularly in the automotive industry. Companies like Audi, BMW, and Mercedes-Benz have been using VR for virtual prototyping and immersive customer experiences. France is a growing hub for VR, with a strong focus on VR in film and the arts. The country hosts the annual NewImages Festival, which focuses on digital creation and virtual worlds. French companies are also leveraging VR in sectors such as real estate and retail.

The Netherlands has been a strong player in the use of VR for urban planning and architecture. Dutch companies have been creating 3D simulations of urban environments that can be explored and modified in VR. Sweden has seen significant VR developments, particularly in the gaming industry. Swedish companies like Resolution Games have made significant strides in VR game development. In the field of RP, Europe also has been seeing a lot of progress. The adoption of RP methods in education and corporate training has been on the rise.

2.3. Impact of VR and RP on youth employment

As the RP and VR sectors grow, they will likely create a range of new job opportunities in Turkey and EU. These may include roles in VR development, game design, VR storytelling, VR training, and technical support. These jobs often require technical skills, creativity, and a good understanding of user experience principles, providing employment opportunities for young people with these skills.



The growth of VR and RP is driving greater demand for digital skills. Young people with coding, design, prototyping and UX/UI skills are likely to find an increasing number of job opportunities. Like many other countries, Turkey has been investing in digital education to ensure young people are prepared for these new opportunities. As VR and RP become more mainstream, there's an increasing demand for professionals who can create engaging virtual content. This includes areas like VR filmmaking, VR game development, and RP scenario writing. This has been generating new employment opportunities in the entertainment industry.

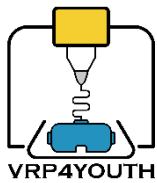
VR and RP are also being used increasingly for education and training purposes. This creates job opportunities in sectors like corporate training, where VR can be used to create realistic training scenarios. There are also roles in educational technology companies which are using VR to create engaging educational content.

Mastery of RP technologies, an important component of Industry 4.0, will have a positive impact on youth employment. RP enables the acceleration and personalization of production processes. This opens up a wide range of new job opportunities for young people, from product design to prototyping and mass production. The widespread adoption of 3D printing technology and its inclusion in programs at educational institutions can help young people develop skills in this field. These skills will directly contribute to future employment opportunities.

3D printing provides young entrepreneurs with the ability to design and manufacture their own products. This undoubtedly makes it easier to create low-cost prototypes and start new businesses. 3D printing encourages them to design and develop new products and solutions. This expands young people's employment prospects and offers them the opportunity to find work in innovative and high-tech sectors. As a result, 3D printing can serve as an important tool to boost youth employment. By equipping young people with the skills needed for the workforce of the future, this technology offers them wider and more diverse job opportunities.

Virtual reality has created a number of new job roles, particularly in sectors such as gaming, education, healthcare, construction and real estate. Roles such as VR content creators, programmers, designers, project managers and analysts can help young people find work in this new and growing sector. VR makes it easier to get practical experiences - for example, simulating a surgical procedure or working on an engineering problem. This helps young people prepare for their future jobs. In addition, VR enables young people to access employment opportunities without geographical limitations. VR gives young people the ability to work from home and work with companies anywhere in the world.

Companies are using virtual reality technology in their recruitment processes. Candidates can participate in "trial days" in a virtual work environment to understand and experience a job. This can help young people better express themselves in the hiring process and better demonstrate their skills to potential employers. There is no doubt that new technologies such as virtual reality and RP offer new opportunities for entrepreneurship. Young people can found or join start-ups that develop VR-based applications or services. Similarly, start-ups providing 3D printing services have become increasingly common in recent years.



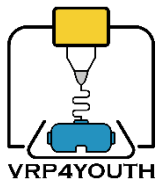
Despite the new opportunities, there is also a risk of job displacement as some roles may become automated or less relevant with the advancement of VR and RP technologies. However, those who adapt and acquire new skills can potentially transition into the new roles created by these technologies.

3. Results and Discussion of the Survey Implementation

50 unemployed youth, 25 academics and 25 sector representatives participated in the survey. Of the unemployed youth surveyed, 44% were female and 48% were male. The other young people did not want to specify their gender. The young people who participated in the survey are mostly graduates of industrial product design, electrical and electronics engineering, metallurgical and materials engineering, mechanical engineering, industrial design engineering, automotive engineering and energy systems engineering. 68% of unemployed youth have knowledge about VR technology. 58% of unemployed youth know about the practical benefits of VR technology, while 42% know about the practical benefits of RP. 88% of young people do not have a VR-oriented course in their university curriculum, while 4% have definitely taken such a course. At the same time, 80% of the students have not attended any VR and/or RP-oriented courses or trainings. It was determined that 22% of the students had an RP-oriented course in the curriculum of their university department. 83% of the young people who participated in RP-focused training stated that it was theoretical and practical. Finally, 22% of the students stated that they were aware of VR integrated RP applications.

Of the academics participating in the survey, 68% were male and 8% were female. The departments of the surveyed academicians are mostly metallurgical and materials engineering, woodworking industrial engineering, energy systems engineering, architecture, industrial design engineering and food engineering. While 36% of the academics have practical experience with VR technologies, 56% have practical experience with RP. 52% of the academics stated that there is no equipment for VR technology in their department, while 60% stated that there is equipment for RP technology in their department. This equipment are 3D printers (Inkjet printing, FDM, SLA) and CNC machine tools. While 20% of the academicians participating in the survey stated that there is a VR-oriented cooperation opportunity with companies, 48% stated that there is an RP-oriented cooperation opportunity with companies. It was stated that 44% of the universities where the academicians participating in the survey work do not have VR integrated RP applications.

Of the sector representatives surveyed, 44% were women and 40% were men. Sector representatives are mostly active in the defense industry, machinery industry and software industries. While 68% of the sector representatives are knowledgeable about VR, 84% are knowledgeable about RP technologies. While 20% of the sector representatives stated that there are VR-oriented applications in their companies, 76% stated that there are RP-oriented applications. 20% stated that they received support from different companies for VR-oriented applications, while 36% stated that they received support for RP-oriented applications.



4. Results of the Focus Group Meeting

Gazi University held a focus group on 06.06.2023 involving various participant populations, including: unemployed youth, academicians, and the sector representatives. Through the focus groups, information was gathered about the current situation in partner countries and the improvement points to bridge the skills/competence gaps of young people.

Gazi University held a focus group discussion with 5 participants on 06.06.2023. The focus group was conducted as part of the Gazi University's involvement in Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth) Project. 2 women and 3 men took part in the focus group meetings. Two of them are unemployed youths, two are academicians and one is a sector representative. One of the academicians works in the department of industrial design engineering, while the other works in the department of computer engineering. The sector representative works in the design and manufacturing sector, in the design and production processes of construction machinery. On the other hand, both of the unemployed young people have recently graduated from the industrial design engineering department and do not have any work experience yet.

The discussion was designed to gather information from the participants in regard to the following outcomes:

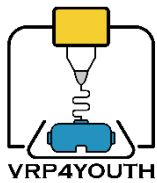
1. To evaluate the answers given by the participants in the questionnaire
2. To learn the level of knowledge of unemployed youth about RP and VR from the participants
3. To evaluate the knowledge level of participants about VR integrated RP applications
4. To determine the theoretical knowledge and practical experience of the participants in VR and RP applications
5. To determine whether there are courses on VR and RP technologies in the curriculum of the university where unemployed young people graduate
6. To inquire about the use of VR and RP technologies in the sector where the sector representative works
7. To determine the purpose for which VR and RP technologies, if any, are used in the sector in which the sector representative works and to determine their suggestions on this issue

The findings obtained from the answers given by the participants to the survey questions are listed:

Outcome 1: Overall, all participants have a good understanding of the practical benefits of VR and RP technologies.

Outcome 2: All participants have had the chance to experience at least one technology first-hand.

Outcome 3: All participants have attended at least one technology-related training/course.



Outcome 4: There are elective courses on VR and RP technologies in the departments where academics work and in the universities where unemployed youth graduate.

Outcome 5: While one of the unemployed youth had only theoretical knowledge about VR technology, the other unemployed youth had the chance to experience VR technology in the companies where they did internships during their student years.

Outcome 6: Both of the unemployed young people had the chance to have one-to-one experience both at school and in the companies where they did their internship. These technologies are material spraying (FDM) and vat photopolymerization (SLA).

Outcome 7: One of the unemployed young people took an elective course on reverse engineering in his department and experienced 3D printing as well as 3D scanning technology.

Outcome 8: An academic in the computer engineering department has theoretical and practical knowledge and experience with VR technology, but only general knowledge with RP technology.

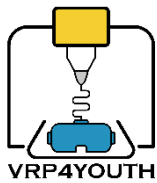
Outcome 9: It has been determined that the academician working in the department of industrial design engineering has knowledge on FDM, SLA and material spraying (Objet Printing) techniques from RP technologies and actively uses these technologies.

Outcome 10: While the industry representative has only a general knowledge on VR technology, it was determined that he took a course sponsored by another company on additive manufacturing technologies from RP technologies.

The sector representative works on the design and production of tracked and wheeled load-carrying construction equipment. While the sector representative stated that autonomous vehicles are mostly used in this field, there are also a small number of vehicles with operators. As a result of the meeting, it was evaluated that VR technology could be utilized for the operator's driving ergonomics in vehicles with operators. At the same time, it was stated that occupational accidents can be minimized and work efficiency can be increased by using VR technology in the occupational health and safety training processes of operators working in the production department. On the other hand, it has been evaluated that VR technology can be used in the assembly-maintenance processes and fault detection of autonomous construction equipment to accelerate the launch of products to the market.

In the company where the sector representative works, 3D printer technologies are not used for mass production parts. 3D printing technologies are used for prototyping certain plastic parts for the prestige of the company and to show the innovative approach of the R&D department, rather than for professional purposes. Two different trainings on these technologies were provided by Infotron, a leading company in Turkey that sells important equipment for RP and VR technologies. As a result of the meeting, it was suggested that the company could use VR and RP technologies for the production of difficult-to-produce parts imported from abroad.

It has been determined that both unemployed young people who graduated from industrial design engineering departments have mastered the FDM technique, one of the 3D printer technologies, and actively use this technique. It has been determined that unemployed young people use FDM technology for prototype production after modeling a new product that they have to develop in



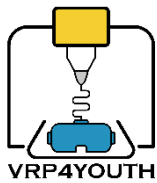
product design courses in their curriculum in Computer Aided Design (CAD) software. It was determined that both unemployed youth had 3D printers for this technology in the design studios of the departments they graduated from. One of the unemployed youth stated that there was an elective course on reverse engineering in the curriculum of the department he graduated from and that the process of finding an internship place became easier thanks to choosing this course. The other unemployed youth stated that he did an internship in a company operating in the design and production of robotic arms and that virtual reality studies were carried out in this company. It was stated that the current analysis processes were shortened by using VR technology in the design and production processes of robotic arms.

An academician in the Department of Computer Engineering teaches an elective course on game programming through the "Unity" program. It is aimed that students taking this course will do internships in companies that use virtual reality technology and to increase university and industry cooperation by writing joint projects with these companies. Within the scope of the course, students are expected to program games that can turn into tournaments using VR glasses with a multi-play approach. Thus, it is aimed to increase the curiosity and interest of young people in this technology.

In the department of industrial design engineering, there are 8 FDM, 2 SLA and 1 OBJET printers. It was stated that there is no course on VR technologies, but new courses on artificial intelligence and virtual reality will be opened in the updated curriculum.

At the end of the meeting, under the leadership of the mentor, the following suggestions were given to increase the use of VR and RP technologies by taking the ideas of all participants;

- VR glasses that work with voice commands can be used to increase the participation of visually impaired students in education.
- In order to increase virtual reality applications in health, new applications can be developed in cooperation with hospitals.
- Virtual reality applications can be used in simulation systems in the defense industry. In this field, employment can be provided for graduates of both design and engineering departments.
- VR goggles can be used in design and engineering departments to help students better understand mechanical parts that are explained verbally. Thus, students can be introduced to these technologies before they graduate and new job opportunities can be created.
- The design and modeling of 3D objects required in virtual reality applications programmed by computer engineering students can be carried out by industrial design students using VR glasses and consoles.
- Architecture students can create architectural objects such as trees, houses, etc. to be used in their projects using VR technologies. In addition, instead of taking measurements of the space, they can draw directly in that environment using VR glasses and consoles.



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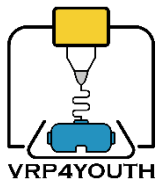
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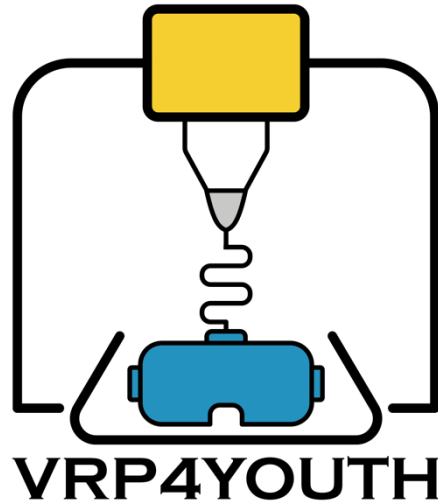
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WP2 – Research Report on the Needs of Youth Regarding VR and RP



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Work Package 2

Research Report on the Needs of Youth Regarding VR and RP

Partner

KTH Royal Institute of Technology

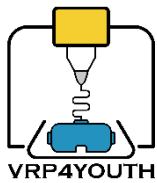


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- Work package 2 includes a research report on the needs of youth and skill mismatches regarding VR and RP affecting their employment in related industries.
- Primary research data will be collected from unemployed youth, academicians, and the representatives of related industries through surveys. The survey will analyze the level of education on these technologies for the development of unemployed youth with higher education degrees.
- In addition, focus group meetings will be held with unemployed youth, sector representatives and academicians.

1. Theoretical Background

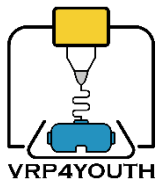
In recent years, Sweden has tried to position itself in a front seat position as a country developing interest and applications for the utilization of virtual reality (VR) and rapid prototyping (RP). Such technologies represent two of the most advanced and innovative activities that can be exploited in several environments, starting from industrial production down to healthcare (Lundegårdh, 2023; Land, 2022). They are both considered as enablers of Industry 4.0 (I4.0), and share parallels in creating immersive and interactive experiences, though they each offer unique opportunities and have distinct areas of application (Antonio Jimeno-Morenilla, 2021; Visionaize Inc., 2022). They also have diverse impacts in promoting and affecting the UN's Sustainability Goals (M. Mabkhot, 2021).

Virtual reality refers to the creation of a fully immersive digital environment that allows users to engage and interact with a simulated reality. In Sweden, VR technology has gained traction in various sectors, including industry and academia, and is being taught for increasing operators competences (Schreeb, 2022).

a) Industrial Applications: VR is being extensively used in the industrial sector in Sweden. Companies are leveraging VR to enhance product development, design visualization, and prototyping processes. By creating virtual models and simulations, designers and engineers can explore different design iterations, evaluate functionality, and identify potential issues before the physical production stage. VR also facilitates collaborative design and allows stakeholders to provide real-time feedback, resulting in more efficient and cost-effective product development cycles (Petter Wannerberg, 2022; Anders Hansen-Haug, 2019).

b) Training and Simulation: VR is widely employed for training purposes in Sweden, particularly in fields that involve complex and potentially hazardous environments. Industries such as manufacturing, aviation, healthcare, and defense utilize VR simulations to train personnel, enhance safety protocols, and prepare individuals for critical situations. VR enables trainees to practice tasks and procedures in a controlled and realistic virtual environment, improving learning outcomes and reducing the risks associated with real-world training (IVAR, 2023) (Harpa Hlíf Guðjónsdóttir, 2022).

c) Healthcare and Therapy: The healthcare sector in Sweden is exploring the potential of VR for medical training, therapy, and patient care. VR-based simulations allow medical professionals to practice surgical procedures, improve diagnostic skills, and enhance patient communication. VR is



also utilized in psychological therapy, providing immersive and controlled environments for exposure therapy, phobia treatment, and stress management (Iop, et al., 2022).

d) Education and Research: Swedish educational institutions and research centers are incorporating VR into their programs to enhance learning experiences and facilitate innovative research. VR enables students to engage in virtual field trips, explore historical or scientific concepts, and participate in interactive simulations. Researchers utilize VR to study human behavior, cognitive processes, and social interactions, contributing to advancements in psychology, neuroscience, and human-computer interaction (F.M. Monetti, 2022).

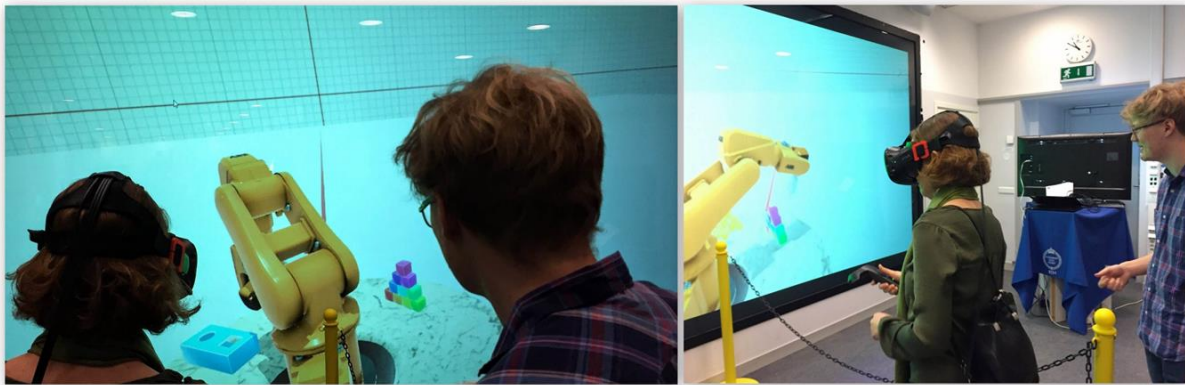


Fig. 1 Students practicing the use of robots through VR in KTH (F.M. Monetti, 2022).

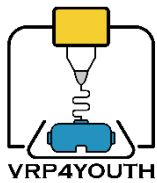
Rapid Prototyping (RP) in Sweden:

Rapid prototyping refers to the iterative process of quickly fabricating physical prototypes using advanced manufacturing technologies. Sweden has been at the forefront of RP developments, leveraging its strong industrial heritage and technological expertise.

a) Industrial Innovation: Swedish industries, ranging from automotive and aerospace to consumer goods and healthcare, utilize RP technologies to accelerate product development cycles and foster innovation. By swiftly fabricating prototypes, companies can evaluate designs, test functionality, and gather valuable feedback before mass production. RP technologies such as 3D printing, CNC machining, and laser cutting offer flexibility, cost-effectiveness, and customization possibilities, enabling Swedish industries to stay competitive and meet evolving market demands (Nordin, 2015).

b) Design and Architecture: In the fields of design and architecture, RP plays a crucial role in visualizing concepts, creating scale models, and validating design decisions. Swedish designers and architects employ RP technologies to communicate ideas effectively, present architectural proposals, and engage clients in the design process. RP also facilitates the exploration of intricate geometries and complex structures that may be challenging or expensive to produce through traditional manufacturing methods (Hosseini, 2023; Hult, 2022).

c) Academic and Research Initiatives: Swedish universities and research institutes actively utilize RP technologies to support academic programs and foster cutting-edge research. RP enables students and researchers to materialize their ideas, validate hypotheses, and advance scientific understanding



across various disciplines. By providing access to state-of-the-art RP facilities, Sweden encourages collaboration, innovation, and knowledge exchange within academia and research communities (Michael Hyunh, 2018).

d) Sustainable Manufacturing: Sweden is committed to sustainable development and has embraced RP technologies as a means to achieve environmentally friendly manufacturing practices. RP enables the production of complex geometries with minimal material waste, reducing resource consumption and environmental impact. Additionally, RP facilitates localized manufacturing and on-demand production, minimizing transportation and inventory costs while optimizing supply chains (M. Mabkhot, 2021).

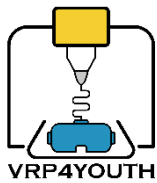


Fig. 2 Operators learning RP techniques at Applikationscenter för additiv tillverkning (Application center for additive manufacturing), with RISE (Research Institutes of Sweden) (Hosseini, 2023).

In conclusion, virtual reality (VR) and rapid prototyping (RP) technologies have found significant application and development in Sweden. VR is utilized across industries for product development, training, healthcare, and education, offering immersive experiences and enhanced simulations. RP technologies have revolutionized industrial practices, enabling rapid prototyping, design validation, and fostering innovation. Both VR and RP play integral roles in driving technological advancements, promoting collaboration, and supporting Sweden's industrial and academic sectors.

2. RP and VR Affecting Youth's Employment in Your Country and Related Industries

2.1. Current State of VR and RP in Leading European Countries



RP and VR technologies have obtained significant attention and advancements across leading European countries, such as Germany, the UK, and France. These nations recognize the potential of RP and VR in transforming industries and driving innovation. Such countries have invested substantially to progress in the development and the application of these technologies, gaining the front seat of technological advancements in Europe. These nations boast thriving ecosystems, comprising research institutions, startups, and established companies that actively explore and harness the potential of these technologies. Their efforts were the base to progress and reach remarkable success, epitomized by the creation of cutting-edge products, enhanced production processes, and improved user experiences (Edita Bezegová, 2022).

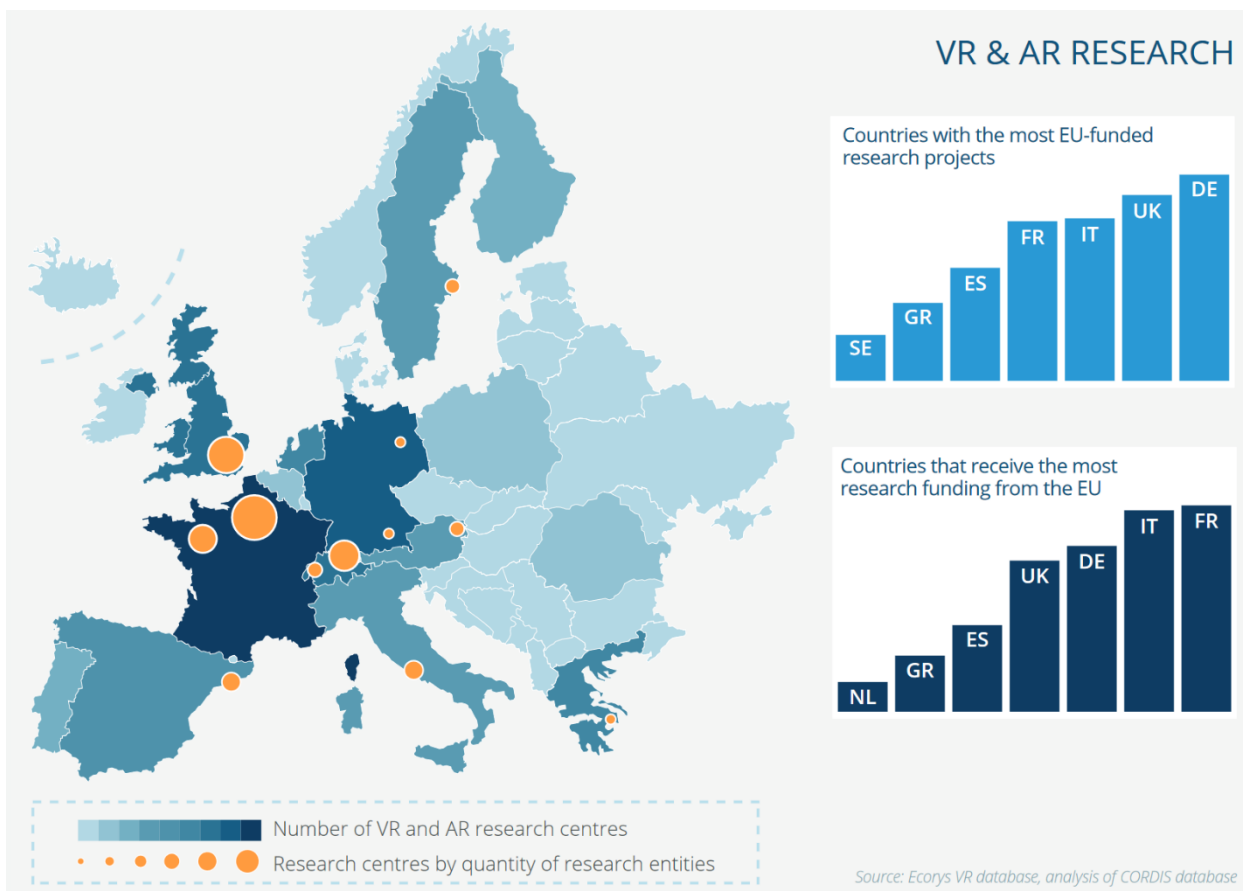
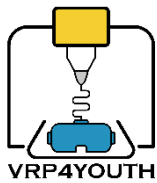


Fig. 3 Regions of importance for technology development in Europe (Edita Bezegová, 2022).

In Germany, RP and VR technologies have found several applications in specific sectors, for specific industries including automotive and aerospace fields. The country's strong manufacturing background has allowed for seamless integration of RP technologies into product development cycles, enabling rapid iteration and efficient prototyping. VR technologies have also been utilized for immersive design reviews, virtual simulations, and training purposes.

France has established itself as a hub for VR content creation and immersive experiences. The country hosts several companies specializing in VR production, content development, and distribution. French universities and research institutions actively contribute to advancements in VR technology,



particularly in areas such as virtual simulations for healthcare training, architectural visualization, and cultural heritage preservation.

The United Kingdom has a thriving VR and RP industry, with London being a prominent center for innovation and startups in this domain. The country's academic institutions offer comprehensive courses and research programs focused on VR and RP technologies, facilitating the development of skilled professionals. The UK has witnessed successful applications of VR in areas such as gaming, healthcare, and architecture, while RP technologies have been instrumental in improving manufacturing processes and enabling customization.

Collectively, leading European countries continue to drive the development and adoption of RP and VR technologies. Their commitment to innovation, research collaboration, and industry partnerships has propelled these technologies to new heights, contributing to economic growth and technological advancement across various sectors.

2.2. Current State of VR and RP in Sweden

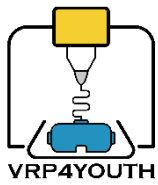
In Sweden, RP and VR technologies have gained considerable recognition and are perceived as catalysts for innovation and competitiveness. The country's desire for technological advancements, and the established culture of partnership and collaboration, has encouraged a promising ground base for the development and spread of RP and VR applications.

Swedish companies aim to streamline product development across different industries, and always try to reduce costs, and improve time-to-market, usually referring to six-sigma and lean principles, with such companies as Scania AB, and Volvo as the preeminent representatives. Additionally, technologies such as 3D printing, laser sintering, and so on, have been adopted for rapid prototyping, especially in research and university settings, but also in industry, enabling the quick iteration of product design variants, the validation of concepts, and prototyping.

VR technologies have also made significant strides in Sweden. From gaming and entertainment to healthcare and education, VR applications are transforming various sectors. Swedish startups and established companies are at the forefront of VR content creation, developing immersive experiences that captivate audiences worldwide. VR is being utilized for training simulations, architectural walkthroughs, virtual tourism, and therapeutic interventions, among other applications (Edita Bezegová, 2022).

The most advanced combination of such technologies brought to the development of specialized department for designing and prototyping specific products. For example, one of the hospitals in Lund, SE, has a dedicated department for surgeons to design and develop medical components in VR, and then produce prototypes with the 3D printing machines (Degerholm, 2022).

Swedish universities have recognized the importance of RP and VR technologies in shaping the future of industries. Many relevant departments within Swedish universities have incorporated courses that cover these topics in their curricula. These courses aim to equip students with the necessary skills and knowledge to effectively leverage RP and VR technologies in their future careers. Students have the



opportunity to learn about fundamental concepts, practical applications, and industry best practices related to RP and VR.

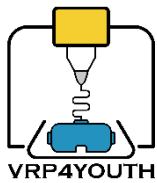


Fig. 4 In 3D-Centrum, in Lund, SE, surgeons can also prepare to operations using VR (Degerholm, 2022).

However, Swedish institutions still need to enhance awareness, accessibility, and provide more practical training opportunities related to RP and VR technologies in Swedish universities and with workshops alike. Overall, knowledge about VR integrated RP applications and their practical purposes is somewhat limited, and as much as the individual technologies are nowadays at least formally known by name by the common public, still deeper knowledge about them needs to be spread, for young people to be able to make informed decisions and undergo study paths that would allow them to become future experts in the field. To bridge this gap, universities should consider expanding their course offerings, promoting collaboration between academia and industry, and providing hands-on training opportunities for students.

2.3. Impact of VR and RP on Youth Employment

RP and VR technologies offer innovative capabilities and provide a platform for youth skill development, and they are herald of unique opportunities to excel in groundbreaking activities. The integration of such technologies in the preeminent industries (manufacturing, architecture, healthcare, automotive) and in education sparked the demand for professionals with relevant skills and expertise.



Swedish youth who possess a strong foundation in RP and VR technologies can leverage these skills to secure employment in dynamic and rapidly evolving sectors.

The youngsters in Sweden are currently demanding more and more that some mandatory courses on RP and VR technologies at a basic level should be provided at various high school levels. It is emphasized the importance of raising awareness and generating interest around these technologies from an early stage, to then leverage the attention created in research and in enhancing industrial skill. With some mandatory courses, students can gain exposure to RP and VR, understand their practical applications, and make informed decisions about their educational paths and career prospects.

Collaboration between universities and private companies is crucial to facilitating knowledge exchange and practical implementation of technologies. Industry support, access to equipment, and opportunities for research collaborations enhance the learning experience and practical exposure for students. Engaging with professionals through internships, projects, and mentorship programs can further equip young individuals with the necessary skills and networks to thrive in the job market.

It is important for unemployed youth to stay updated with the dynamic nature of technology. It is essential to focus on mastering the underlying concepts and principles of innovative equipment, rather than aiming at mastering every little detail of specific tools or technologies. Clearly this is meant for the early stages of education, when it is good to possess an overview of the field and of the technologies available. Adaptability, continuous learning, and keeping up with the evolving world of technology are critical for long-term success in the field.

Overall, RP and VR technologies have the potential to create new employment opportunities, especially for the youth in Sweden. By addressing the knowledge gaps, enhancing educational offerings, fostering collaboration between academia and industry, and promoting continuous learning, Sweden can empower its youth to become skilled professionals who drive innovation, contribute to economic growth, and shape the future of RP and VR industries.

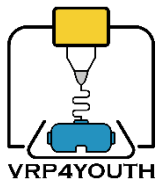
3. Results and Discussion of the Survey Implementation

The survey targeted three key groups: sector representatives, academicians, and unemployed youth. A total of 47 participants took part in the survey, with 14 unemployed youth, 24 academicians, and 9 sector representatives providing valuable insights.

Participant Demographics

Among the unemployed youth surveyed, 5 were females, 9 males. These young participants primarily held degrees in industrial production, industrial design, materials engineering, mechanical engineering. The surveyed academicians consisted of 18 males, 5 females. Their fields of expertise spanned from industrial design engineering to materials engineering. The sector representatives comprised 6 males and 3 females. They predominantly operated in the machinery industry and software industries.

Knowledge and Practical Experience



The survey revealed that 68 % of unemployed youth possessed knowledge about VR technology. Additionally, 58 % of them were aware of the practical benefits of VR technology, while 42 % were familiar with the practical benefits of RP. Notably, 88 % of the participants did not have a VR-oriented course in their university curriculum, and only 4 % had taken such a course. Moreover, 80 % of the unemployed youth had not attended any VR and/or RP-oriented courses or trainings.

Among the academicians, 36 % reported having practical experience with VR technologies, while 56 % had practical experience with RP. Approximately 52 % stated that their departments lacked equipment for VR technology, whereas 60 % indicated the presence of RP technology equipment such as 3D printers (Inkjet printing, FDM, SLA) and CNC machine tools. Around 20 % of the surveyed academicians identified VR-oriented cooperation opportunities with companies, while 48 % acknowledged RP-oriented cooperation opportunities. Notably, 44 % of the universities where the academicians worked did not have VR-integrated RP applications.

The survey found that 68 % of sector representatives possessed knowledge about VR technology, while a larger percentage (84 %) had knowledge about RP technologies. In terms of applications, 20 % of sector representatives stated that their companies had VR-focused applications, while 76 % reported having RP-focused applications. Moreover, 20 % received support from different companies for VR-oriented applications, while 36 % received support for RP-oriented applications.

University Curriculum and Equipment

Regarding VR in university curricula, 12 out of 24 academicians indicated the absence of a VR curriculum, while 10 were uncertain about its existence. Notably, 4 academicians confirmed the availability of equipment such as VR glasses and holographic displays for VR-related studies. In terms of RP, 10 academicians reported the presence of an RP curriculum, while 2 confirmed the absence, and 12 were unsure. Furthermore, 18 academicians stated that their universities were equipped to incorporate RP in their curricula, whereas 2 reported a lack of equipment.

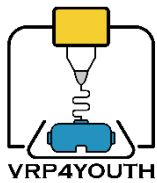
The survey provided valuable insights into the knowledge, practical experience, and integration of VR and RP technologies among unemployed youth, academicians, and sector representatives. It highlighted the prevalence of VR knowledge and the need for improved curricula and equipment in universities. The findings will serve as a foundation for further research and development efforts aimed at promoting the integration of VR and RP technologies in various sectors, fostering innovation and collaboration between academia and industry.

4. Results of the Focus Group Meeting

KTH Royal Institute of Technology (hereby KTH) held a focus group on 25.05.2023, involving various participant populations, including: three members of the unemployed youth, an academician, and one sector representative.

Through the focus groups, information was gathered about the current situation in Sweden and the improvement points to bridge the skills/competence gaps of young people.

One of the VRP4Youth project researcher mentored the focus group meeting. Participation in these activities was also focused on gender balance and gender inclusion. 5 participants, equal in number



for each project partner, took part in the focus groups: 2 women and 3 men joined the focus group meeting. Three are unemployed youngsters (between 18 and 30 years of age), one is a member of academia, and one is a sector representative.

The findings obtained from the answers given by the participants to the survey questions are listed:

Outcome 1: Unemployed youth participants have varying levels of exposure and experience with RP and VR technologies. Some have received technical training and utilized VR for assembly training, while others have engaged in RP-related projects during their studies, especially concerning industrial internships and thesis work. There is agreement among the youth that RP is important for engineers, and VR technologies have potential for simulating environments and providing training opportunities.

Outcome 2: The unemployed youth participants expressed their desire for more mandatory courses on RP and VR technologies at basic level, which would help raising awareness and creating interest around the topic. The interested students could then enroll in more advanced, and facultative courses. They also emphasized the need for accessible applications and equipment for RP in university settings, but appreciated that in their studies they were enrolled in institutes that mostly had equipment available.

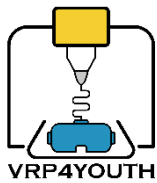
Outcome 3: The academician participant shared personal experience with VR and AR technologies during their PhD studies and mentioned that VR was used by them as a teaching tool for other concepts during a course aimed at master's level. While RP courses are offered in their department, and VR courses are offered in the university, but in other departments, there is an overall lack of knowledge about VR integrated RP applications and specific high-level courses on the topic.

Outcome 4: The industry representative explained the ongoing research project in their company related to RP technologies, although they currently lack the necessary equipment, being a startup. They highlighted the ongoing collaboration between industry and academia in the field of VR technologies for surgeons and expressed interest in fostering collaborations with other companies in the industry.

Outcome 5: Overall, there is a lack of knowledge among the participants regarding VR integrated RP applications and their practical purposes. While the industrial member have observed such applications in company fairs and recognized the potential benefits in design and prototyping, there is a need for further exploration and awareness in this area.

Outcome 6: The unemployed youth participants expressed the need for clearer information about the practical uses and benefits of RP and VR technologies when choosing their courses. They emphasized that understanding the practical applications of these technologies would help them make informed decisions about their educational paths and career prospects.

Outcome 7: The senior participants highlighted the importance of collaboration between universities and private companies to facilitate knowledge exchange and practical implementation of RP and VR technologies. They mentioned the value of industry support, access to equipment, and opportunities for research collaborations to enhance the learning experience and practical exposure for students.



Outcome 8: The industry representative emphasized the dynamic nature of technology and encouraged the participants to focus on mastering the underlying concepts and principles rather than becoming overly fixated on specific technologies. They emphasized the importance of adaptability, continuous learning, and staying updated with the evolving world of technology.

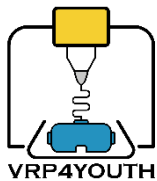
Overall, there was a shared sentiment among the participants that RP technologies have a significant role to play in the future job market, particularly in terms of designing new products, reducing production costs, and creating innovative solutions. They acknowledged the potential of VR technologies for simulating real-world environments and enhancing training processes in various fields. However, it is worth mentioning that VR also has other potentially significant applications, such as aiding in product design and layout planning. The participants, especially the unemployed youth, displayed a more extensive knowledge about RP topics compared to VR.

The unemployed youth participants expressed frustration regarding the accessibility of RP equipment in universities. They noted that certain machines and technologies deployed in university labs are often underutilized or have limited access, as they are restricted to specific projects that may run only once a year or less. This limitation greatly hinders their opportunities for hands-on experience and practical application. Implementing lower-level RP courses could enhance their access and provide more practical training opportunities.

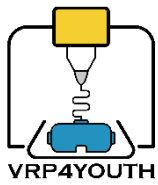
The participants recognized the importance of collaboration and knowledge sharing within their respective fields. The senior members of the group particularly encouraged the young participants to explore and connect with like-minded individuals to exchange ideas, share experiences, and foster innovation in the field of RP and VR technologies. They emphasized the significance of collaborative efforts and discouraged aiming to become major experts solely in the hope of achieving personal breakthroughs, but instead suggested to be eager to impact on the progress of the technological field.

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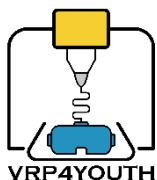
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Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)
2022-1-TR01-KA220-You-000089257
WP2 – Research Report on the Needs of Youth Regarding VR and RP



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WP2 ITALIAN RESEARCH REPORT

Research Report on the Needs of Youth Regarding VR and RP

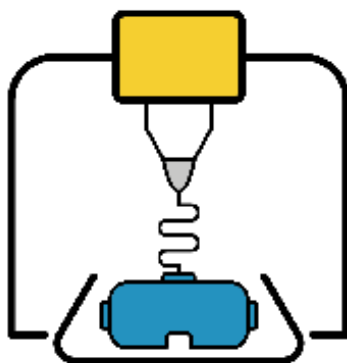
realised in the framework of the project

**"VRP4Youth: Innovative Integration between
Virtual Reality and Rapid Prototyping for Youth".**

Acronym 'VRP4Youth'

Project reference: 2022-1-TR01-KA220-YOU-000089257

Programme Erasmus+ - KA220-YOU - Cooperation partnerships in Youth



VRP4YOUTH

research done by

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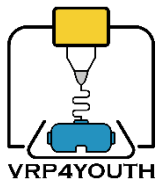
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1. Theoretical Background

There is increasing talk of virtual reality (VR) and augmented reality (AR).

Not infrequently, the two are confused or overlapped.

Basically, the principle on which they are based is the same: that of building a new, coherent and articulated sensory experience through the use of information technology.



The substantial difference is in the type of experience offered.

When we talk about virtual reality, we are in fact talking about a fully immersive reality, in which the user is totally involved.

It moves in an entirely virtual environment interacting with a visor, headset and gloves.

When we talk about augmented reality, however, the user always maintains a firm connection with the world around him.

In practice, augmented reality adds new elements, 3D images, graphics, videos and indicators of various kinds to our everyday experience of reality.

Augmented reality, therefore, does not replace reality with an alternative digital universe, but enriches our personal everyday experience.

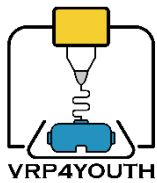
For example, even a satellite navigation system for driving a car is a form of augmented reality.

Virtual and augmented reality now extend to every field of human endeavour, even the most basic: suffice it to say that today the development of these technologies even touches areas of great strategic importance such as military training.

In fact, this type of technology makes it possible to simulate extreme and dangerous situations very well, making it possible to safely prepare for all kinds of eventualities.

Virtual and augmented reality and all the possibilities they offer in various fields, from marketing to specialised medicine, via education and online gaming, have been the focus of attention for some years now, so much so that we could openly say that we now speak of a true video game era.

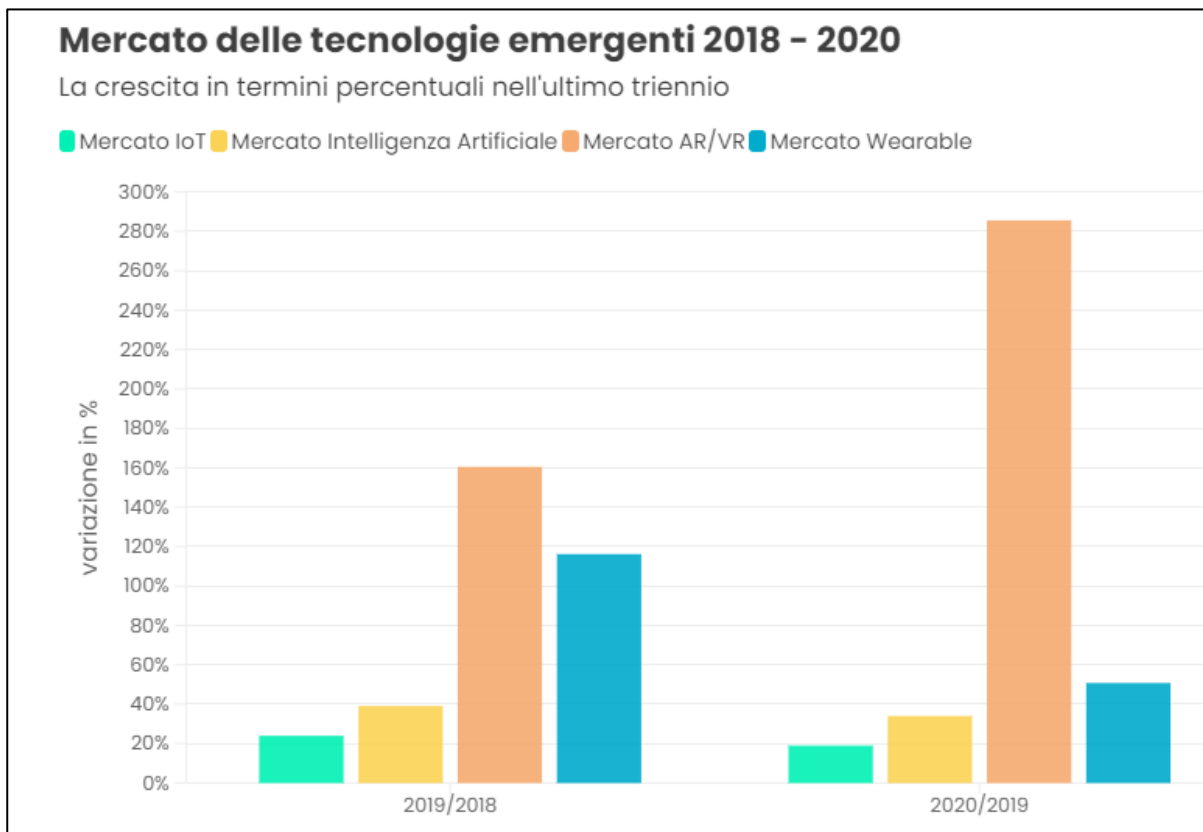
2. RP and VR influencing youth employment in Italy and related industries



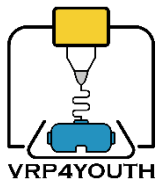
Tim Cook, Apple's CEO, recently called augmented reality a 'promise' that can really be a game-changer in the market.

In fact, many high-tech companies, even in Italy, are experimenting with new uses and opportunities, including training opportunities related to Virtual Reality (VR) and Augmented Reality (AR), trying to meet the ever-increasing demand of the Italian and global market (according to the latest report by Goldman Sachs Research, Virtual Reality (VR) and Augmented Reality will have a market weight of 80 billion by 2025 and, indeed, the consulting firm Pricewaterhouse Cooper, has predicted that the sector will bring 1.500 billion and 23.3 million new jobs to the world economy by 2030.

The graph below shows the percentage market growth that occurred in the three-year period 2018-2020:



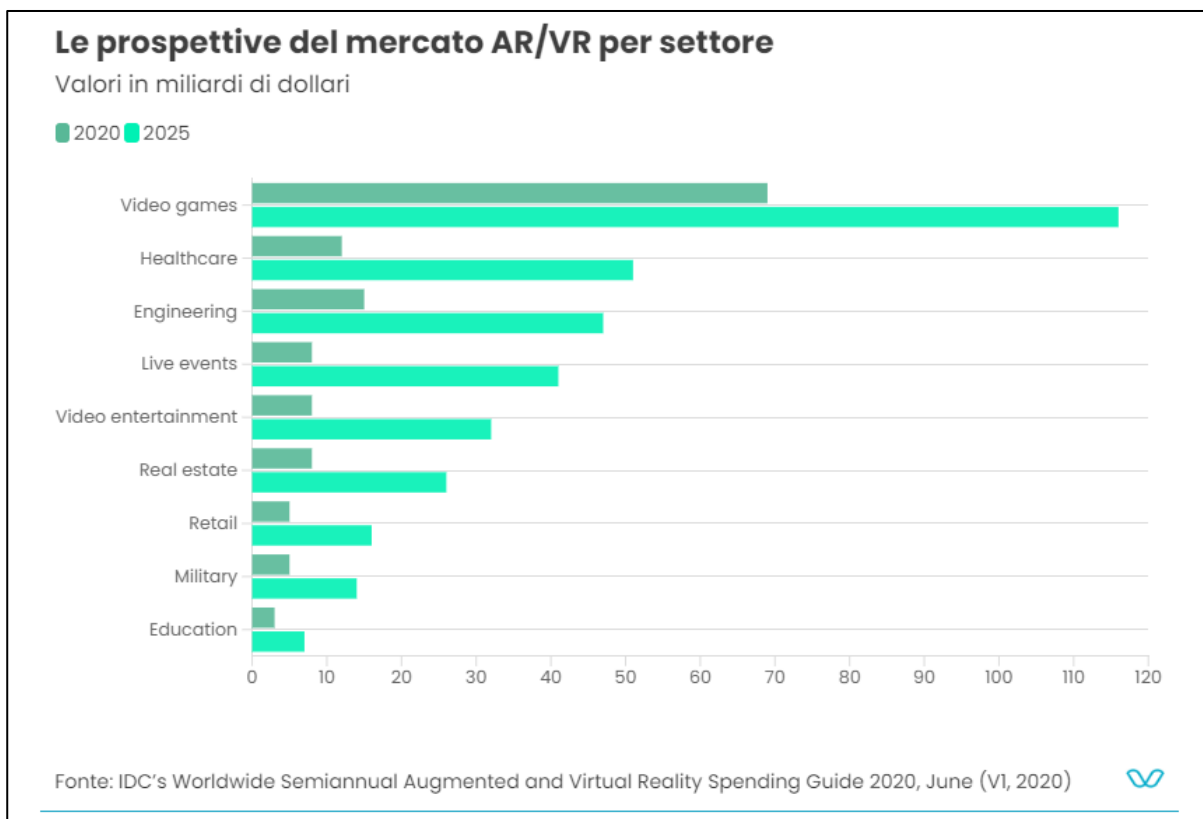
According to VRMedia (a spin-off company of the Scuola Superiore Sant'Anna, which designs and markets systems and solutions for virtual and augmented reality) there will be 2.4 billion users worldwide by 2023.



In 2020 compared to 2019, the market grew by 285 per cent for augmented reality and virtual reality, and by 2023, there will be approximately 2.4 billion mobile augmented reality users worldwide, an increase of 2.2 billion from the 200 million seen in 2015.

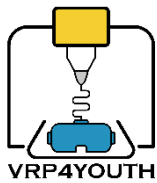
In Italy, the size of the augmented and virtual reality market amounted to EUR 16 million in 2019, a growth of 161% compared to 2018, reaching EUR 61 million last year, with development in all sectors.

The following graph shows the market outlook for the coming years up to 2025, with a considerable market surge in these areas:



This is why investments in 'augmented reality' for industrial applications are growing all over the world, and Italy is certainly not standing idly by, on the contrary, it is fully involved in this innovation process that is still underway and will accompany it for decades to come.

We are therefore talking about a phenomenon that is no longer a hi-tech niche, but a real and fast-growing trend, involving consumers and businesses at several levels.



In Europe and on an industrial level, it will be the manufacturing and healthcare sectors that will invest more in these technologies, responding on the one hand to the challenges imposed by Covid-19 and on the other hand following the lines of development and innovation dictated by the European Commission's Industry 4.0 and Industry 5.0 models.

Also interesting is the market forecast for smart factories, i.e. industrial solutions that exploit the Internet of Things (IoT) to connect machines and control production in real time.

According to the Industrial IoT report, this market is expected to grow almost threefold in the Europe-5 cluster, which includes the top five economies of the Union: for this reason, Italy has already invested as much as 580 million in 2020, a figure that is set to increase significantly by 2025.

In this regard, it is very interesting what is happening in the automotive sector, in historical companies such as Lamborghini, Ferrari, up to the new Stellantis plants.

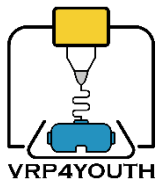
In such major companies, augmented reality has become central, representing the core technology for designing, setting up and analysing the design and functionality of next-generation vehicles.

And again: industries such as mechanical and mechatronics, textiles and rubber and plastics manufacturing are finding augmented reality the ideal solution to make production processes more agile and increase employee safety by supporting learning processes and replacing or supplementing user manuals and training sessions.

In addition, especially in the case of companies investing in participation in trade fairs and industry events, augmented reality is making it possible to virtually bring the entire catalogue of products or machinery to the attention of potential customers, allowing them to explore 3D models wherever they are and in total autonomy.

The uses of AR even extend to the construction sector, where the new technologies enable increased employee safety, support learning processes and support the design of buildings by architects, surveyors and engineers, with a significant reduction in costs and lower error rates on the final result. Despite the great market prospects, however, there is still a significant mismatch between the training needs of young people in the field of Augmented Reality and Virtual Reality, a gap that affects their employment in industries in Italy and other countries using these technologies.

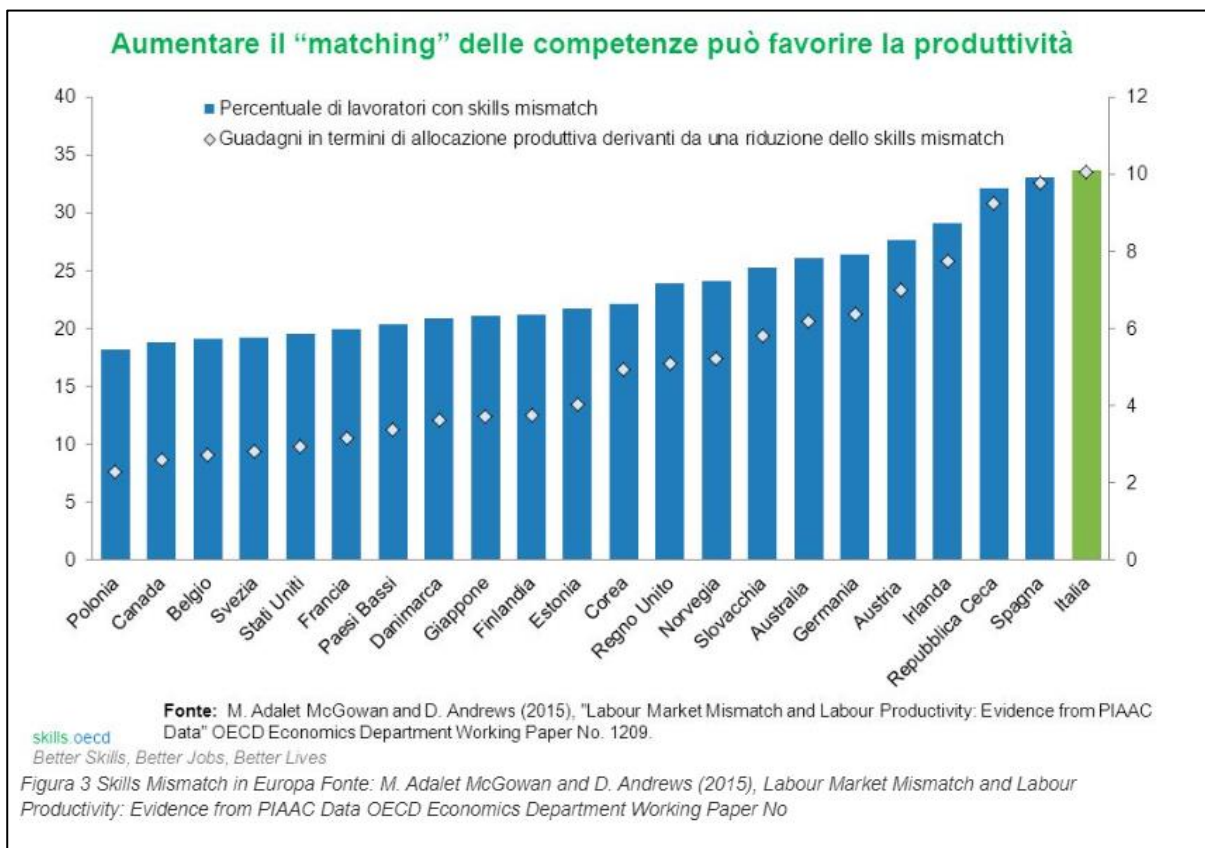
A first problem is determined by the low percentage of STEM graduates which, unfortunately, does not cover, if only to a small extent, the demand of Italian companies, as there is a tendency for students to choose to study what they are passionate about and not what offers more outlets on the labour



market: economics, engineering, statistics, medicine are fields in which there is a shortage of graduates.

On the other hand, humanities graduates abound, which, although useful soft skills, on their own are not very appealing to employers when choosing candidates if not accompanied by additional skills.

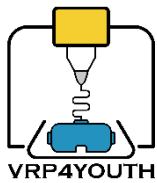
The graph below shows how the skills matching of young people in all European countries needs to be increased in order to boost productivity and employment:



But, of course, the issue also encompasses other fundamental issues such as the school drop-out rate and the shortage of skilled workers.

Investing in lifelong learning must be a direction that should be encouraged as soon as possible, so as not to prevent generations of workers in Italy from being lost along the way.

According to eminent labour market experts, the near future will see a substantial decrease in medium-skilled professions, while low-skilled and highly-skilled professions will increase exponentially.



This, on a social level, could create further and more serious inequalities, in a country like Italy, which is already suffering the effects of a long-standing economic and structural crisis.

For a country, like Italy, to be able to understand the direction of global dynamics in a world that is now globalised and to be able to orient social policies, it is necessary to be able to intercept the changes and offer an effective 'support network', such as the provision of policies to support lifelong learning, in order to create opportunities to obtain more remunerative jobs even for those who by class would be destined for less specialised jobs, despite their skills.

Furthermore, young people in Italy are few and poorly educated: the number of graduates aged between 25 and 34 is 20 per cent compared to the OECD countries' average of 35 per cent.

Longer schooling has increased the delayed entry of young people into the labour market and lowered the share of active young people in the 15-19 age group.

With university reforms (e.g. the so-called '3+2' system), the percentage of young people who decided to continue their studies after secondary school increased

The youth unemployment rate in Italy has reached the threshold of 30 per cent, while areas at risk of marginalisation for young people not in education/training or even in employment continue to increase.

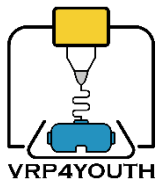
In Italy, the so-called NEET (Neither in Education nor in Employment or Training) young people aged between 20 and 24 are almost 25 per cent (around 2 million).

Unemployment is accompanied by obsolescence of skills and a decline in motivation: the difficulties of young people (and graduates) entering the world of work translate into an ever-decreasing appreciation of skills in their first job.

Young people should be offered more opportunities for first contacts with the world of work, promoting more study of new technologies and fostering new working relationships such as apprenticeships, traineeships and internships.

Universities must be incentivised to provide training courses that are consistent with the idea of lifelong learning and with the real demands of the world of work, and thus with an eye to new technologies and the need to open up PhDs to the production system and the labour market.

Young people must be placed in the educational and teaching conditions to become 'masters of their own future and not victims of the limitations and inertia of our educational institutions'.



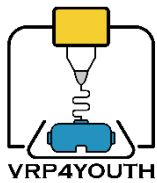
It also means enhancing responsibility, initiative and entrepreneurship among young people, by rewarding, also in the provision of funds for research and university spin-offs, those with really good ideas

The elements defined by the desk-research also find full confirmation in the evaluations obtained during the other phases of work-package 2: in fact, both the results of the survey developed online on a sample of 61 participants who answered in Italian and 15 who answered directly in English (thus in total 76 people participated in the survey in Italy), and the results of the focus group conducted face-to-face on 9 June 2023 reveal basically the same results and the same gaps still existing in this area.



This reinforces the importance of the VRP4Youth project that through the development of appropriate products can certainly contribute to increasing youth employment in Europe in the long term by fostering understanding of the needs of unemployed youth and related industries in the context of virtual reality (VR) and rapid

prototyping (RP), developing knowledge of innovative applications to young people on an international scale to increase their employability and promoting the integration of Industry 4.0 results into the skills and competences of young people.



3. Results and discussion of survey implementation

As mentioned in the previous paragraph, the survey in Italy involved 76 people of whom

- 61 responded to the survey developed in Italian;
- 15 responded to the survey developed in English.

The survey was developed using the platform provided by the Portuguese partner.

3.1. Results of the Online Survey in Italian

Below are the results of the survey compiled in Italian

Who participated in the survey

Sixty-one people participated in the survey, including nine unemployed young people, 37 academics and 15 representatives of companies in the sector.

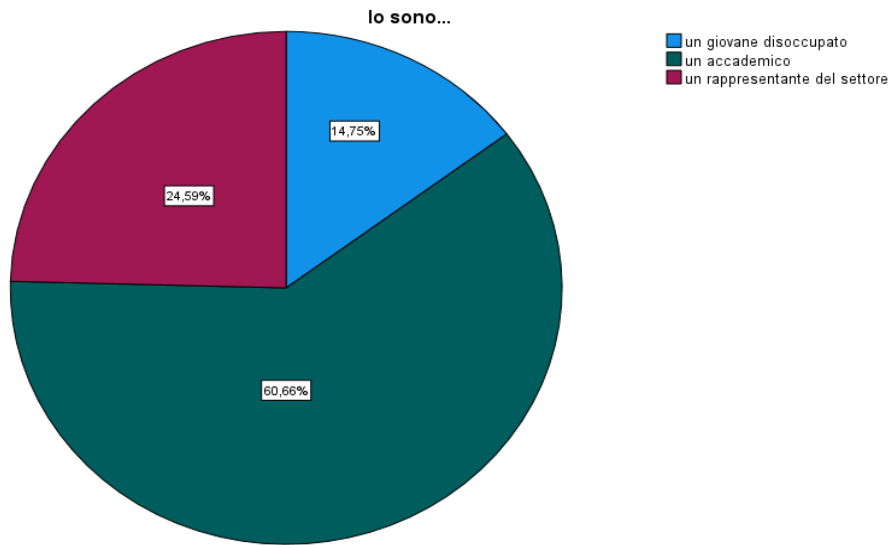
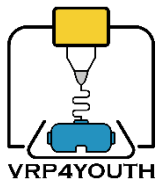
Statistics

I am...

N	Valid	61
	Missing	0

I am...

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	a young unemployed person	9	14,8	14,8	14,8
	an academic	37	60,7	60,7	75,4
	an industry representative	15	24,6	24,6	100,0
	Total	61	100,0	100,0	



I confirm that I am between 18 and 30 years of age.

Of the 61 participants, only 9 confirmed that they were young (they obviously correspond to the unemployed)

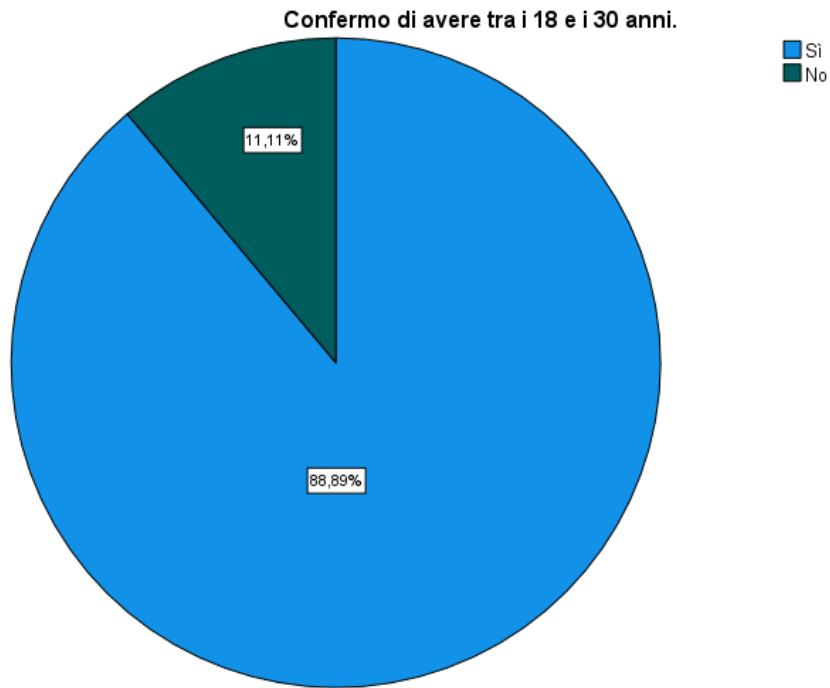
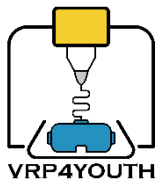
Statistics

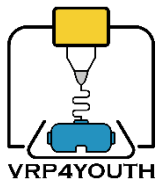
I confirm that I am between 18 and 30 years old.

N	Valid	Missing
	9	52

I confirm that I am between 18 and 30 years of age.

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	8	13,1	88,9	88,9
	No	1	1,6	11,1	100,0
	Total	9	14,8	100,0	
Missing	System	52	85,2		
Total		61	100,0		





02. Which department did you graduate from?

Below are the results of the type of school attended by all 61 participants.

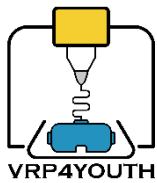
Statistics

02. Which department did you graduate from?

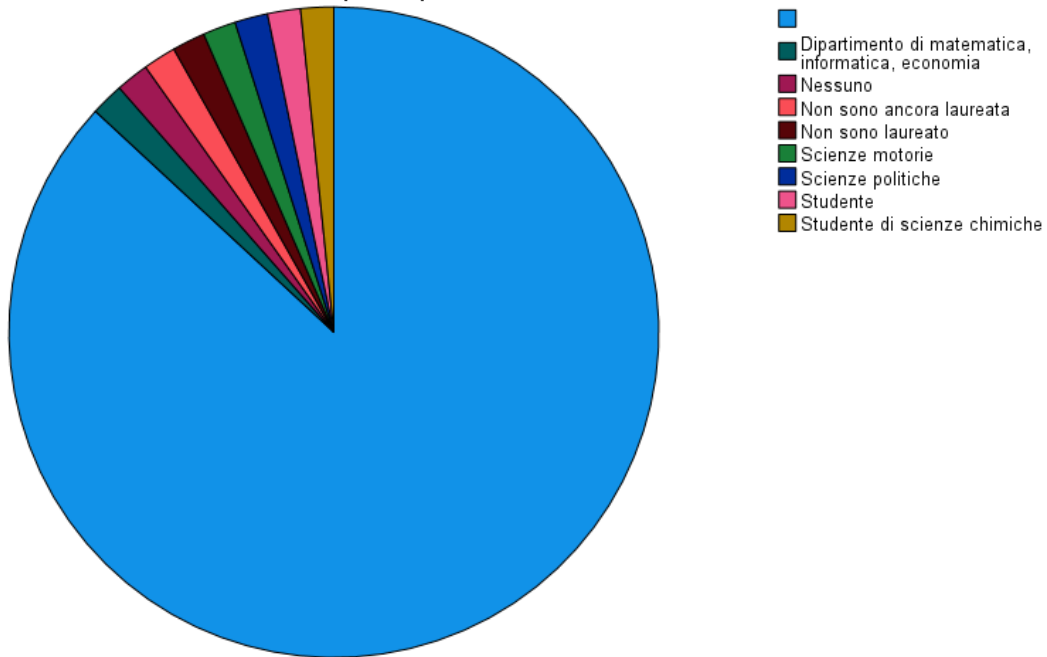
N	Valid	61
	Missing	0

02. Which department did you graduate from?

	Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	53	86,9	86,9	86,9
Department of Mathematics, Informatics, Economics	1	1,6	1,6	88,5
None	1	1,6	1,6	90,2
I have not yet graduated	1	1,6	1,6	91,8
I am not a graduate	1	1,6	1,6	93,4
Motor sciences	1	1,6	1,6	95,1
Political Science	1	1,6	1,6	96,7
Student	1	1,6	1,6	98,4
Chemical science student	1	1,6	1,6	100,0
Total	61	100,0	100,0	



02. In quale dipartimento si è laureato?



Results of the answers given by the 9 Young People

01. What is your gender?

Of the 61 participants, 8 were young people aged between 18 and 30 and 1 had a different age. Of the 9 young participants in the survey:

- 6 indicated they were female
- 2 indicated they were male
- 1 preferred not to indicate this figure.

Statistics

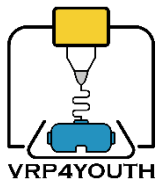
01. What is your gender?

N	Valid	8
	Missing	53

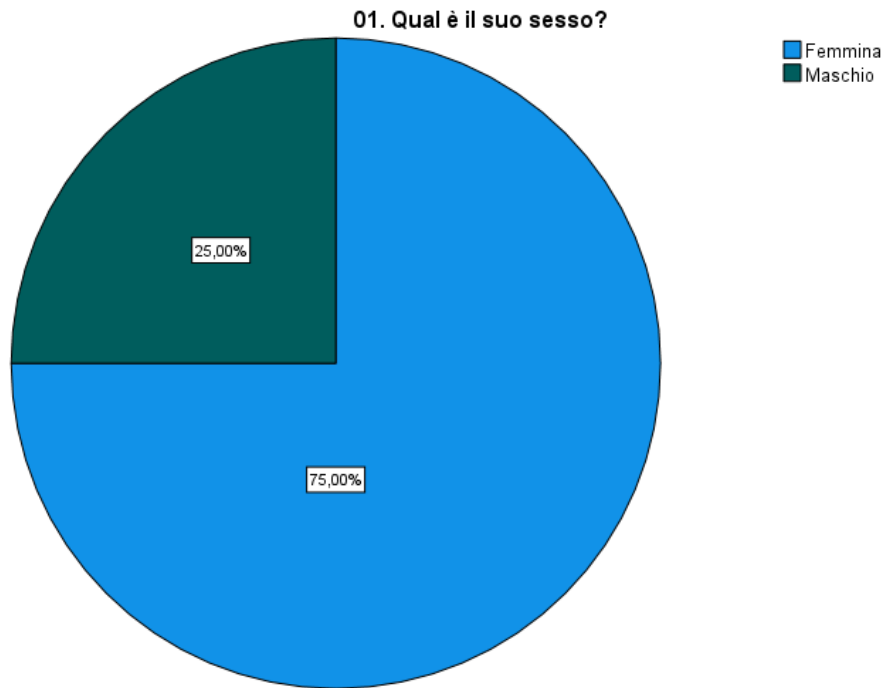
01. What is your gender?

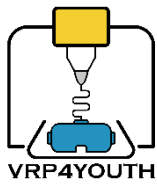
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Female	6	9,8	75,0	75,0
	Male	2	3,3	25,0	100,0





Total	8	13,1	100,0
Missing System	53	86,9	
Total	61	100,0	





03. Have you ever heard of Virtual Reality (VR)?

Of the 9 young participants:

- 8 indicated that they had heard of augmented reality,
- 1 did not reply.

Statistics

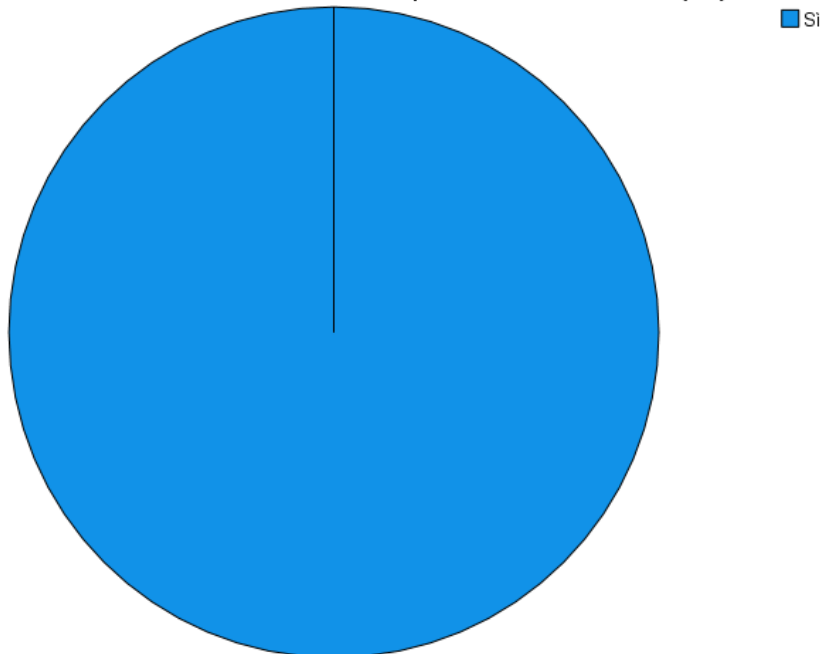
03. Have you ever heard of Virtual Reality (VR)?

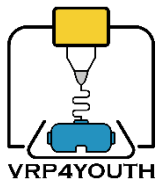
N	Valid	8
	Missing	53

03. Have you ever heard of Virtual Reality (VR)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	8	13,1	100,0	100,0
Missing	2	53	86,9		
Total		61	100,0		

03. Ha mai sentito parlare di Realtà Virtuale (VR)?





04. Do you know any practical purposes of VR?

Of the 9 young participants:

- 8 indicated that they knew of good applications for VR,
- 1 did not reply.

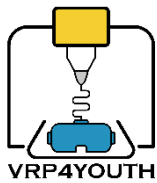
Statistics

04. Do you know any practical purposes of VR?

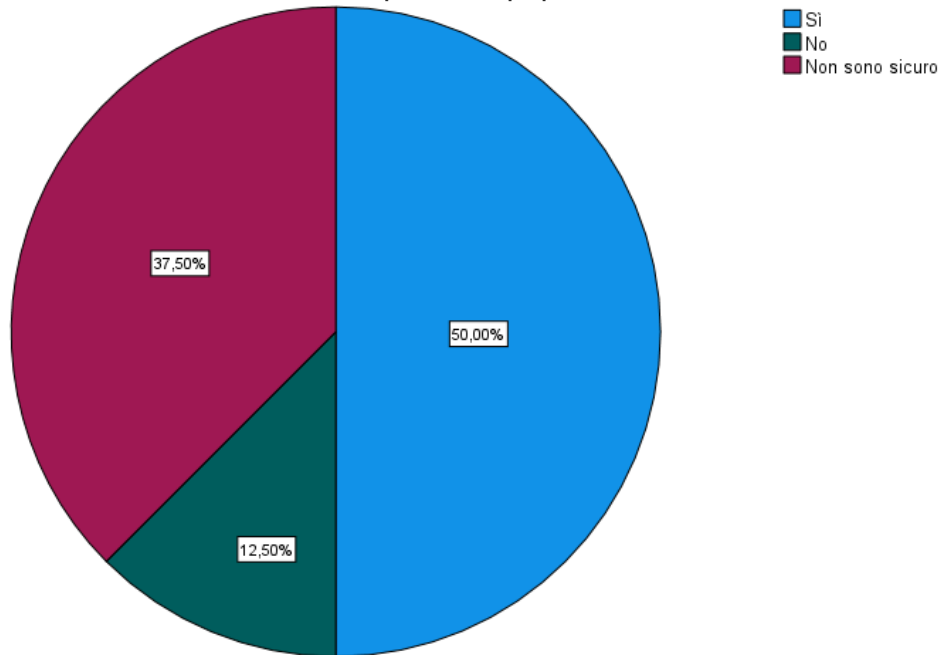
N	Valid	8
	Missing	53

04. Do you know any practical purposes of VR?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	4	6,6	50,0	50,0
	No	1	1,6	12,5	62,5
	Not sure	3	4,9	37,5	100,0
	Total	8	13,1	100,0	
Missing	4	53	86,9		
Total		61	100,0		



04. Conosce qualche scopo pratico della VR?



05. Are there any VR-focused courses in curricula at your University?

Of the 9 young participants:

- 8 indicated that there was a VR course at their university,
- 1 did not reply.

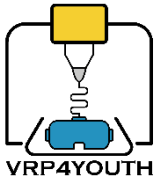
Statistics

05. Are there any VR-focused courses in curricula at your University?

N	Valid	8
	Missing	53

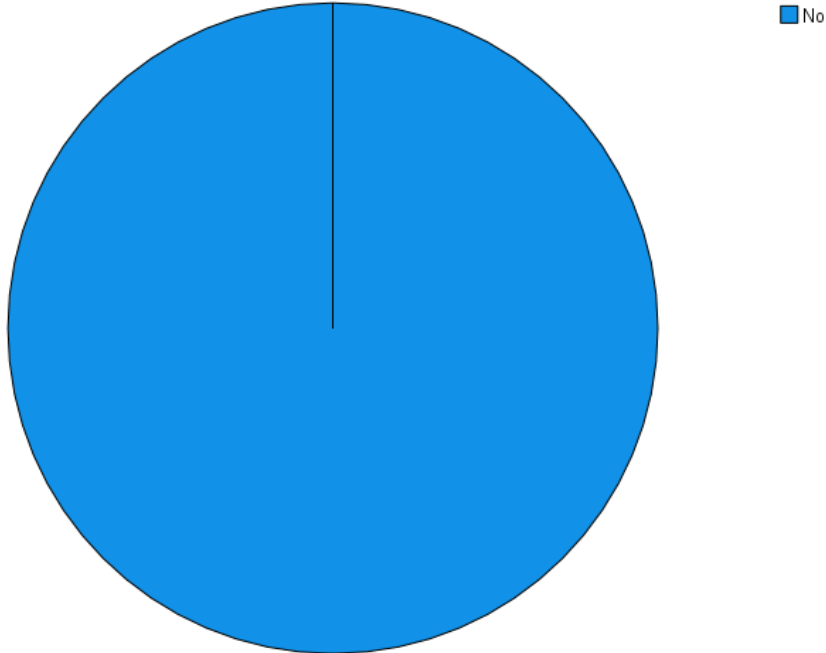
05. Are there any VR-focused courses in curricula at your University?

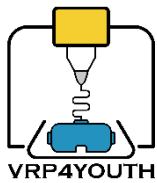
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	8	13,1	100,0	100,0
Missing	2	53	86,9		



Total	61	100,0		
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05. C'era un corso di VR nel curriculum della sua università?





06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

Out of 9 young participants:

- 8 indicated that they had participated in VR training courses outside the university,
- 1 did not reply.

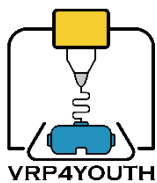
Statistics

06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

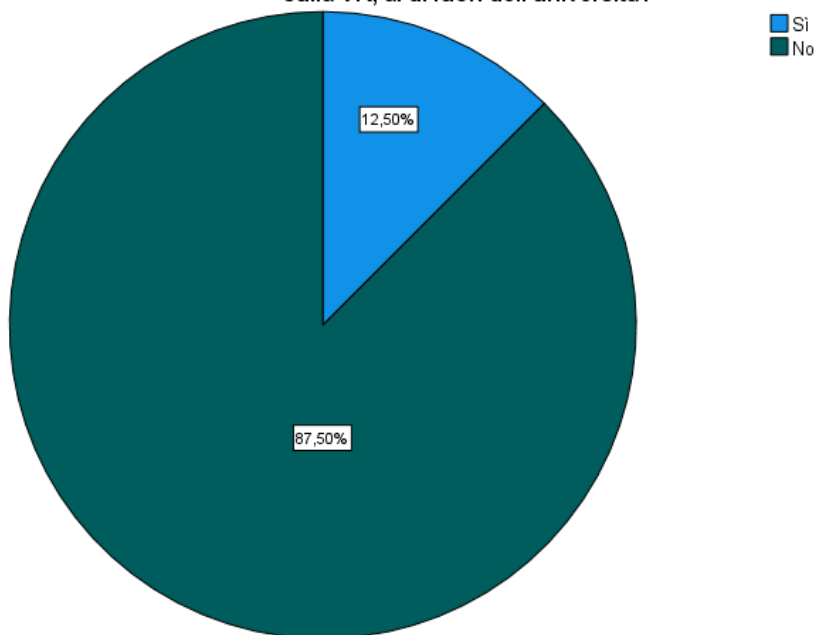
N	Valid	8
	Missing	53

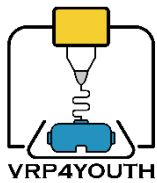
06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	1,6	12,5	12,5
	No	7	11,5	87,5	100,0
	Total	8	13,1	100,0	
Missing	3	53	86,9		
Total		61	100,0		



06. Ha mai partecipato a workshop, corsi di formazione, stage, formazione sul posto di lavoro, ecc. incentrati sulla VR, al di fuori dell'università?





07. Do you know any practical purpose of VR Integrated RP applications?

Of the 9 young participants:

- 8 indicated that they knew of no integrated practical applications,

- 1 did not reply.

Statistics

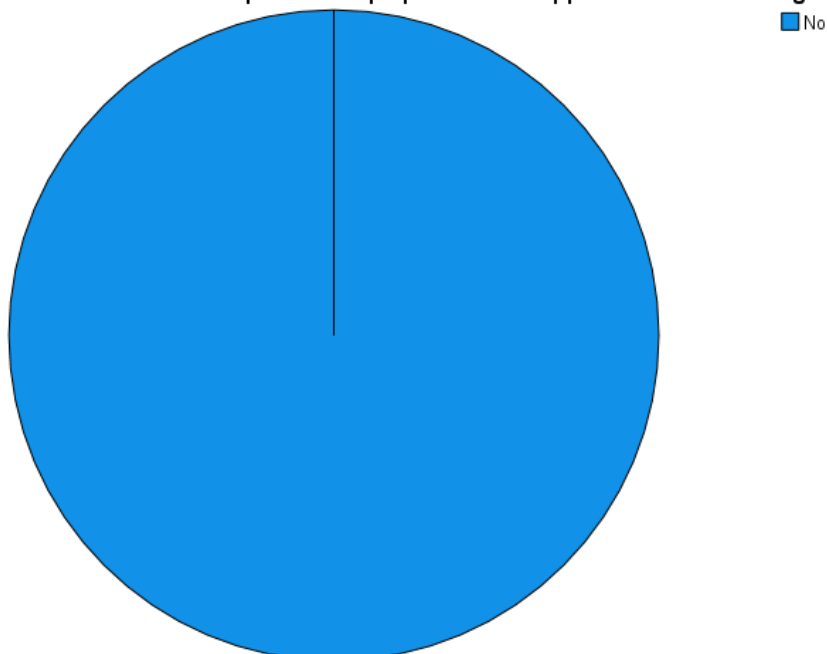
07. Do you know any practical purposes of the integrated VR RP applications?

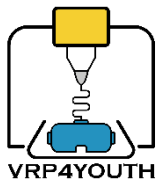
N	Valid	8
	Missing	53

07. Do you know any practical purpose of VR Integrated RP applications?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	8	13,1	100,0	100,0
Missing	2	53	86,9		
Total		61	100,0		

07. Conosce qualche scopo pratico delle applicazioni VR RP integrate?





08. Have you ever heard about Rapid Prototyping (RP)?

Of the 9 young participants:

- 8 indicated that they had already heard of RP rapid prototyping,
- 1 did not reply.

Statistics

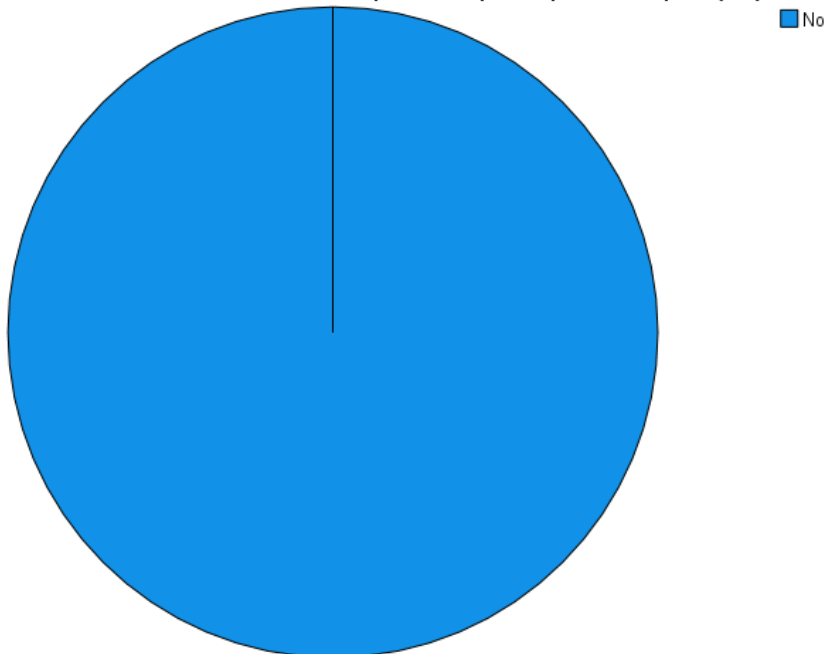
08. Have you ever heard of rapid prototyping (RP)?

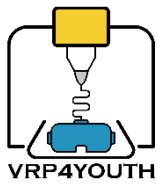
N	Valid	8
	Missing	53

08. Have you ever heard about Rapid Prototyping (RP)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	8	13,1	100,0	100,0
Missing	2	53	86,9		
Total		61	100,0		

08. Ha mai sentito parlare di prototipazione rapida (RP)?





09. Do you know any practical purpose of PR?

Of the 9 young participants:

- 8 indicated that they were familiar with practical applications of PR,
- 1 did not reply.

Statistics

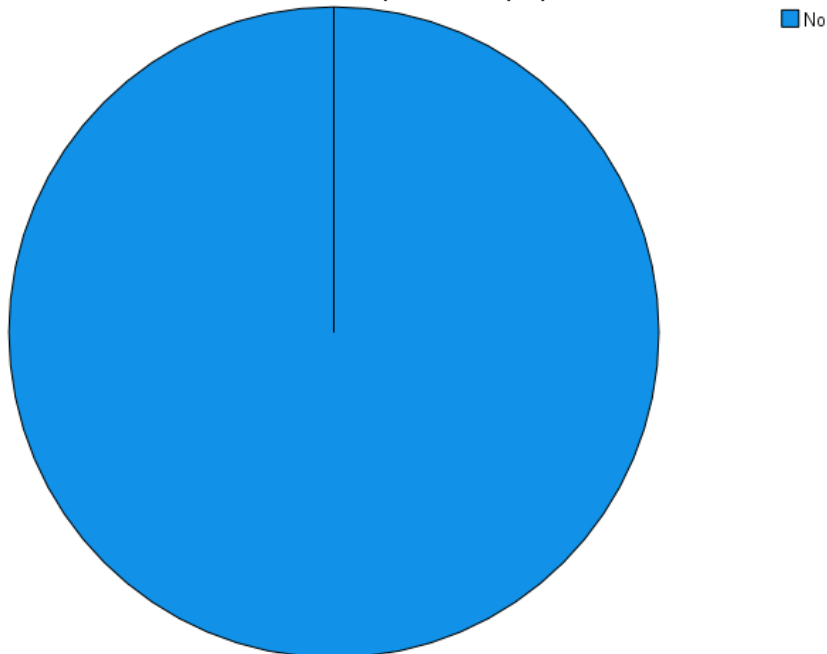
09. Do you know any practical purposes of RP?

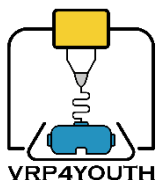
N	Valid	8
	Missing	53

09. Do you know any practical purpose of RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	8	13,1	100,0	100,0
Missing	2	53	86,9		
Total		61	100,0		

09. Conosce qualche scopo pratico della RP?





10. Are there any RP-focused courses in curricula at your University?

Of 9 young participants,

- 7 indicated that there was no course on PR at their university
- 1 was said to be there.
- 1 did not reply.

Statistics

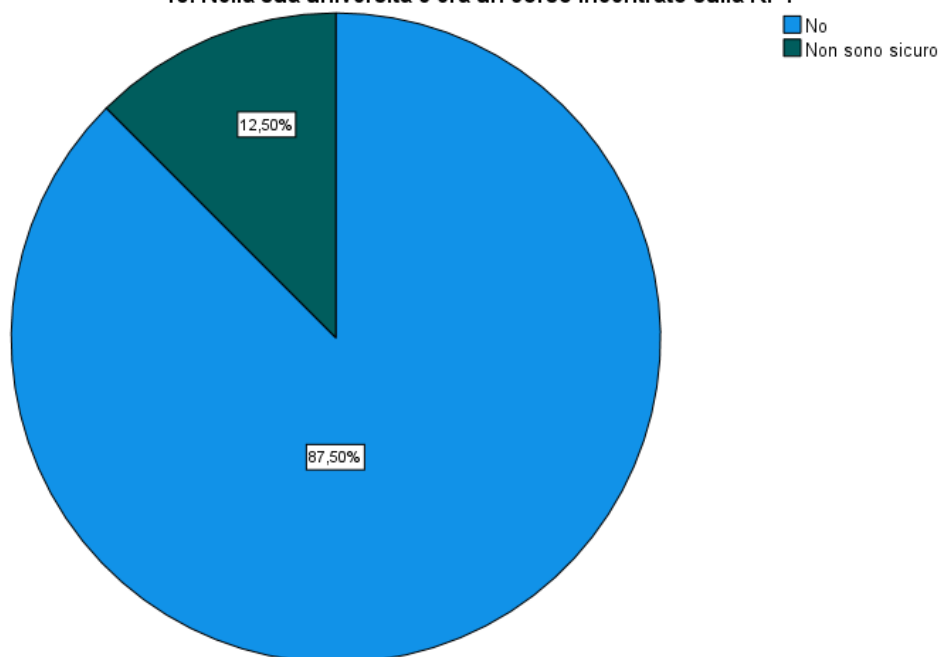
10. Are there any RP-focused courses in curricula at your University?

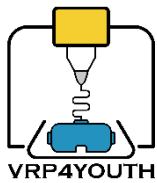
N	Valid	8
	Missing	53

10. Are there any RP-focused courses in curricula at your University?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	7	11,5	87,5	87,5
	Not sure	1	1,6	12,5	100,0
	Total	8	13,1	100,0	
Missing	3	53	86,9		
Total		61	100,0		

10. Nella sua università c'era un corso incentrato sulla RP?





11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

Out of 9 young participants:

- 8 indicated that they had not participated in PR courses outside the university,
- 1 did not reply.

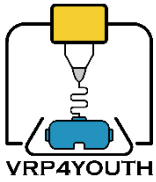
Statistics

11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

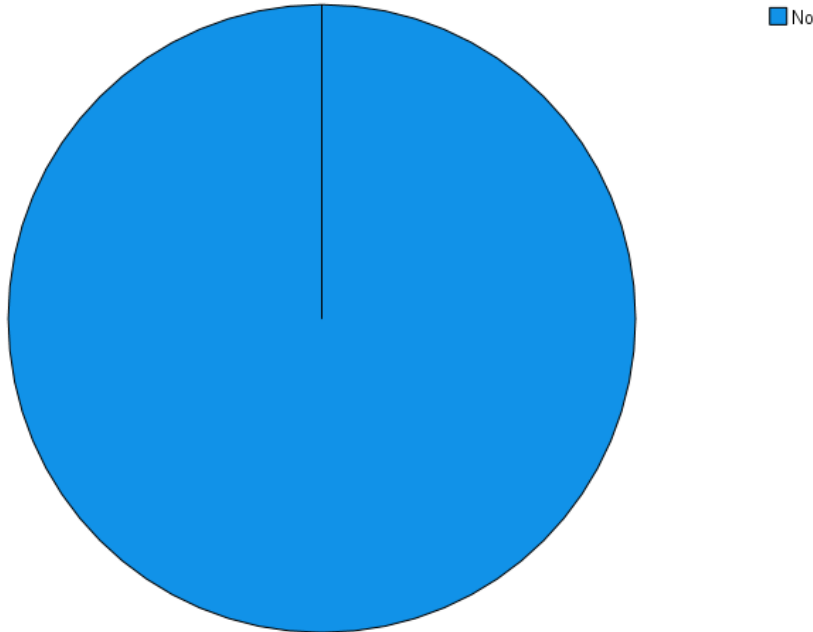
N	Valid	8
	Missing	53

11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	8	13,1	100,0	100,0
Missing	2	53	86,9		
Total		61	100,0		



11. Ha mai partecipato a workshop, corsi di formazione, stage, formazione sul posto di lavoro, ecc. incentrati sulla RP, al di fuori dell'università?



11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

Of the 9 young participants, none answered

Statistics

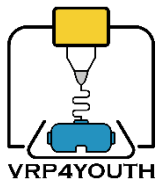
11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

N	Valid	61
	Missing	0

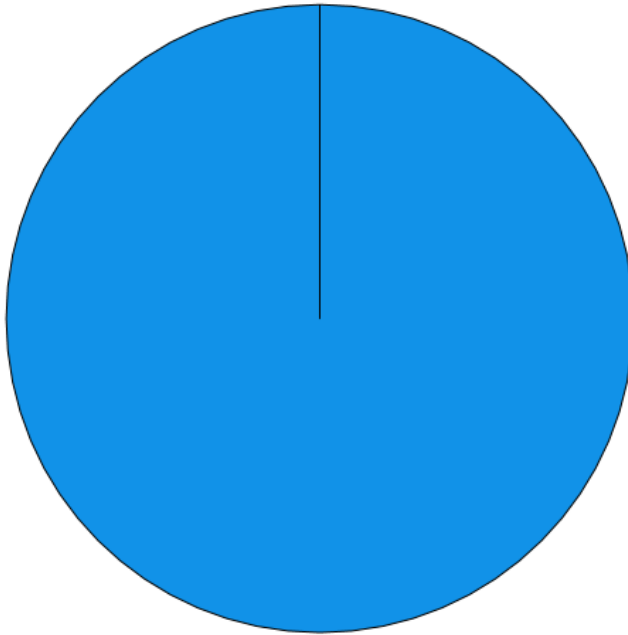
11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

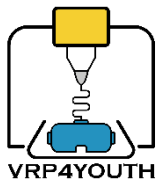
	Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	61	100,0	100,0	100,0





11. a) Quali tecnologie RP (ad es. lavorazione CNC, stampaggio a iniezione, stampa 3D, stereolitografia ecc.) ha frequentato?





11. b) Did the RP-focused training contain theoretical knowledge and practical applications?
Of the 9 young participants, none answered

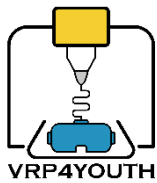
Statistics

11. b) Did the RP-focused training contain theoretical knowledge and practical applications?

N	Valid	0
	Missing	61

11. b) Did the RP-focused training contain theoretical knowledge and practical applications?

		Frequency	Percent
Missing	1	61	100,0



Results of the responses provided by the 37 academics

01. What is your gender?

- Of the 37 academics:
 - 23 claimed to be female
 - 9 being male
 - 5 did not reply

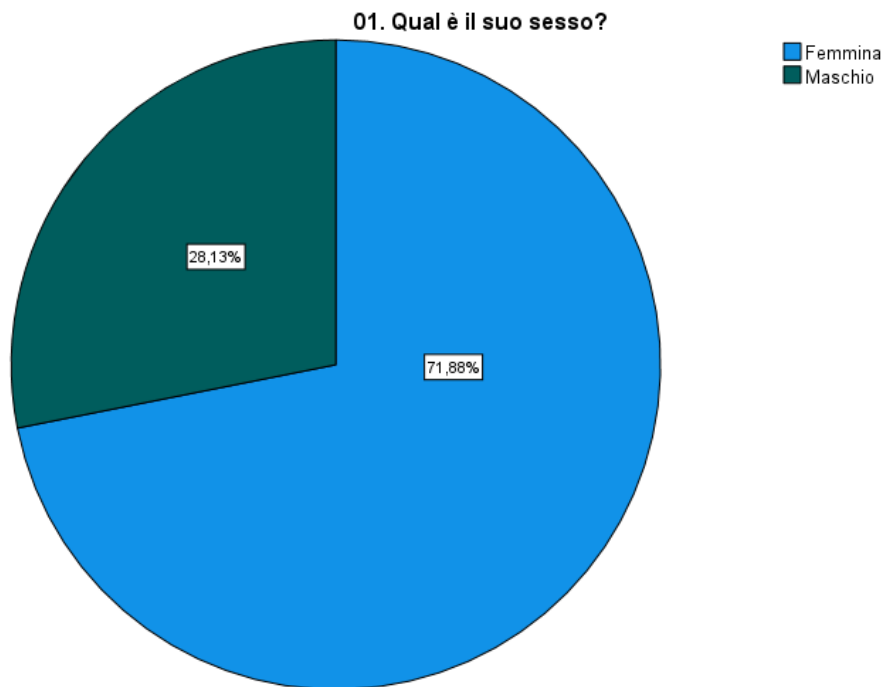
Statistics

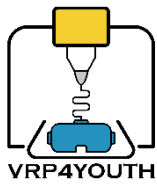
01. What is your gender?

N	Valid	32
	Missing	29

01. What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Female	23	37,7	71,9	71,9
	Male	9	14,8	28,1	100,0
	Total	32	52,5	100,0	
Missing	System	29	47,5		
Total		61	100,0		





02. In which department are you an academic?

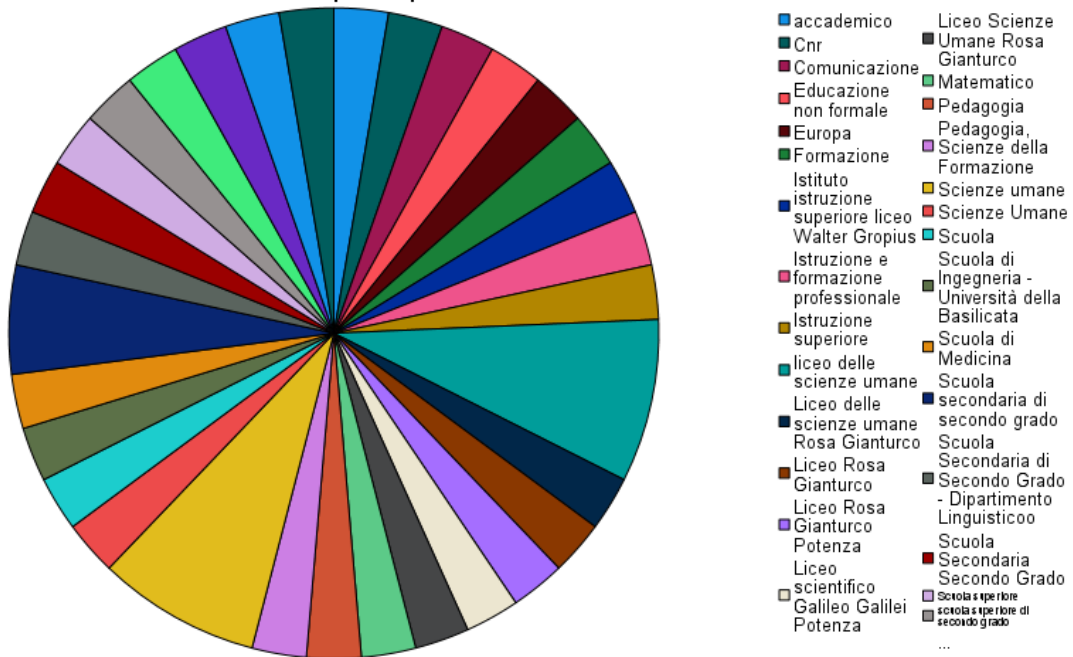
Below are the answers of the 37 academics regarding their department.

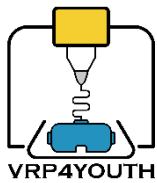
Statistics

02. In which department are you an academic?

N	Valid	37
	Missing	24

02. In quale dipartimento è accademico?





03. Do you have any practical experience with Virtual Reality (VR) technologies?

Of 37 academics:

- 23 stated that they had some practical experience with VR technologies
- 9 stated that they had no such experience
- 7 stated that they were not sure if they had any

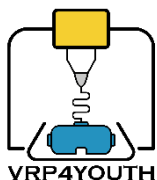
Statistics

03. Do you have any practical experience with Virtual Reality (VR) technologies?

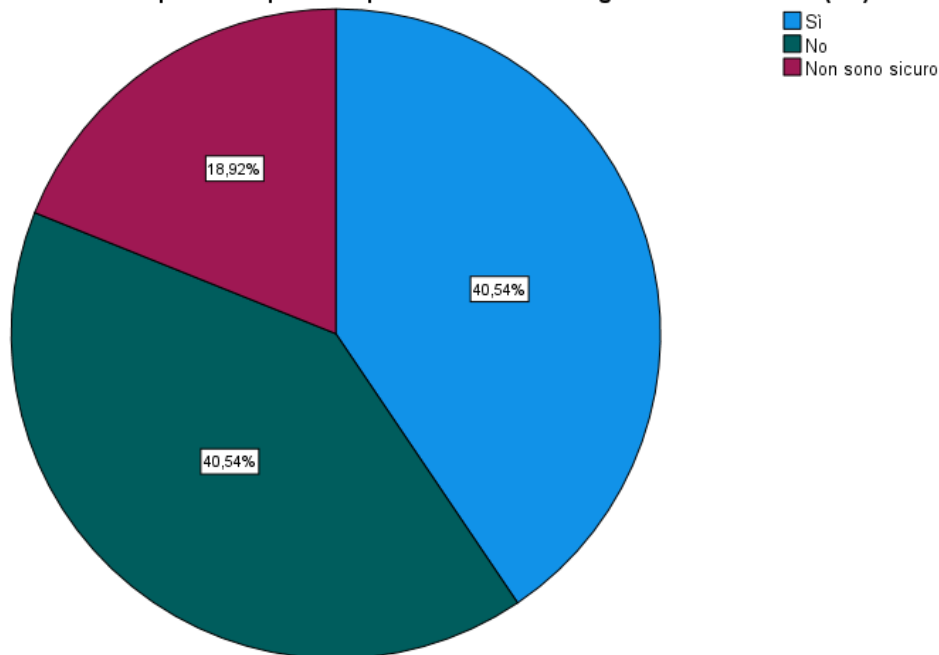
N	Valid	37
	Missing	24

03. Do you have any practical experience with Virtual Reality (VR) technologies?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	15	24,6	40,5	40,5
	No	15	24,6	40,5	81,1
	Not sure	7	11,5	18,9	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		
Total		61	100,0		



03. Ha qualche esperienza pratica con le tecnologie di Realtà Virtuale (VR)?



04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?

Of the 37 academics:

- 23 stated that their university is equipped with such equipment
- 21 stated that their university is not provided with such equipment
- 10 stated that they are not sure whether their university is provided with it

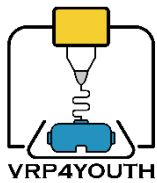
Statistics

04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?

N	Valid	37
	Missing	24

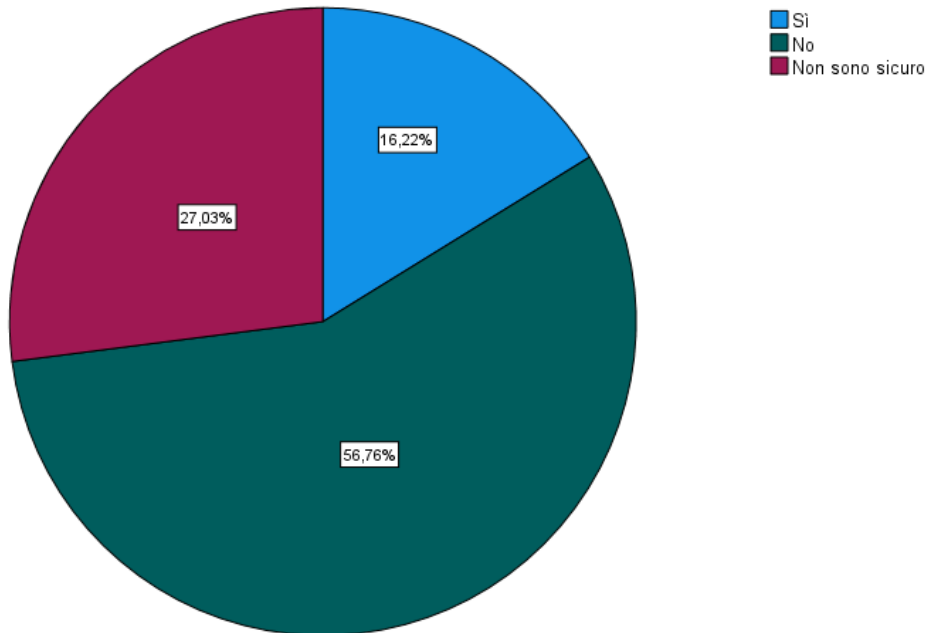
04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	6	9,8	16,2	16,2
	No	21	34,4	56,8	73,0
	Not sure	10	16,4	27,0	100,0



Total	37	60,7	100,0
Missing	4	24	39,3
Total	61	100,0	

04. La sua università è attrezzata (ad es. occhiali VR, console, ecc.) per incorporare la VR nel suo programma di studi?



04. a) What equipment is available?

Of the 37 academics:

- 6 indicated equipment

- 31 did not indicate anything

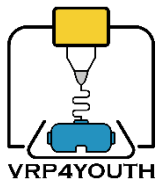
Statistics

04. a) What equipment is available?

N	Valid	6
	Missing	55

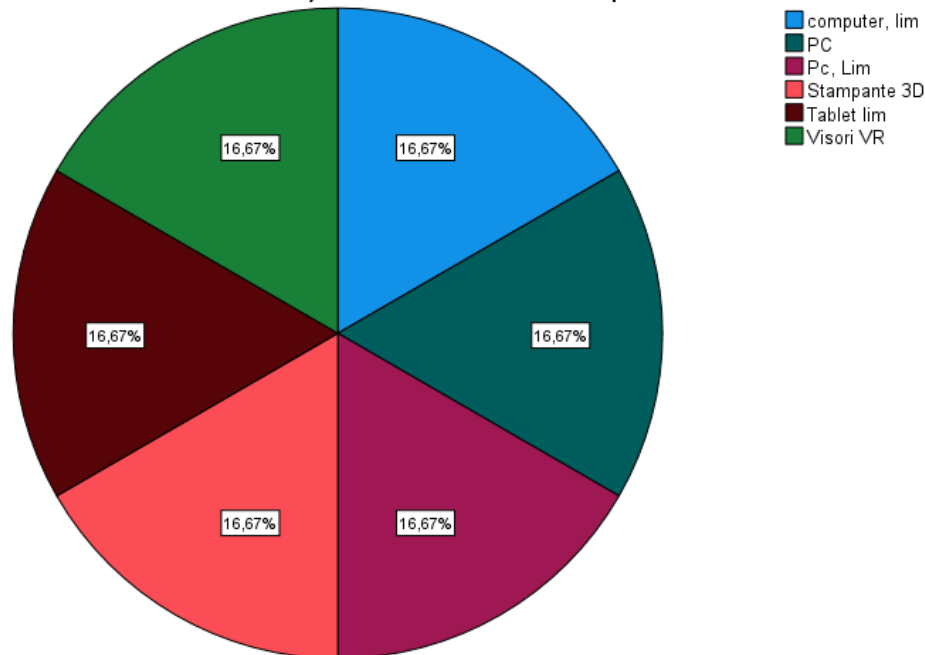
04. a) What equipment is available?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	computer, lim	1	1,6	16,7	16,7
	PC	1	1,6	16,7	33,3
	Pc, Lim	1	1,6	16,7	50,0



	3D printer	1	1,6	16,7	66,7
	Tablet lim	1	1,6	16,7	83,3
	VR viewers	1	1,6	16,7	100,0
	Total	6	9,8	100,0	
Missing	7	55	90,2		
Total		61	100,0		

04. a) Quali attrezzature sono disponibili?



05. Is there a possibility for cooperation between courses and private companies using VR?

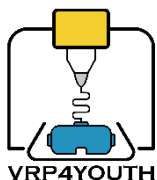
Of the 37 academics:

- 11 stated that there is a possibility to cooperate with private companies on VR
- 11 stated that there is no possibility to cooperate with private companies on VR
- 15 stated that they are not sure whether there is a possibility to cooperate with private companies on VR

Statistics

05. Is there a possibility for cooperation between courses and private companies using VR?

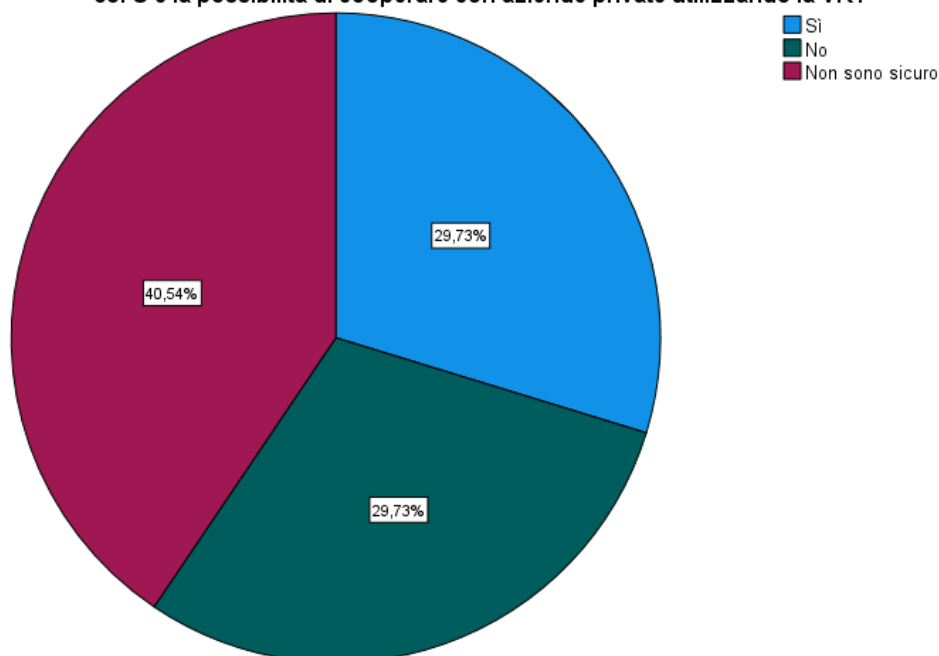
N	Valid	37
	Missing	24



05. Is there a possibility for cooperation between courses and private companies using VR?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	11	18,0	29,7	29,7
	No	11	18,0	29,7	59,5
	Not sure	15	24,6	40,5	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		
Total		61	100,0		

05. C'è la possibilità di cooperare con aziende private utilizzando la VR?



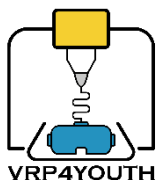
06. Do you have a VR curriculum established at your university at the moment Of 37 academics:

- 1 stated that a VR curriculum has been established at their university
- 29 stated that no VR curriculum was established at their university
- 7 stated that they were not sure whether a VR curriculum existed at their university

Statistics

06. Do you have a VR curriculum established at your university at the moment?

N	Valid	Total
		37

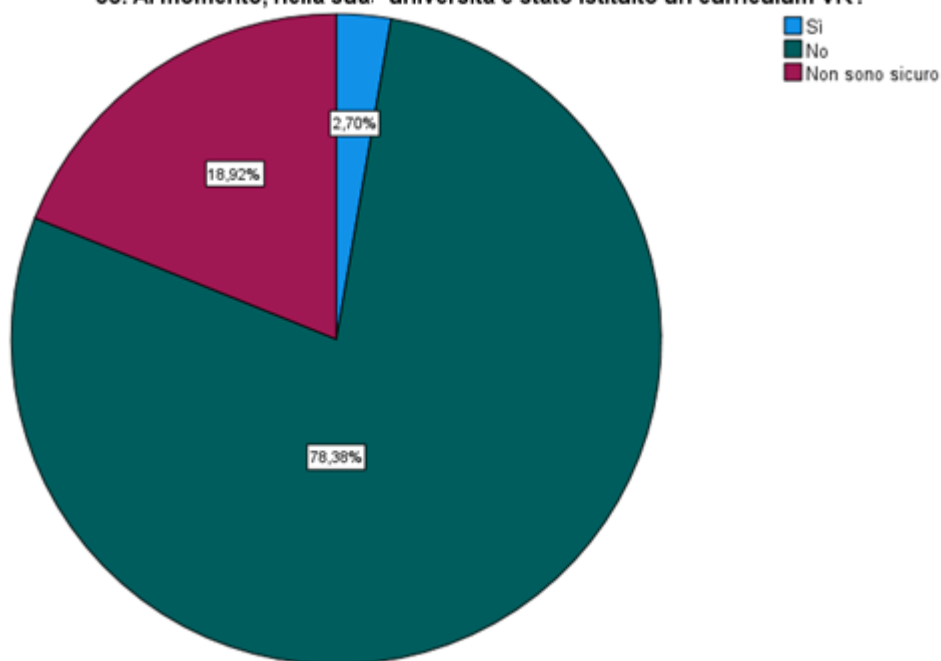


Missing 24

06. Do you have a VR curriculum established at your university at the moment?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	1,6	2,7	2,7
	No	29	47,5	78,4	81,1
	Not sure	7	11,5	18,9	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		
Total		61	100,0		

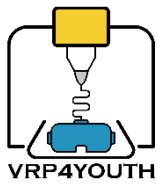
06. Al momento, nella sua università è stato istituito un curriculum VR?



07. Are there VR Integrated RP applications in your university?

Of the 37 academics:

- 3 stated that there are VR-integrated RP applications at their university
- 19 stated that there are no VR-integrated RP applications at their university
- 15 stated that they are not sure whether there are VR-integrated RP applications at their university



Statistics

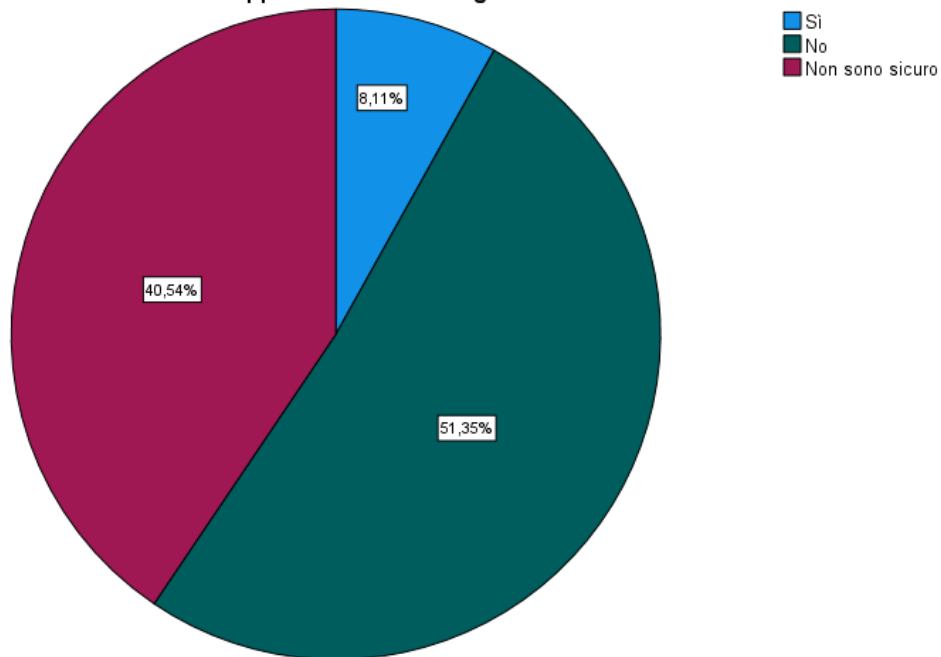
07. Are there VR Integrated RP applications in your university?

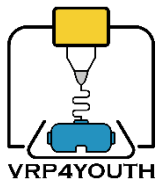
N	Valid	37
	Missing	24

07. Are there VR Integrated RP applications in your university?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	3	4,9	8,1	8,1
	No	19	31,1	51,4	59,5
	Not sure	15	24,6	40,5	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		
Total		61	100,0		

07. Esistono applicazioni di RP integrate con la VR nella sua università?





08. Do you have practical experience with rapid prototyping (RP) technologies?

Of 37 academics:

- 2 stated that they had practical experience with rapid prototyping (RP) technologies
- 33 stated that they had no practical experience with rapid prototyping (RP) technologies
- 2 stated that they were not sure if they had practical experience with rapid prototyping (RP) technologies

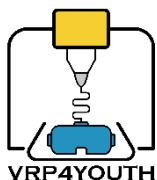
Statistics

08. Do you have practical experience with rapid prototyping (RP) technologies?

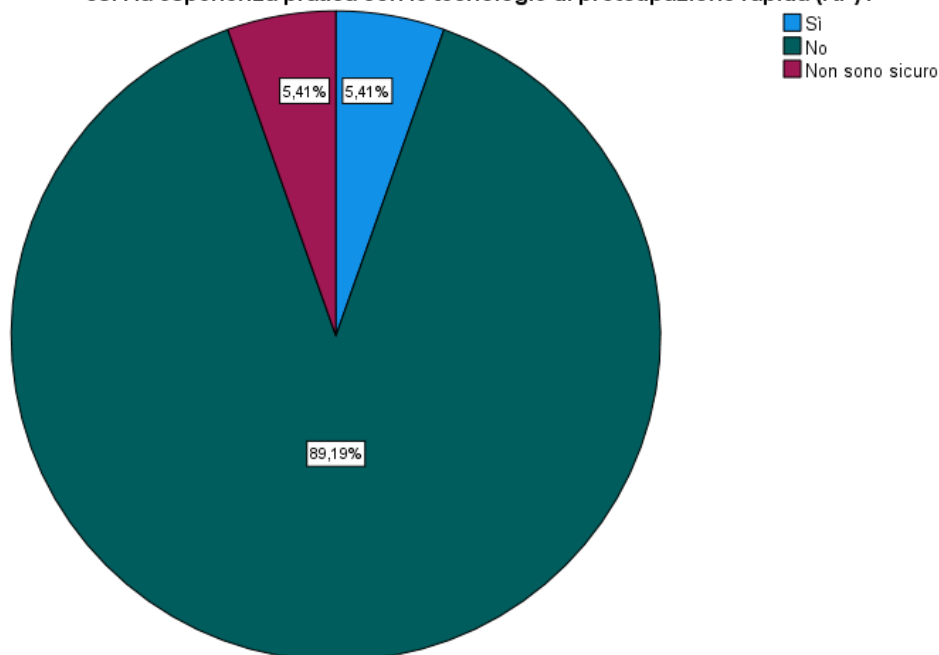
N	Valid	37
	Missing	24

08. Do you have practical experience with rapid prototyping (RP) technologies?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	3,3	5,4	5,4
	No	33	54,1	89,2	94,6
	Not sure	2	3,3	5,4	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		
Total		61	100,0		



08. Ha esperienza pratica con le tecnologie di prototipazione rapida (RP)?



09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

Of the 37 academics:

- 14 stated that their university is equipped to incorporate PR into their curriculum
- 10 stated that their university is not equipped to incorporate PR into their curriculum
- 13 stated that they are not sure if their university is equipped to incorporate PR into their curriculum

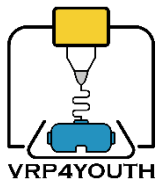
Statistics

09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

N	Valid	37
	Missing	24

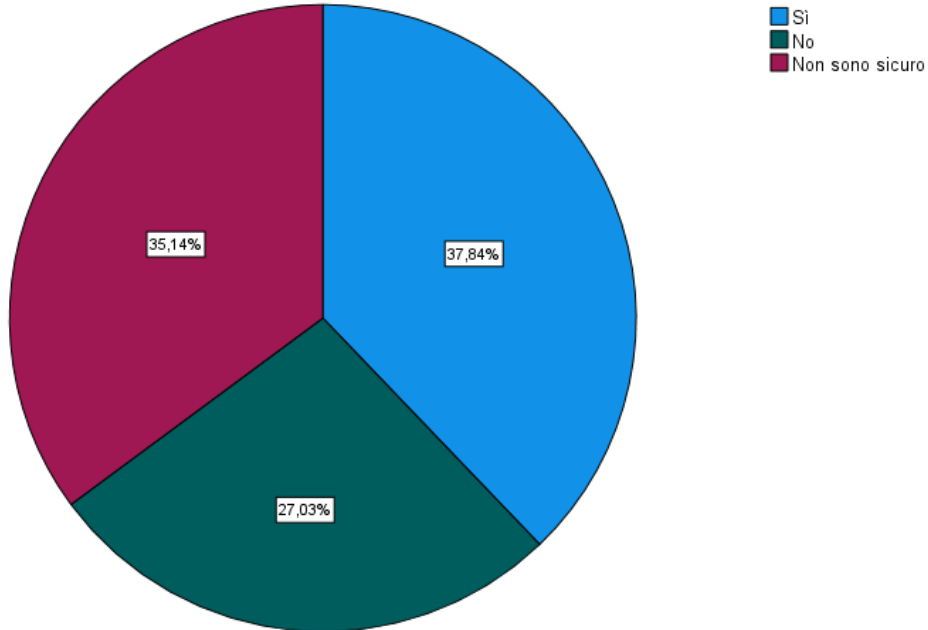
09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

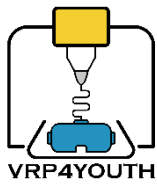
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	14	23,0	37,8	37,8
	No	10	16,4	27,0	64,9
	Not sure	13	21,3	35,1	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		



Total	61	100,0		
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09. La sua università è attrezzata (ad esempio, macchine utensili CNC, stampanti 3D, materiali, ecc.) per incorporare la RP nel suo curriculum?





09. a) What equipment is available?

Of the 37 academics, only 14 indicated equipment available at their university

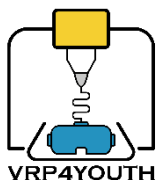
Statistics

09. a) What equipment is available?

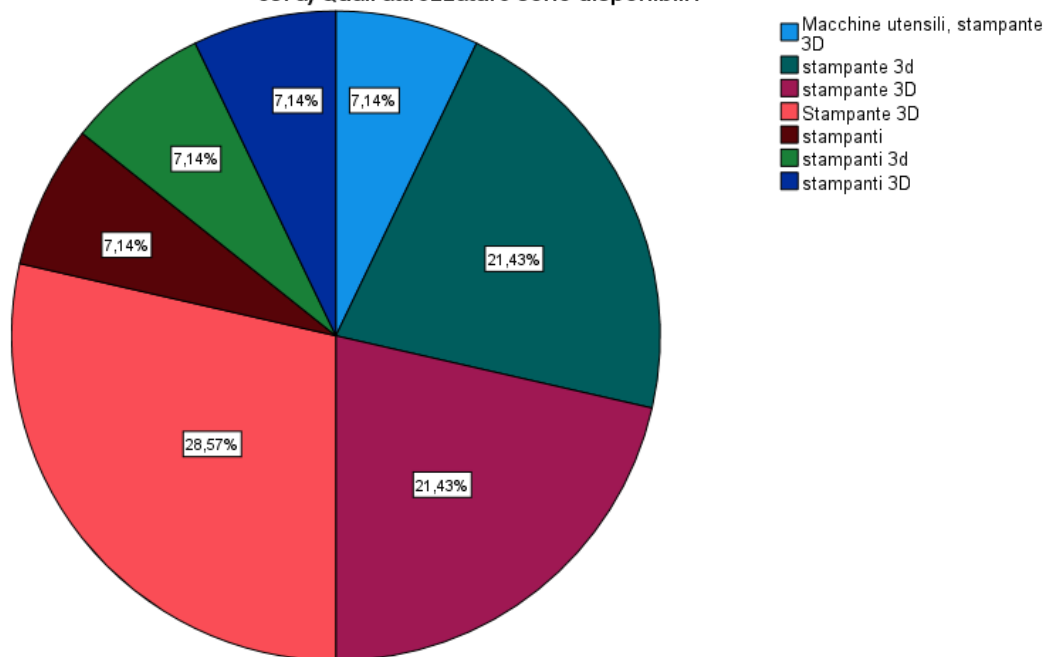
N	Valid	14
	Missing	47

09. a) What equipment is available?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Machine tools, 3D printer	1	1,6	7,1	7,1
	3d printer	3	4,9	21,4	28,6
	3D printer	3	4,9	21,4	50,0
	3D printer	4	6,6	28,6	78,6
	printers	1	1,6	7,1	85,7
	3D printers	1	1,6	7,1	92,9
	3D printers	1	1,6	7,1	100,0
	Total	14	23,0	100,0	
Missing	8	47	77,0		
Total		61	100,0		



09. a) Quali attrezzature sono disponibili?



10. Is there a possibility for cooperation between courses and private companies using RP??

Of the 37 academics:

- 8 stated that there is the possibility of collaborating with private companies using RP
- 11 stated that there is no possibility of collaborating with private companies using RP
- 18 stated that they are not sure whether there is a possibility of collaborating with private companies using RP

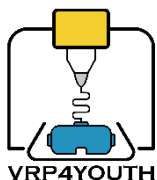
Statistics

10. Is there a possibility for cooperation between courses and private companies using RP

N	Valid	Missing
	37	24

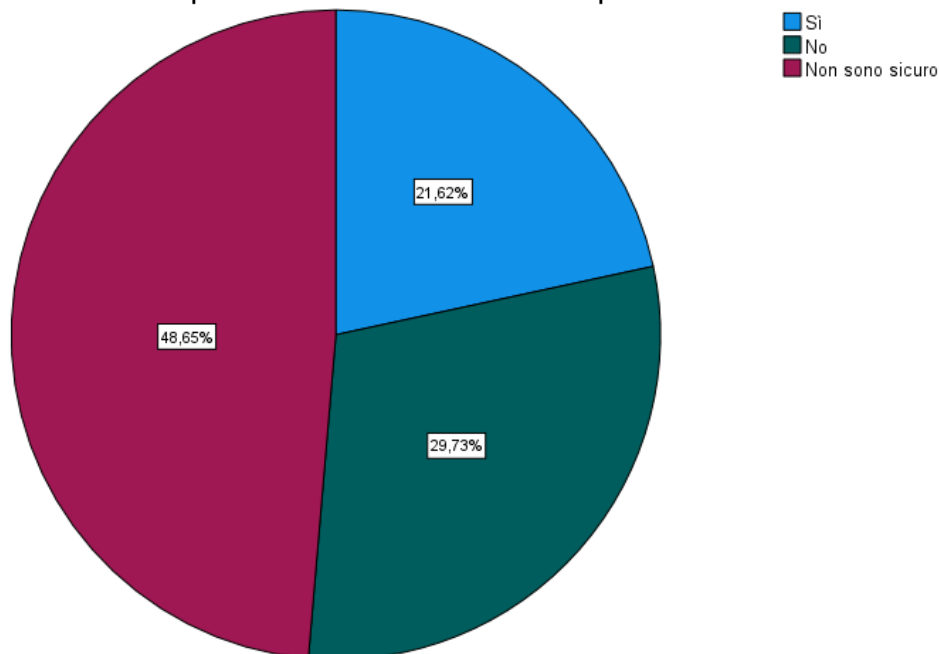
10. Is there a possibility for cooperation between courses and private companies using RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	8	13,1	21,6	21,6
	No	11	18,0	29,7	51,4
	Not sure	18	29,5	48,6	100,0
	Total	37	60,7	100,0	
Missing	4	24	39,3		



Total	61	100,0	
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10. C'è la possibilità di collaborare con aziende private utilizzando la RP?



11. Do you have an RP curriculum established at your university at the moment?

Of 37 academics:

- 1 stated that an RP curriculum is currently established at their university
- 25 stated that no RP curriculum is currently established at their university
- 11 stated that they were not sure whether an RP curriculum was currently established at their university

Statistics

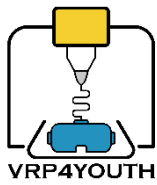
11. Do you have an RP curriculum established at your university at the moment?

N	Valid	37
	Missing	24

11. Do you have an RP curriculum established at your university at the moment?

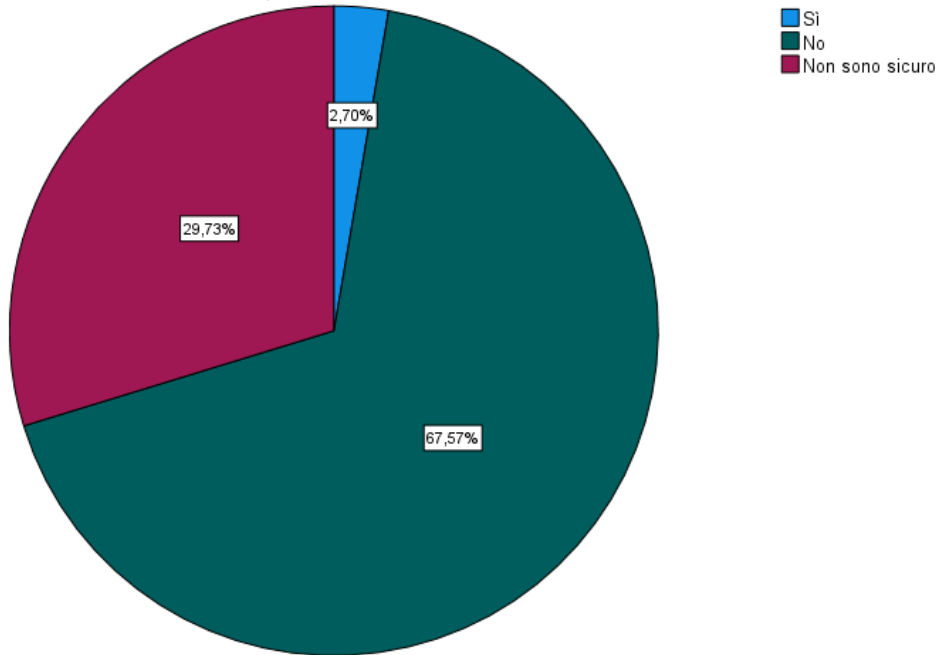
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	1,6	2,7	2,7
	No	25	41,0	67,6	70,3





Not sure	11	18,0	29,7	100,0
Total	37	60,7	100,0	
Missing	4	24	39,3	
Total	61	100,0		

11. Al momento, nella sua università è stato istituito un curriculum RP?



Results of the answers provided by the 15 representatives of companies in the sector

01. What is your gender?

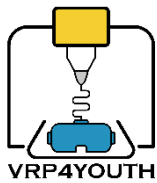
Of the 15 business representatives

- 10 claimed to be female
- 4 being male
- 1 did not reply

Statistics

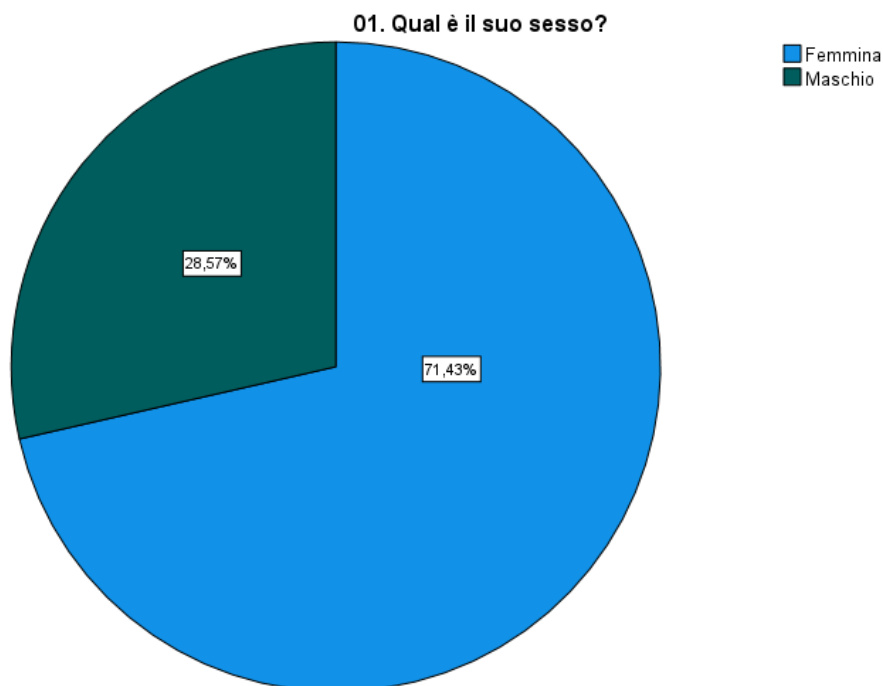
01. What is your gender?

N	Valid	14
	Missing	47



01. What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Female	10	16,4	71,4	71,4
	Male	4	6,6	28,6	100,0
	Total	14	23,0	100,0	
Missing	System	47	77,0		
Total		61	100,0		



02. In which sector does your company operate?

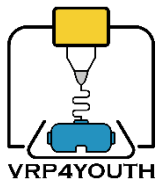
Below are the answers of the 15 representatives of companies in the sector, regarding the sectors in which their companies operate.

Statistics

02. In which sector does your company operate?

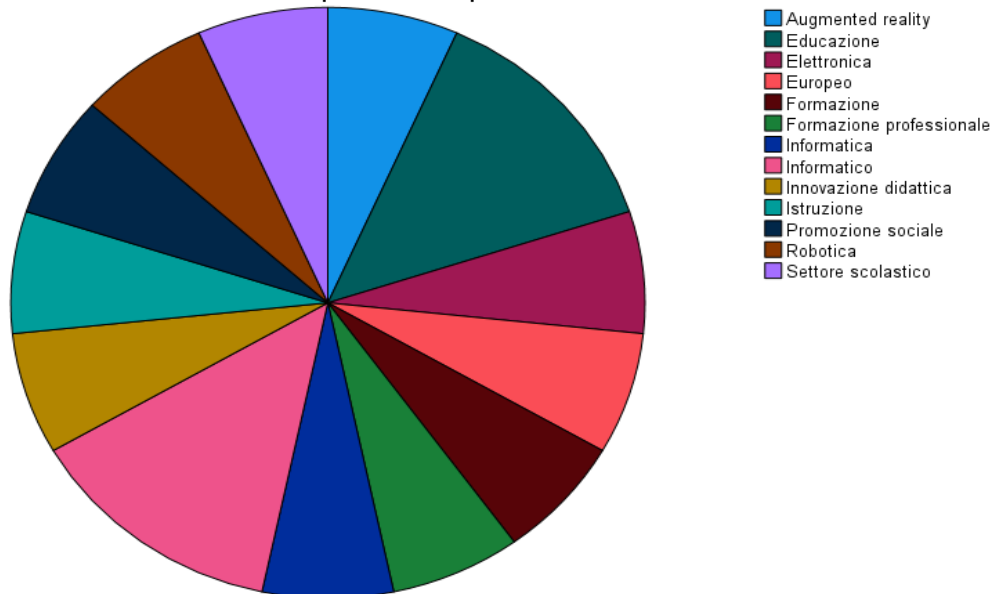
N	Valid	15
	Missing	46

02. In which sector does your company operate?



		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Augmented reality	1	1,6	6,7	6,7
	Education	2	3,3	13,3	20,0
	Electronics	1	1,6	6,7	26,7
	European	1	1,6	6,7	33,3
	Training	1	1,6	6,7	40,0
	Vocational Training	1	1,6	6,7	46,7
	Informatics	1	1,6	6,7	53,3
	Computer	2	3,3	13,3	66,7
	Educational Innovation	1	1,6	6,7	73,3
	Education	1	1,6	6,7	80,0
	Social Promotion	1	1,6	6,7	86,7
	Robotics	1	1,6	6,7	93,3
	School sector	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
	Missing	14	46	75,4	
Total		61	100,0		

02. In quale settore opera la sua azienda?



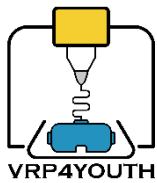
03. Have you ever heard of Virtual Reality (VR)?

Of the 15 industry representatives:

- 13 stated that they had heard of Virtual Reality (VR)
- 2 stated that they had not heard of Virtual Reality (VR)

Statistics



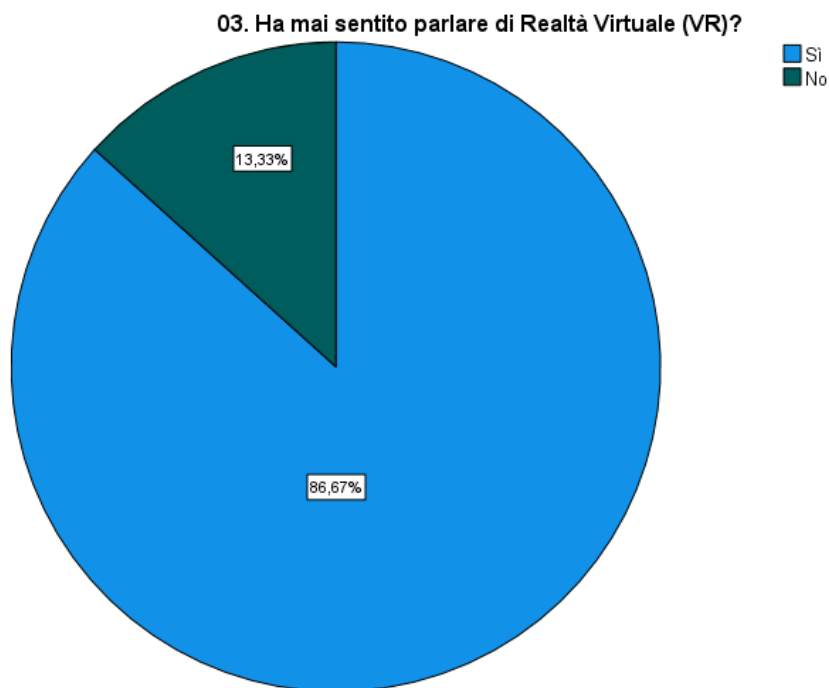


03. Have you ever heard of Virtual Reality (VR)?

N	Valid	15
	Missing	46

03. Have you ever heard of Virtual Reality (VR)?

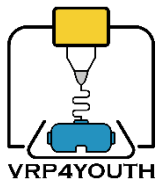
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	13	21,3	86,7	86,7
	No	2	3,3	13,3	100,0
	Total	15	24,6	100,0	
Missing	3	46	75,4		
Total		61	100,0		



04. Do you know any practical purpose of Virtual Reality (VR)?

Of the 15 representatives of companies in the sector:

- 11 stated that they knew some practical purpose of Virtual Reality (VR)



- 3 stated that they knew some practical purpose of Virtual Reality (VR)
- 1 stated that he was not sure of any practical purpose of Virtual Reality (VR)

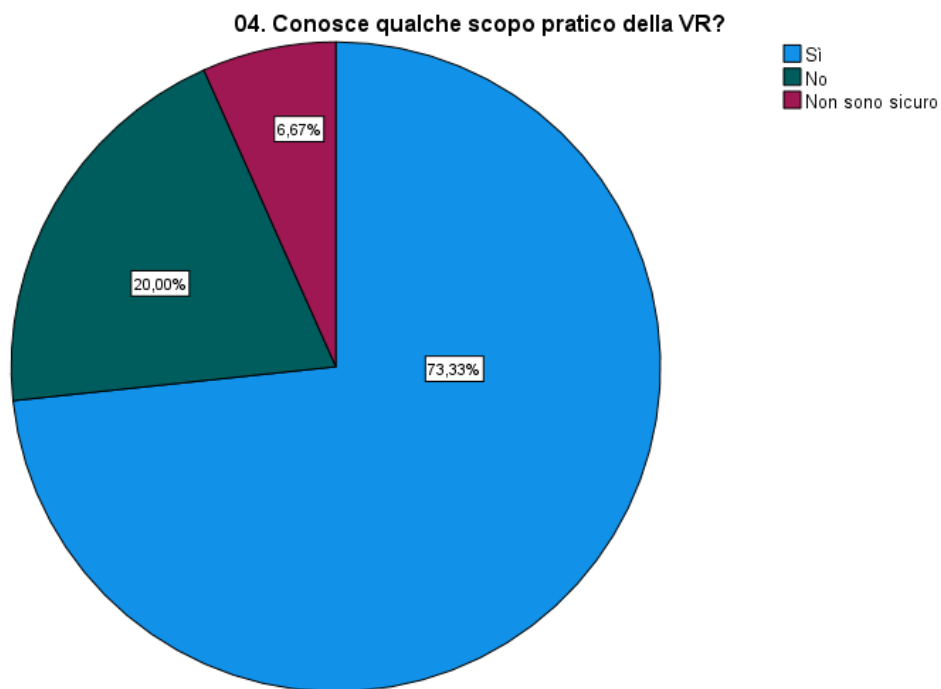
Statistics

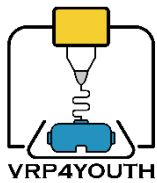
04. Do you know any practical purpose of Virtual Reality (VR)??

N	Valid	15
	Missing	46

04. Do you know any practical purpose of Virtual Reality (VR)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	11	18,0	73,3	73,3
	No	3	4,9	20,0	93,3
	Not sure	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		





05. Are there any VR-focused applications in your company?

Of the 15 company representatives in the industry:

- 2 stated that there are applications focused on Virtual Reality (VR) in their company
- 12 stated that there are no Virtual Reality (VR)-focused applications in their company
- 1 stated that they are not sure whether there are Virtual Reality (VR)-focused applications in their company

Statistics

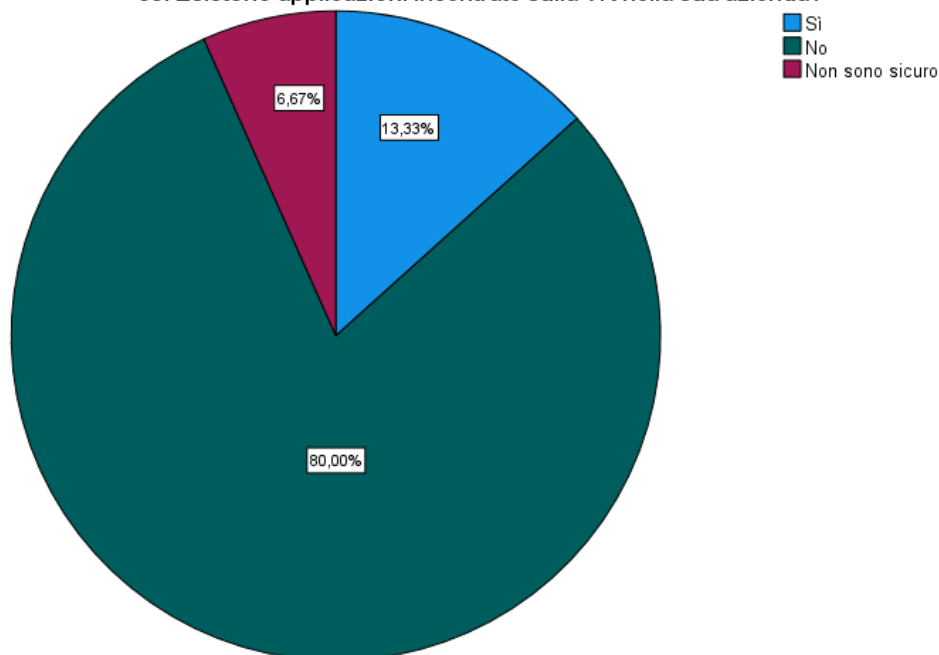
05. Are there any VR-focused applications in your company?

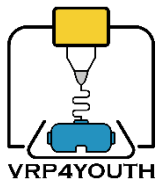
N	Valid	15
	Missing	46

05. Are there any VR-focused applications in your company?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	3,3	13,3	13,3
	No	12	19,7	80,0	93,3
	Not sure	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		

05. Esistono applicazioni incentrate sulla VR nella sua azienda?





06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?

Of 15 representatives of companies in the sector:

- 3 stated that their company has adequate equipment for VR-centred applications
- 12 stated that their company does not have adequate equipment for VR-centred applications

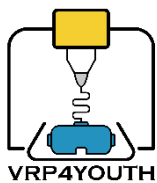
Statistics

06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?

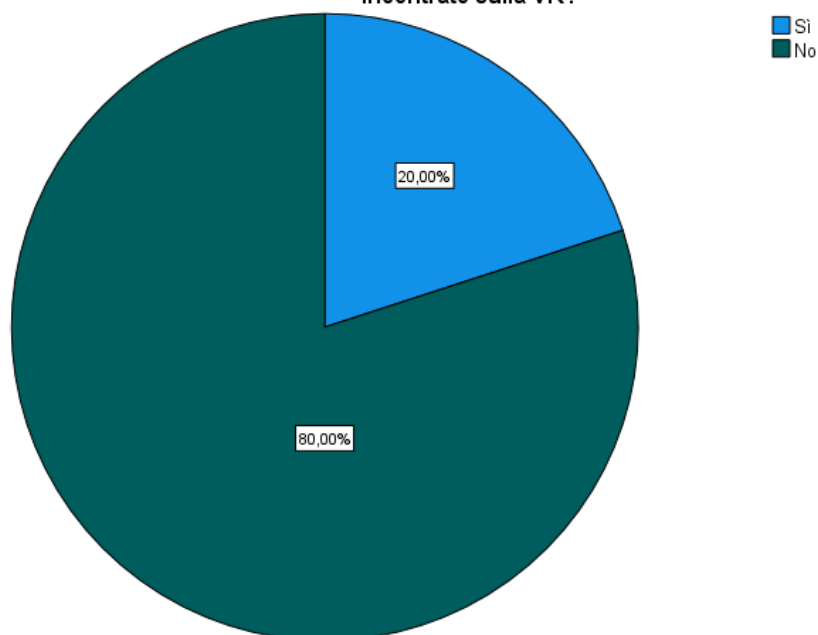
N	Valid	15
	Missing	46

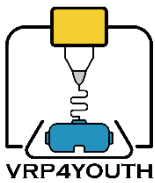
06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	3	4,9	20,0	20,0
	No	12	19,7	80,0	100,0
	Total	15	24,6	100,0	
Missing	3	46	75,4		
Total		61	100,0		



06. La sua azienda dispone di attrezzature adeguate (ad esempio occhiali VR, console, ecc.) per le applicazioni incentrate sulla VR?





07. Do you receive service support from different companies for VR-focused applications?

Of the 15 company representatives in the industry:

- 1 stated that they receive support from several companies for VR-focused applications
- 12 stated that they do not receive support from different companies for VR-focused applications
- 2 stated that they were unsure about receiving support from different companies for VR-focused applications

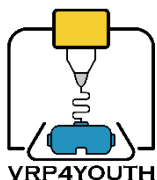
Statistics

07. Do you receive service support from different companies for VR-focused applications?

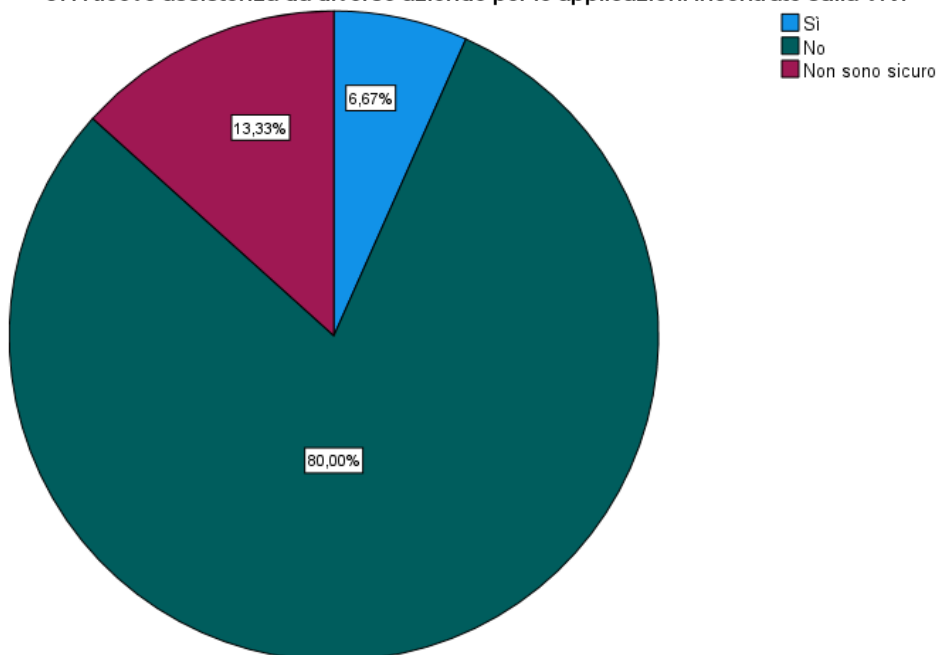
N	Valid	15
	Missing	46

07. Do you receive service support from different companies for VR-focused applications?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	1,6	6,7	6,7
	No	12	19,7	80,0	86,7
	Not sure	2	3,3	13,3	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		



07. Riceve assistenza da diverse aziende per le applicazioni incentrate sulla VR?



08. Are there VR integrated RP applications in your company?

Of the 15 company representatives in the industry:

- 12 stated that there are no VR-integrated RP applications in their company
- 3 stated that they are not sure whether there are VR-integrated RP applications in their company

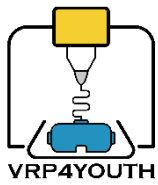
Statistics

08. Are there VR integrated RP applications in your company?

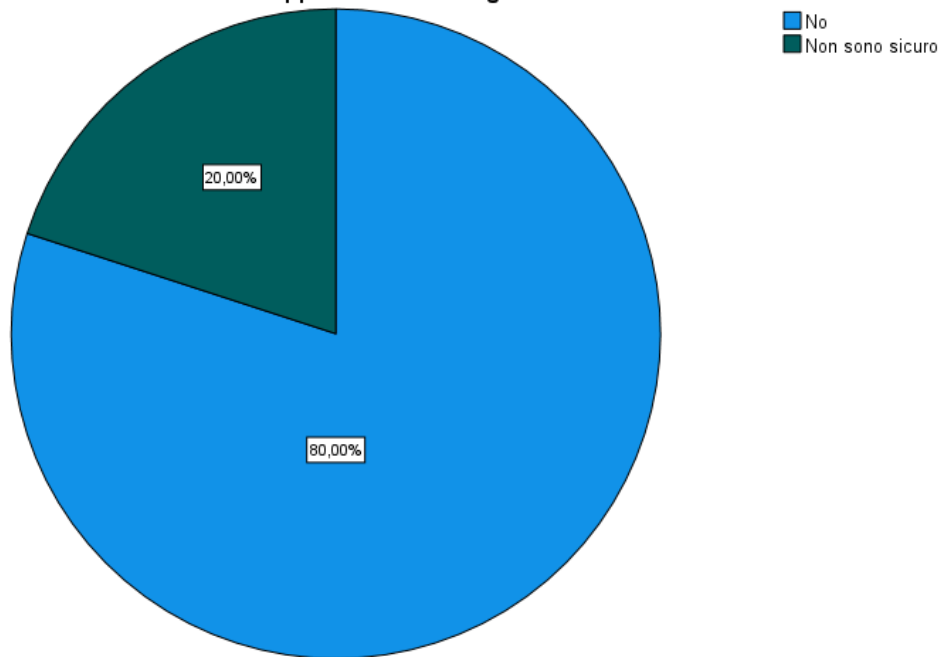
N	Valid	15
	Missing	46

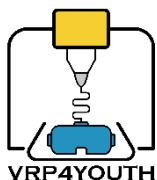
08. Are there VR integrated RP applications in your company?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	12	19,7	80,0	80,0
	Not sure	3	4,9	20,0	100,0
	Total	15	24,6	100,0	
Missing	3	46	75,4		
Total		61	100,0		



08. Esistono applicazioni RP integrate alla VR nella sua azienda?





09. Have you ever heard of Rapid Prototyping (RP)?

Of the 15 industry representatives:

- 5 stated that they had already heard of rapid prototyping (RP)
- 9 stated that they had never heard of rapid prototyping (RP)
- 1 stated that he was not sure whether he had heard of rapid prototyping (RP) before.

Statistics

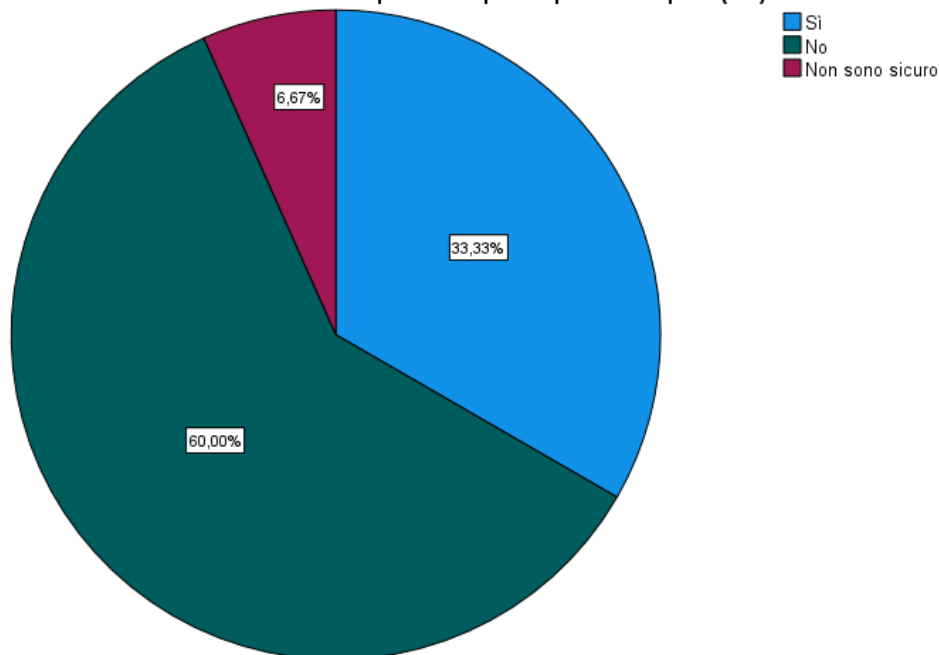
09. Have you ever heard of Rapid Prototyping (RP)?

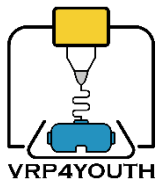
N	Valid	15
	Missing	46

09. Have you ever heard of Rapid Prototyping (RP)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	5	8,2	33,3	33,3
	No	9	14,8	60,0	93,3
	Not sure	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		

09. Ha mai sentito parlare di prototipazione rapida (RP)?





10. Do you know any practical purposes of RP?

Of the 15 representatives of companies in the sector:

- 4 stated that they knew some practical purpose of rapid prototyping (RP)
- 10 stated that they did not know any practical purpose of rapid prototyping (RP)
- 1 stated that he was not sure of any practical purpose of rapid prototyping (RP)

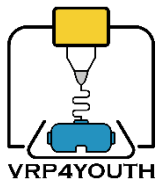
Statistics

10. Do you know any practical purposes of RP?

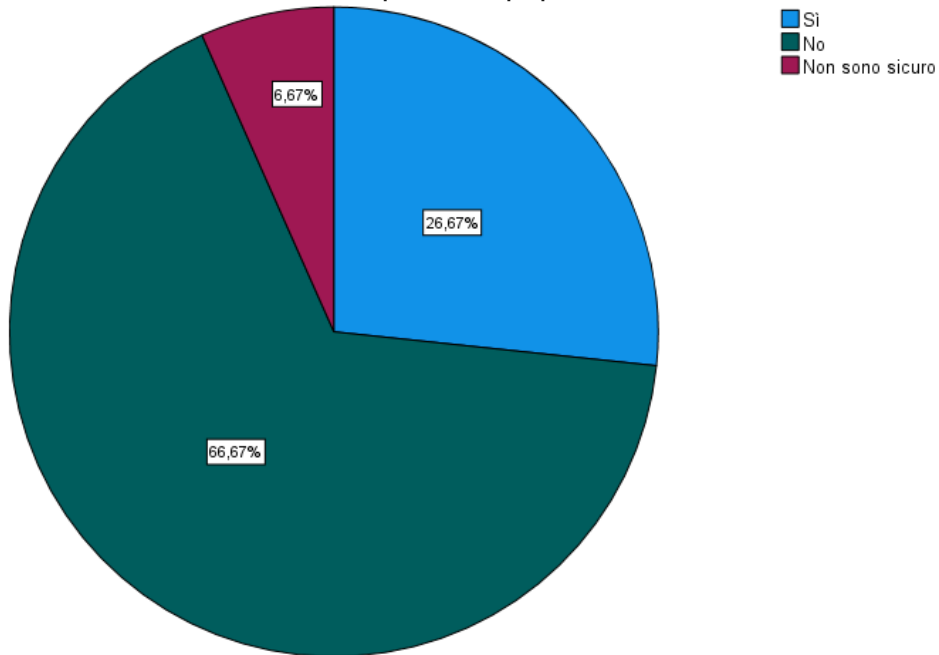
N	Valid	15
	Missing	46

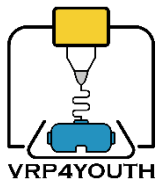
10. Do you know any practical purposes of RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	4	6,6	26,7	26,7
	No	10	16,4	66,7	93,3
	Not sure	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		



10. Conosce qualche scopo pratico della RP?





11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

Of 15 representatives of companies in the sector:

- 6 stated that their company has applications focused on rapid prototyping (RP)
- 8 stated that there are no applications focused on rapid prototyping (RP) in their company
- 1 stated that they are not sure whether there are applications focused on rapid prototyping (RP) in their company

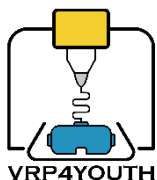
Statistics

11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

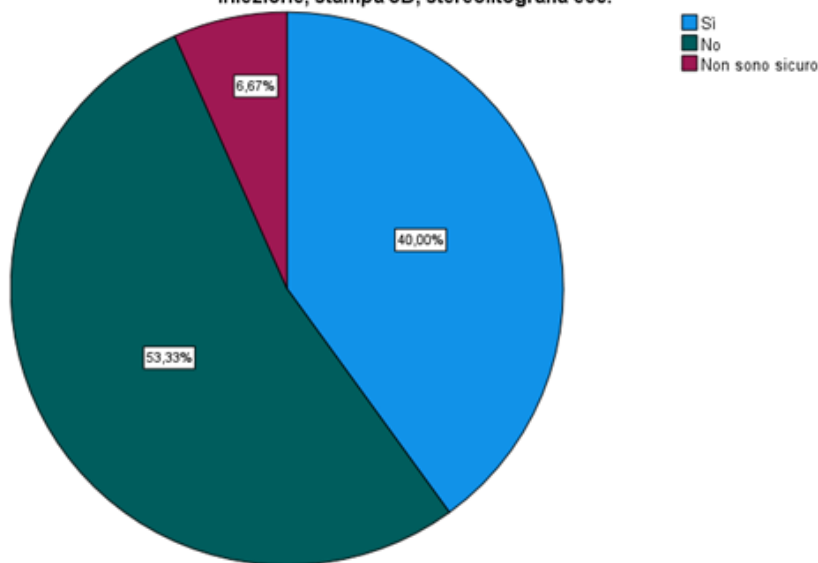
N	Valid	15
	Missing	46

11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	6	9,8	40,0	40,0
	No	8	13,1	53,3	93,3
	Not sure	1	1,6	6,7	100,0
	Total	15	24,6	100,0	
Missing	4	46	75,4		
Total		61	100,0		



11. Nella sua azienda esistono applicazioni incentrate sulla RP (ad es. lavorazione CNC, stampaggio a iniezione, stampa 3D, stereolitografia ecc.)



12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

Of 15 representatives of companies in the sector:

- 6 stated that their company has adequate equipment for applications focusing on rapid prototyping (RP)
- 9 stated that their company does not have adequate equipment for applications focusing on rapid prototyping (RP)

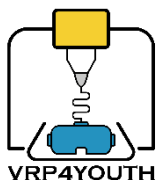
Statistics

12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

N	Valid	Missing
	15	46

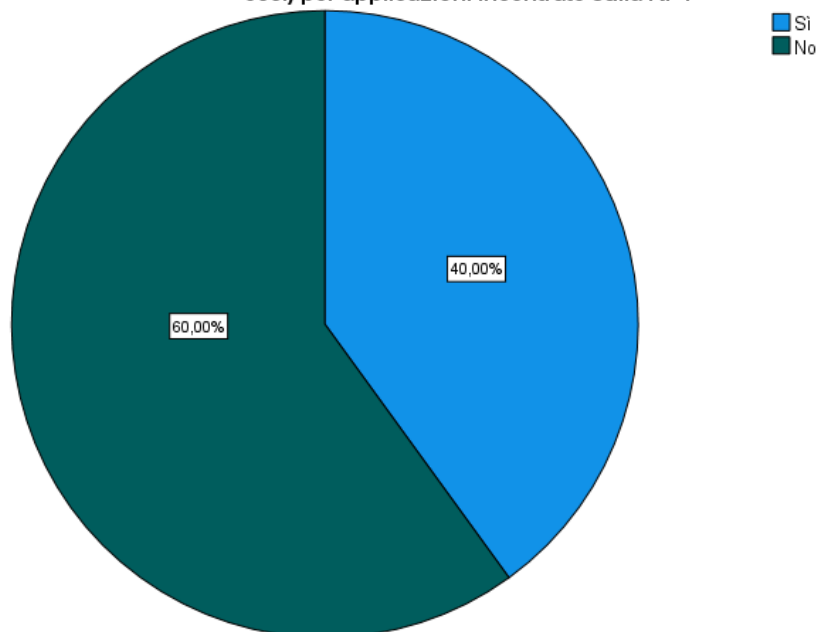
12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	6	9,8	40,0	40,0
	No	9	14,8	60,0	100,0
	Total	15	24,6	100,0	
Missing	3	46	75,4		



Total	61	100,0		
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12. La sua azienda dispone di attrezzature adeguate (ad es. macchine utensili CNC, stampanti 3D, materiali, ecc.) per applicazioni incentrate sulla RP?



13. Do you receive service support from different companies for RP-focused applications?

Of the 15 company representatives in the sector:

- 4 stated that they receive assistance from different companies for applications focused on rapid prototyping (RP)
- 10 stated that they do not receive support from different companies for applications focused on rapid prototyping (RP)
- 1 stated that he was not sure about receiving support from different companies for applications focused on rapid prototyping (RP)

Statistics

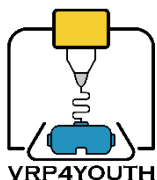
13. Do you receive service support from different companies for RP-focused applications

N	Valid	15
	Missing	46

13. Do you receive service support from different companies for RP-focused applications?

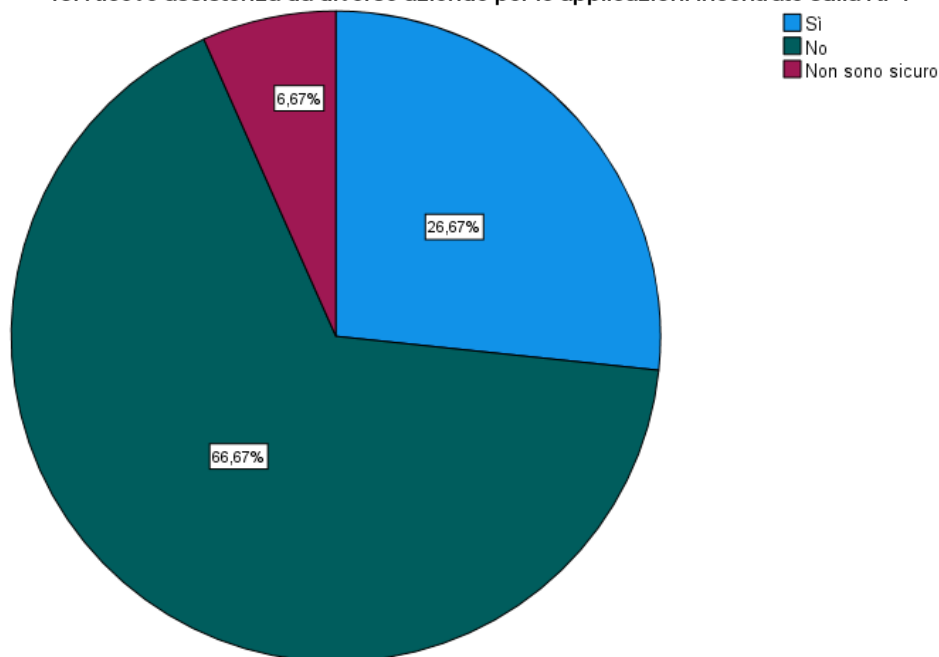
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	4	6,6	26,7	26,7
	No	10	16,4	66,7	93,3
	Not sure	1	1,6	6,7	100,0





Total	15	24,6	100,0
Missing	4	46	75,4
Total	61	100,0	

13. Riceve assistenza da diverse aziende per le applicazioni incentrate sulla RP?



3.1 Results of the Online Survey in English

Below are the results of the survey compiled directly in English

Who participated in the evaluation

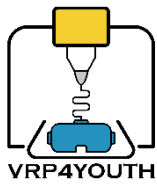
15 people took part in the evaluation, including 2 unemployed young people, 8 academics and 5 representatives of companies in the sector.

I confirm that I am between 18 and 30 years of age.

Of the 15 participants, as mentioned above, 2 have confirmed that they are between 18 and 30 years of age (they obviously correspond to the unemployed)

Statistics

I confirm that I am between 18 and 30 years of age.



N	Valid	2
	Missing	13

I confirm that I am between 18 and 30 years of age.

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	100,0	100,0
Missing	System	13	86,7		
Total		15	100,0		



Results of the answers given by the 2 Young People

01. What is your gender?

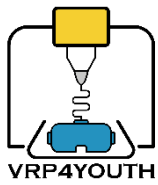
Of the 15 participants, 2 were young people between 18 and 30, both male

Statistics

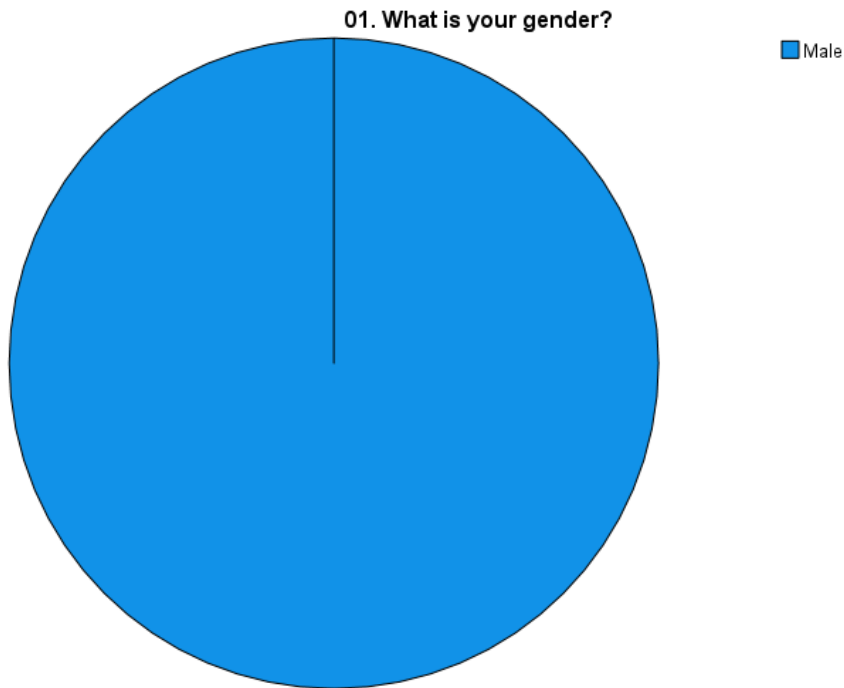
01. What is your gender?

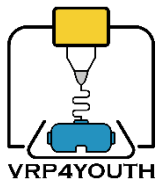
N	Valid	2
	Missing	13

01. What is your gender?



		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Bad	2	13,3	100,0	100,0
Missing	System	13	86,7		
Total		15	100,0		





02. Which department did you graduate from?

Below are the results of the type of school attended by the 2 young participants

Statistics

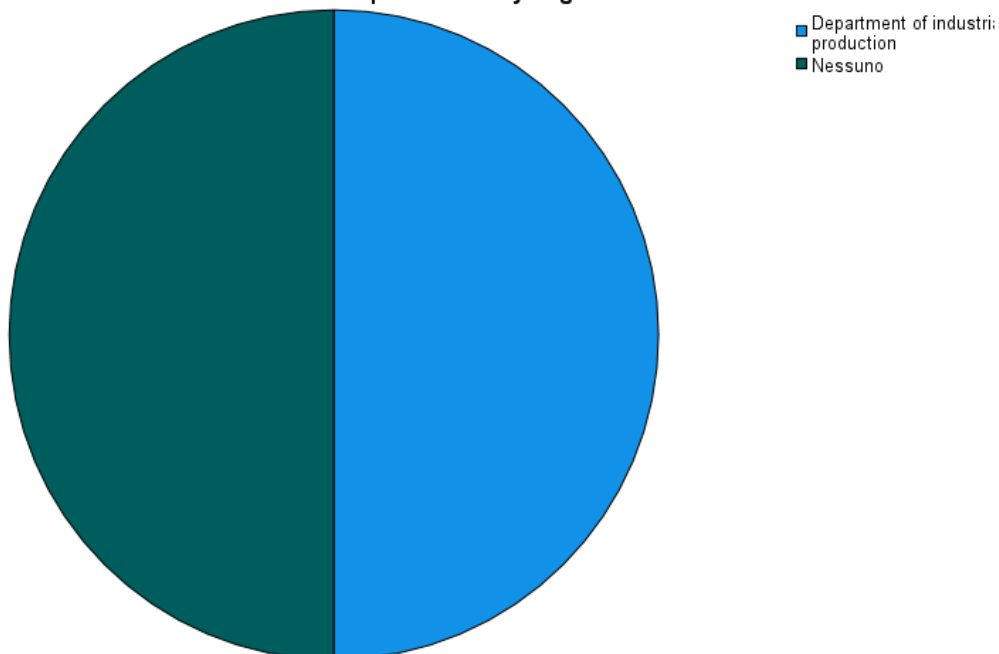
02. Which department did you graduate from?

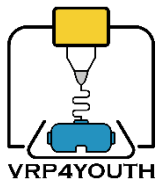
N	Valid	2
	Missing	13

02. Which department did you graduate from?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Department of industrial production	1	6,7	50,0	50,0
	None	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		

02. Which department did you graduate from?





03. Have you ever heard about Virtual Reality (VR)?

Of the 2 young participants, both indicated that they had already heard about augmented reality,

Statistics

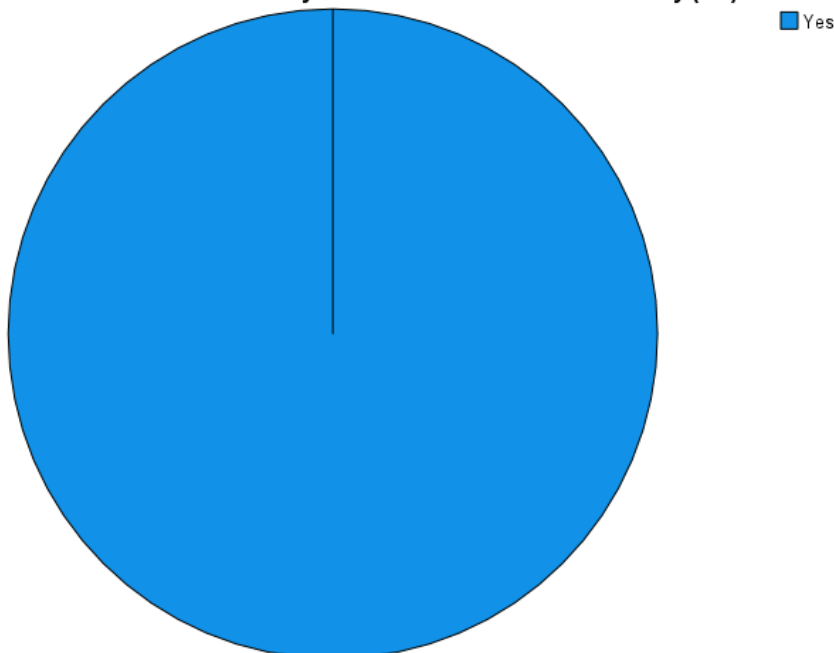
03. Have you ever heard about Virtual Reality (VR)?

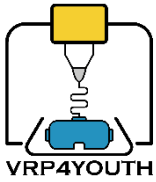
N	Valid	2
	Missing	13

03. Have you ever heard about Virtual Reality (VR)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	100,0	100,0
Missing	2	13	86,7		
Total		15	100,0		

03. Have you ever heard about Virtual Reality (VR)?





04. Do you know any practical purpose of VR?

Of the 2 young participants:

- 1 indicated that they knew of good applications for VR,
- 1 indicated that he was not sure if he knew any good applications for VR,

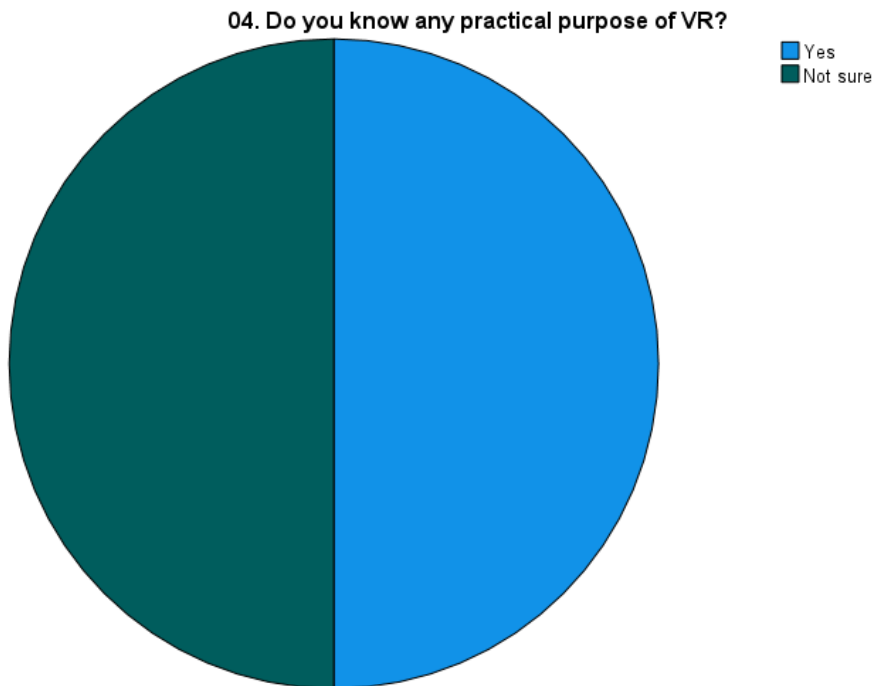
Statistics

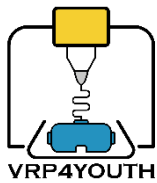
04. Do you know any practical purpose of VR?

N	Valid	2
	Missing	13

04. Do you know any practical purpose of VR?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	6,7	50,0	50,0
	Not sure	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		





05. Are there any VR-focused courses in curricula at your University?

Of the 2 young participants:

- 1 indicated that there was a VR course at their university,
- 1 indicated that they were not sure whether a VR course existed at their university

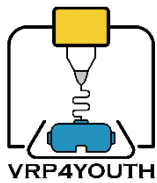
Statistics

05. Are there any VR-focused courses in curricula at your University?

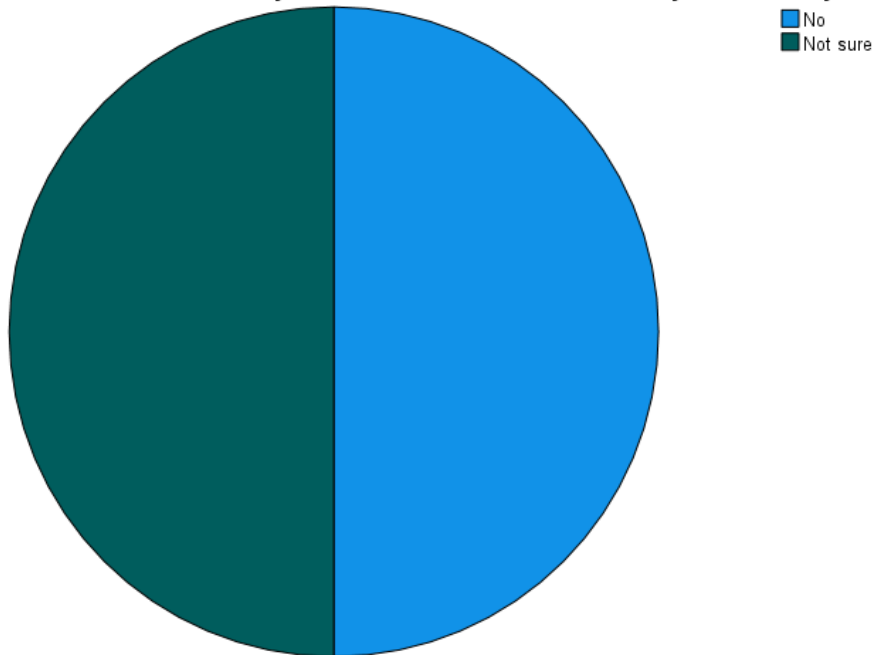
N	Valid	2
	Missing	13

05. Are there any VR-focused courses in curricula at your University?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	1	6,7	50,0	50,0
	Not sure	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		



05. Are there any VR-focused courses in curricula at your University?



06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

Of the 2 young participants, both indicated that they had attended VR training courses outside the university,

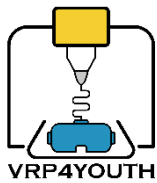
Statistics

06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

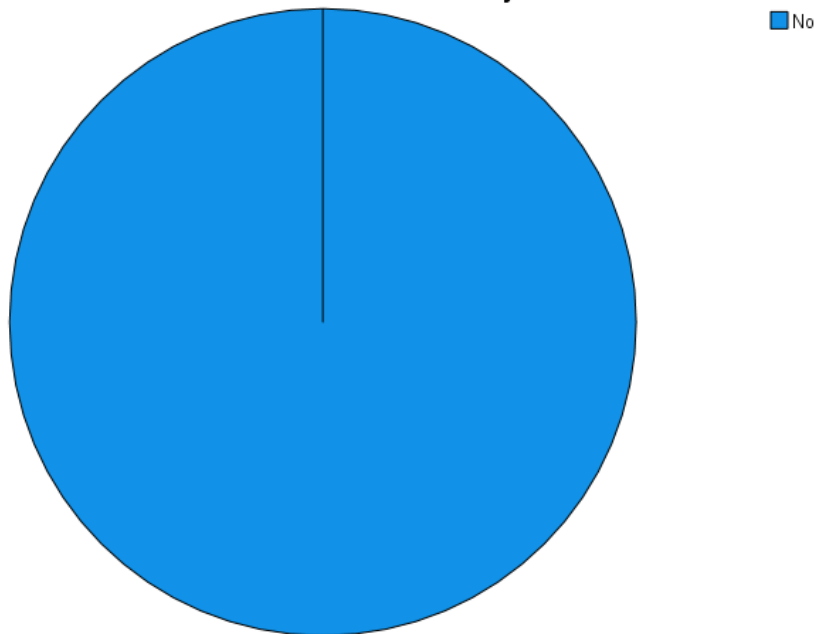
N	Valid	2
	Missing	13

06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	2	13,3	100,0	100,0
Missing	2	13	86,7		
Total		15	100,0		



06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?



07. Do you know any practical purpose of VR Integrated RP applications?

Of the 2 young participants, both indicated that they did not know any practical integrated applications,

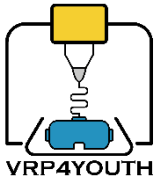
Statistics

07. Do you know any practical purpose of VR Integrated RP applications?

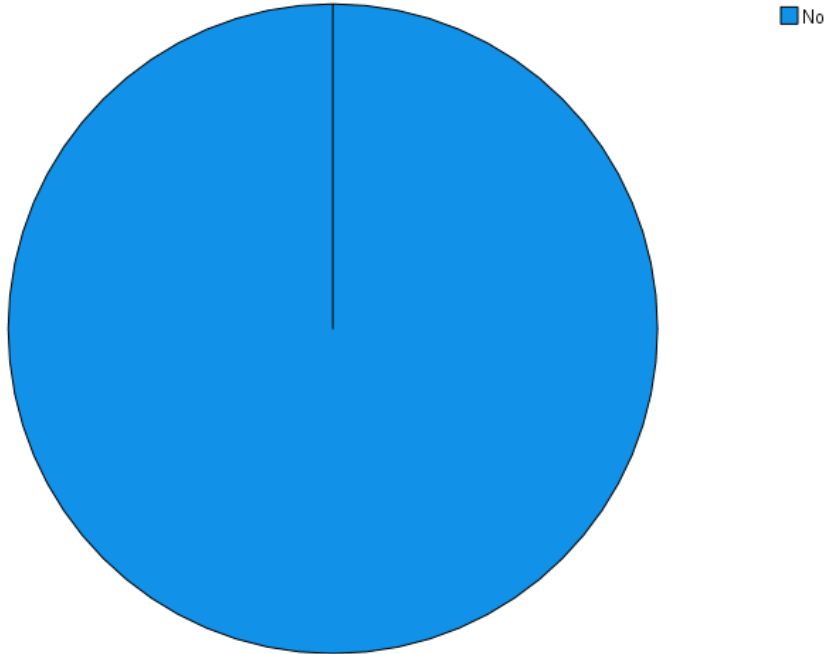
N	Valid	2
	Missing	13

07. Do you know any practical purpose of VR Integrated RP applications?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	2	13,3	100,0	100,0
Missing	2	13	86,7		
Total		15	100,0		



07. Do you know any practical purpose of VR Integrated RP applications?



08. Have you ever heard about Rapid Prototyping (RP)?

Of the 2 young participants:

- 1 indicated that he had already heard of RP rapid prototyping,
- 1 indicated that he was not sure whether he had heard of RP rapid prototyping before,

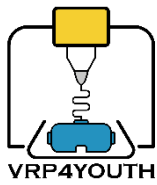
Statistics

08. Have you ever heard about Rapid Prototyping (RP)?

N	Valid	2
	Missing	13

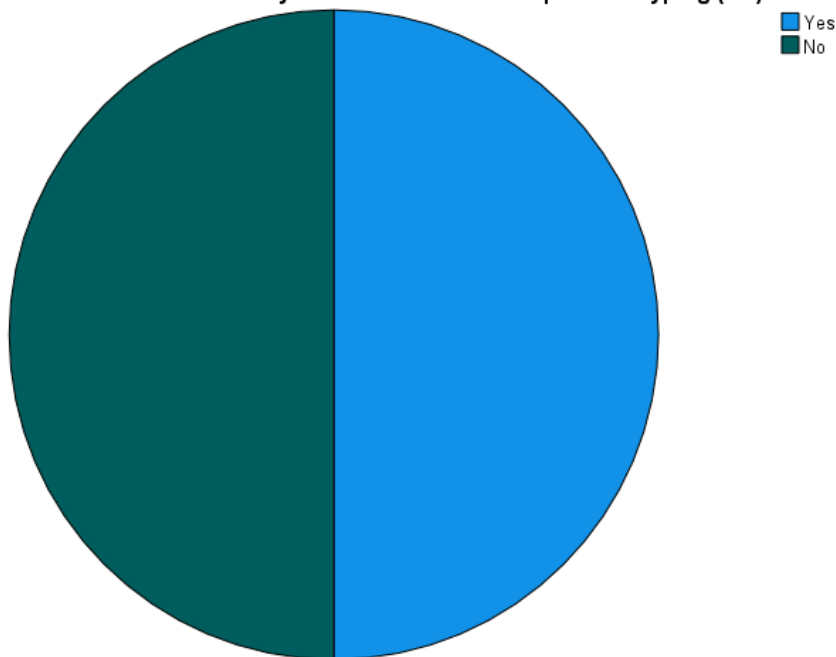
08. Have you ever heard about Rapid Prototyping (RP)?

Frequency	Percent	Valid Percent	Cumulative Percentage
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Valid	Yes	1	6,7	50,0	50,0
	No	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		

08. Have you ever heard about Rapid Prototyping (RP)?



09. Do you know any practical purpose of RP?

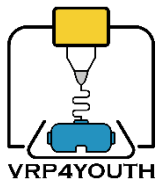
Of the 2 young participants:

- 1 indicated knowledge of practical applications of PR,
- 1 indicated that he was unsure of practical applications of RP

Statistics

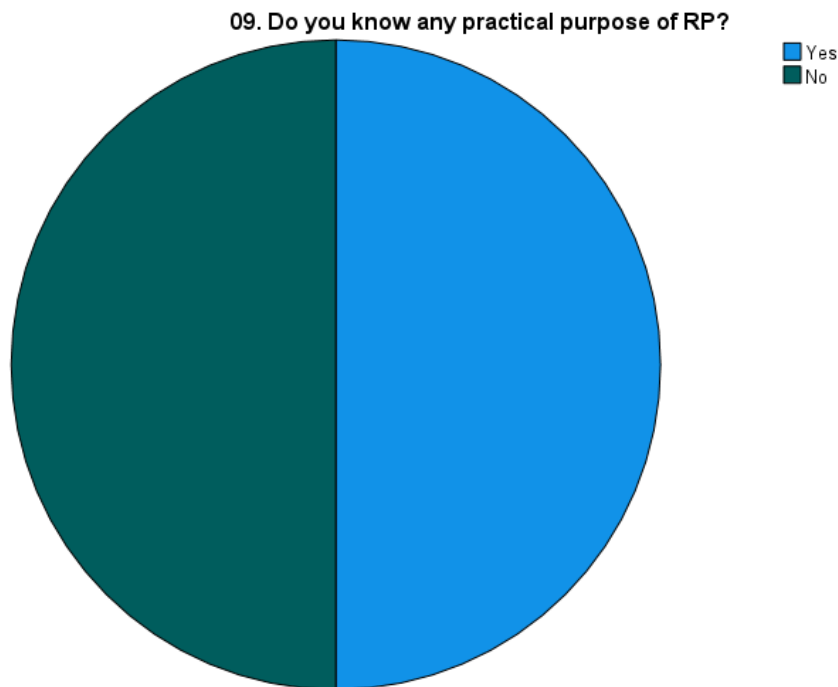
09. Do you know any practical purpose of RP?

N	Valid	2
	Missing	13



09. Do you know any practical purpose of RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	6,7	50,0	50,0
	No	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		

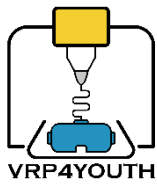


10. Are there any RP-focused courses in curricula at your university?

Of the 2 young participants:

- 1 indicated that there was no course on PR at their university
- 1 was said to be there.

Statistics



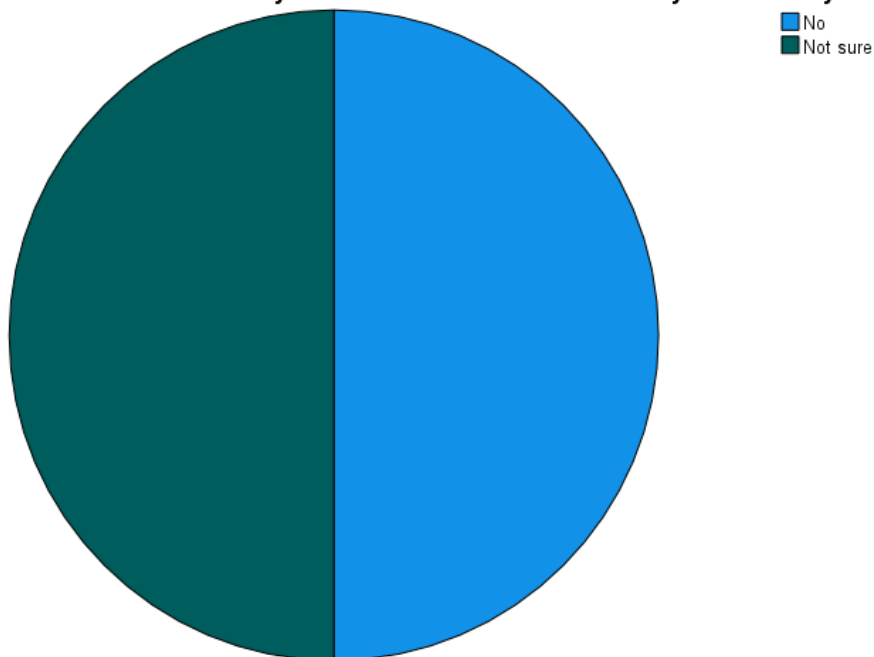
10. Are there any RP-focused courses in curricula at your University?

N	Valid	2
	Missing	13

10. Are there any RP-focused courses in curricula at your University?

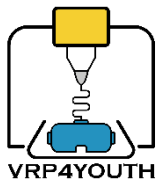
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	1	6,7	50,0	50,0
	Not sure	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		

10. Are there any RP-focused courses in curricula at your University?



11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

Of the 2 young participants, both indicated that they had not attended any RP courses outside the university.



Statistics

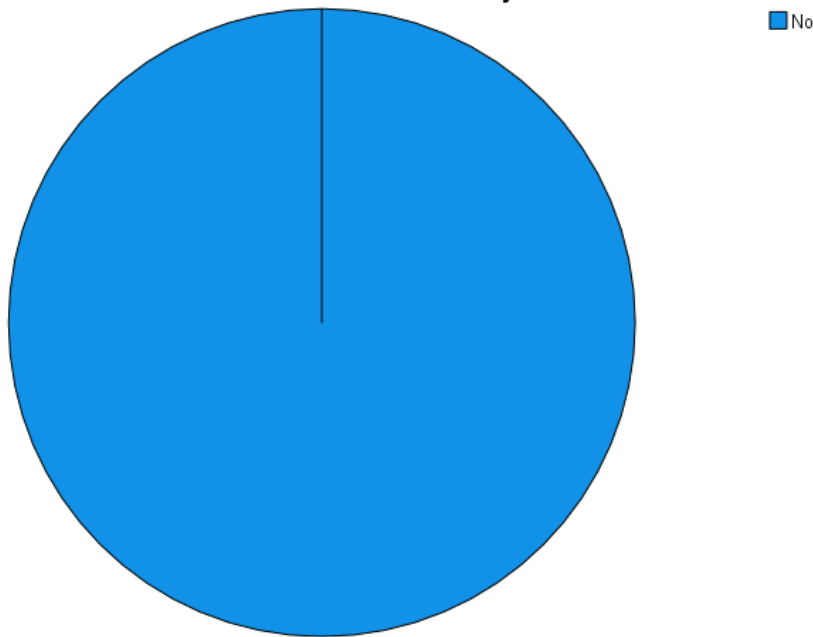
11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

N	Valid	2
	Missing	13

11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?

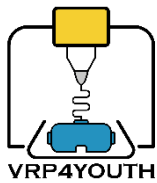
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	2	13,3	100,0	100,0
Missing	2	13	86,7		
Total		15	100,0		

11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?



11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

Of the 2 young participants, none responded



Statistics

11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

N	Valid	0
	Missing	15

11. a) Which RP technologies (CNC machining, injection moulding, 3D printing, stereolithography etc.) did you attend at the training?

		Frequency	Percent
Missing	1	15	100,0

11. b) Did the RP-focused training contain theoretical knowledge and practical applications?
Of the 2 young participants, none responded

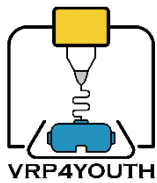
Statistics

11. b) Did the RP-focused training contain theoretical knowledge and practical applications?

N	Valid	0
	Missing	15

11. b) Did the RP-focused training contain theoretical knowledge and practical applications?

		Frequency	Percent
Missing	1	15	100,0



Results of the answers provided by the 8 academics

01. What is your gender?

- Of the 8 academics:
 - 5 claimed to be female
 - 3 being male

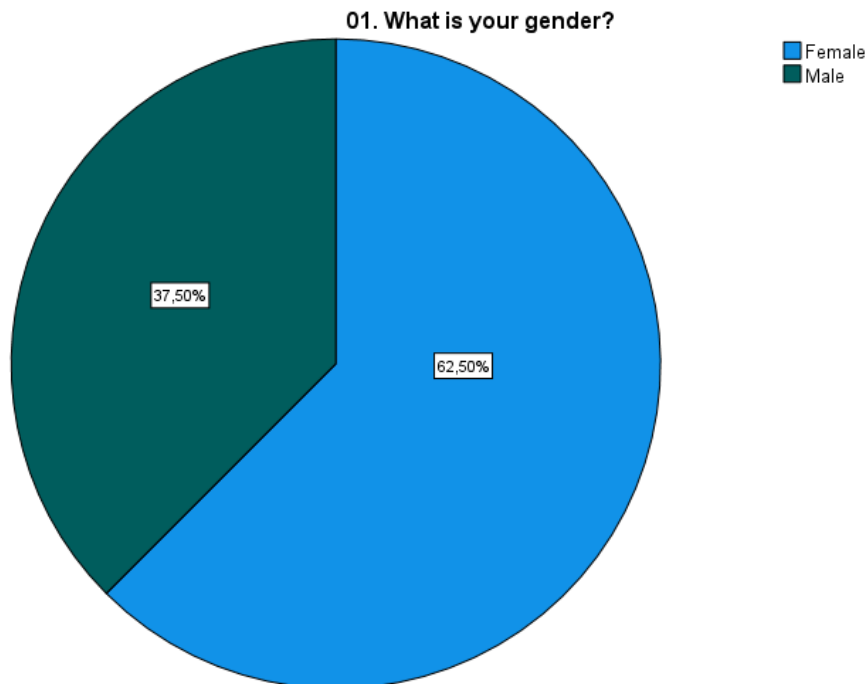
Statistics

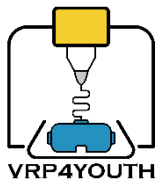
01. What is your gender?

N	Valid	8
	Missing	7

01. What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Female	5	33,3	62,5	62,5
	Bad	3	20,0	37,5	100,0
	Total	8	53,3	100,0	
Missing	System	7	46,7		
Total		15	100,0		





02. In which department are you an academic?

Below are the answers of the 8 academics regarding their department.

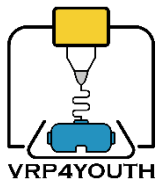
Statistics

02. In which department are you an academic?

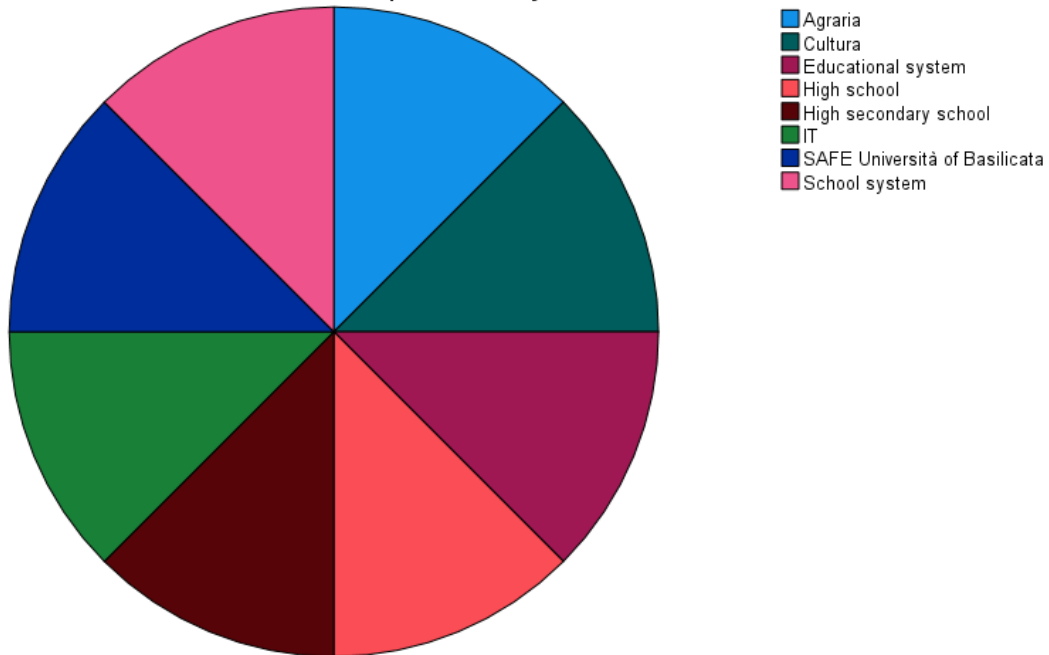
N	Valid	8
	Missing	7

02. In which department are you an academic?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Agraria	1	6,7	12,5	12,5
	Culture	1	6,7	12,5	25,0
	Educational system	1	6,7	12,5	37,5
	High school	1	6,7	12,5	50,0
	High secondary school	1	6,7	12,5	62,5
	EN	1	6,7	12,5	75,0
	SAFE University of Basilicata	1	6,7	12,5	87,5
	School system	1	6,7	12,5	100,0
	Total	8	53,3	100,0	
Missing	9	7	46,7		
Total		15	100,0		



02. In which department are you an academic?



03. Do you have any practical experience with Virtual Reality (VR) technologies?

Of the 8 academics:

- 4 stated that they had some practical experience with VR technologies
- 4 stated that they had no such experience

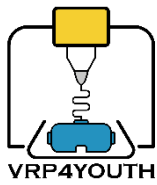
Statistics

03. Do you have any practical experience with Virtual Reality (VR) technologies?

N	Valid	Missing
	8	7

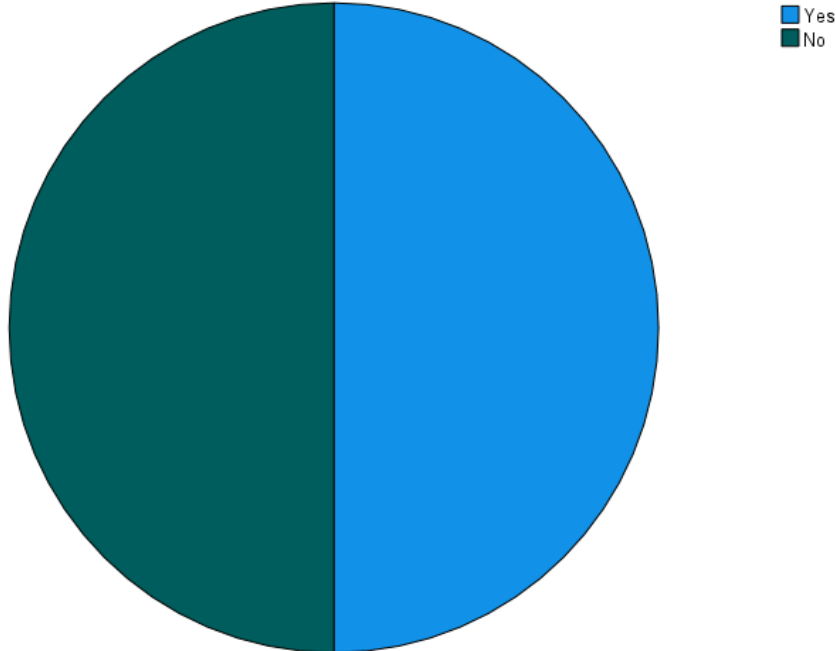
03. Do you have any practical experience with Virtual Reality (VR) technologies?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	4	26,7	50,0	50,0
	No	4	26,7	50,0	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		



Total	15	100,0		
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03. Do you have any practical experience with Virtual Reality (VR) technologies?



04. Is your university equipped to incorporate VR into its curricula (with VR glasses, consoles, etc., for example)?

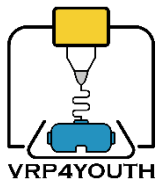
Of the 8 academics:

- 2 stated that their university is equipped with such equipment
- 4 stated that their university is not equipped with such equipment
- 2 stated that they were not sure whether their university was provided with them

Statistics

04. Is your university equipped to incorporate VR in its curricula (with VR glasses, consoles, etc., for example)?

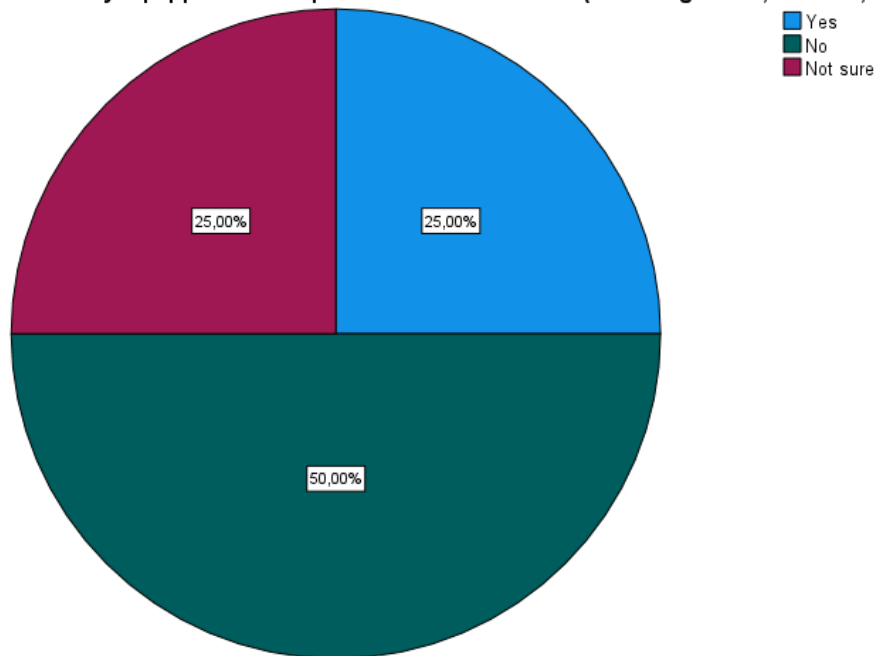
N	Valid	8
	Missing	7



04. Is your university equipped to incorporate VR in its curricula (with VR glasses, consoles, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	25,0	25,0
	No	4	26,7	50,0	75,0
	Not sure	2	13,3	25,0	100,0
	Total	8	53,3	100,0	
Missing	4	7	46,7		
Total		15	100,0		

04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?



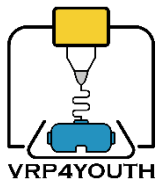
04. a) What equipment is available?

- Of the 8 academics:*
 - 2 indicated equipment
 - 6 did not indicate anything

Statistics

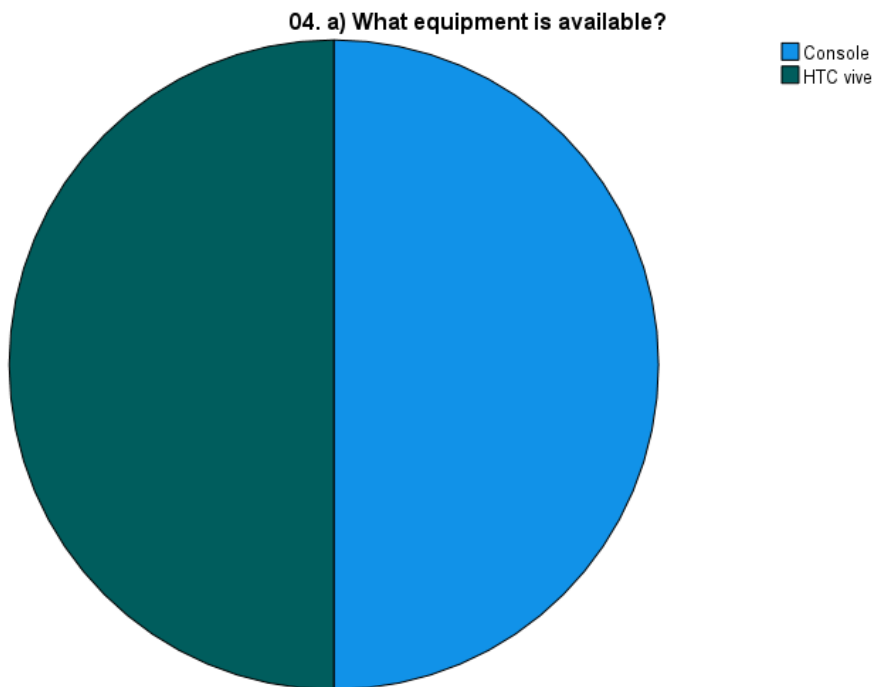
04. a) What equipment is available?

N	Valid	2
	Missing	13



04. a) What equipment is available?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Console	1	6,7	50,0	50,0
	HTC lives	1	6,7	50,0	100,0
	Total	2	13,3	100,0	
Missing	3	13	86,7		
Total		15	100,0		

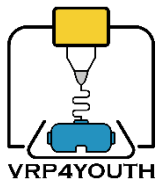


05. Is there a possibility for cooperation between courses and private companies using VR?

Of the 8 academics:

- 2 stated that there is the possibility of cooperation with private companies on VR
- 6 stated that there is no possibility to cooperate with private companies on VR

Statistics



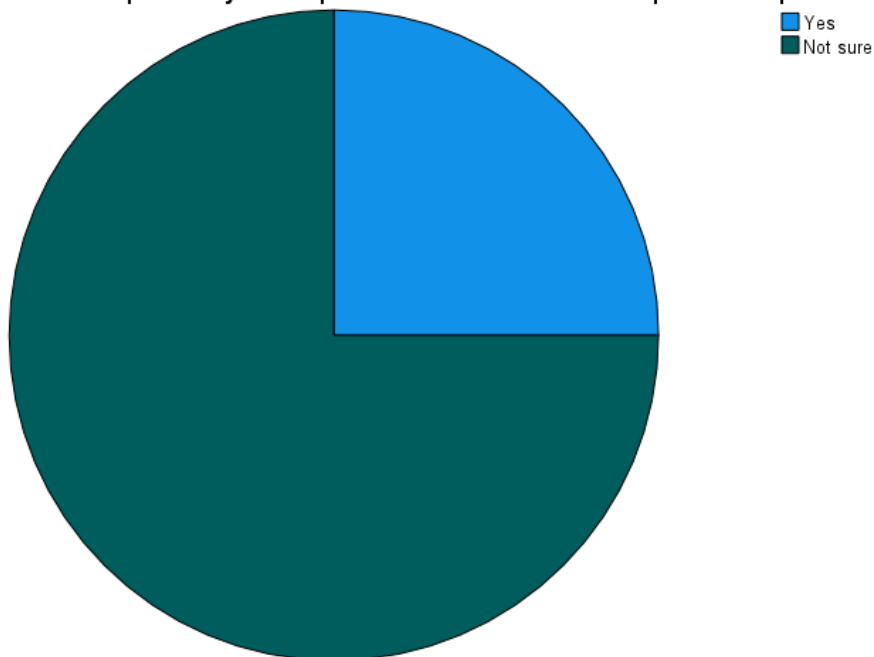
05. Is there a possibility for cooperation between courses and private companies using VR?

N	Valid	8
	Missing	7

05. Is there a possibility for cooperation between courses and private companies using VR?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	25,0	25,0
	Not sure	6	40,0	75,0	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		
Total		15	100,0		

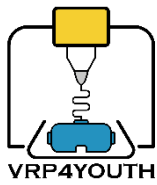
05. Is there a possibility for cooperation between courses and private companies using VR?



06. Do you have a VR curriculum established at your university at the moment?

Of the 8 academics:

- 5 stated that no VR curriculum was established at their university
- 3 stated that they were not sure whether a VR curriculum existed at their university



Statistics

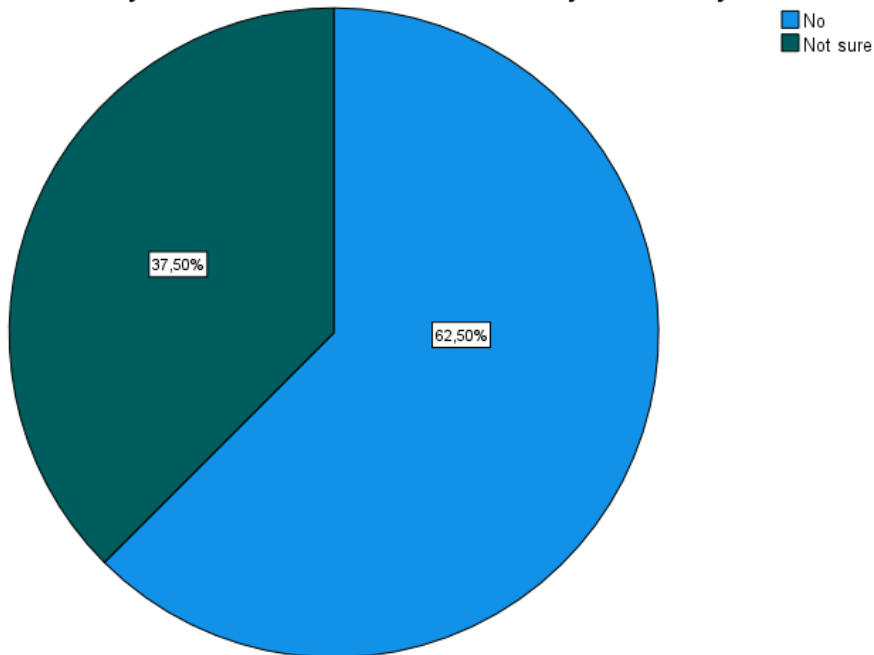
06. Do you have a VR curriculum established at your university at the moment?

N	Valid	8
	Missing	7

06. Do you have a VR curriculum established at your university at the moment?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	5	33,3	62,5	62,5
	Not sure	3	20,0	37,5	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		
Total		15	100,0		

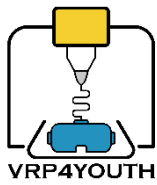
06. Do you have a VR curriculum established at your university at the moment?



07. Are there VR Integrated RP applications in your university?

Of the 8 academics:

- 4 stated that there are no VR-integrated PR applications at their university



- 4 stated that they are not sure whether there are VR-integrated PR applications at their university

Statistics

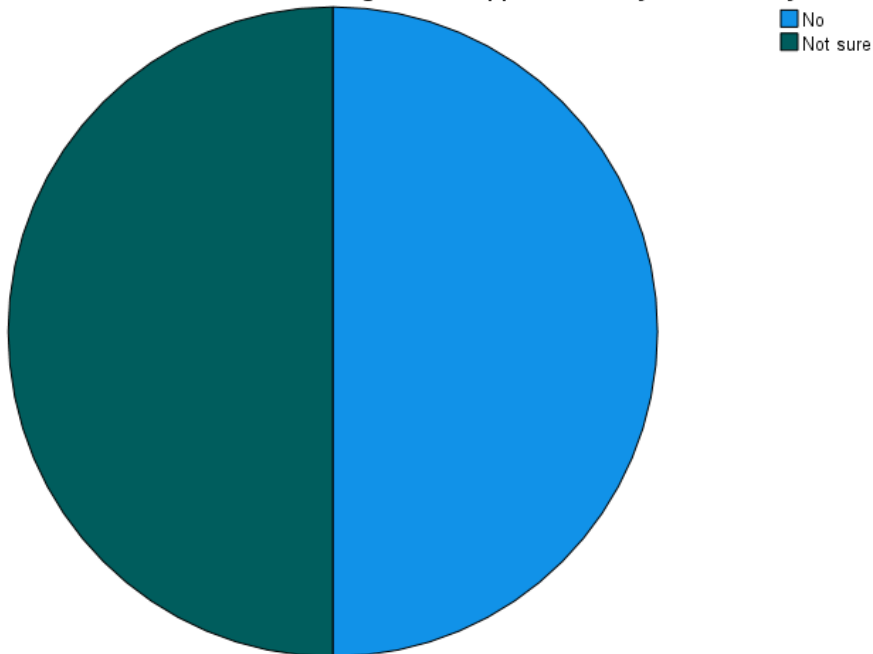
07. Are there VR Integrated RP applications in your university?

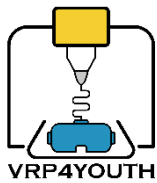
N	Valid	8
	Missing	7

07. Are there VR Integrated RP applications in your university?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	4	26,7	50,0	50,0
	Not sure	4	26,7	50,0	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		
Total		15	100,0		

07. Are there VR Integrated RP applications in your university?





08. Do you have any practical experience with Rapid Prototyping (RP) technologies?

Of the 8 academics:

- 7 stated that they had no practical experience with rapid prototyping (RP) technologies
- 1 stated that he was not sure whether he had practical experience with rapid prototyping (RP) technologies

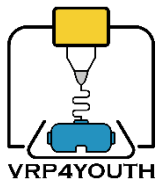
Statistics

08. Do you have any practical experience with Rapid Prototyping (RP) technologies?

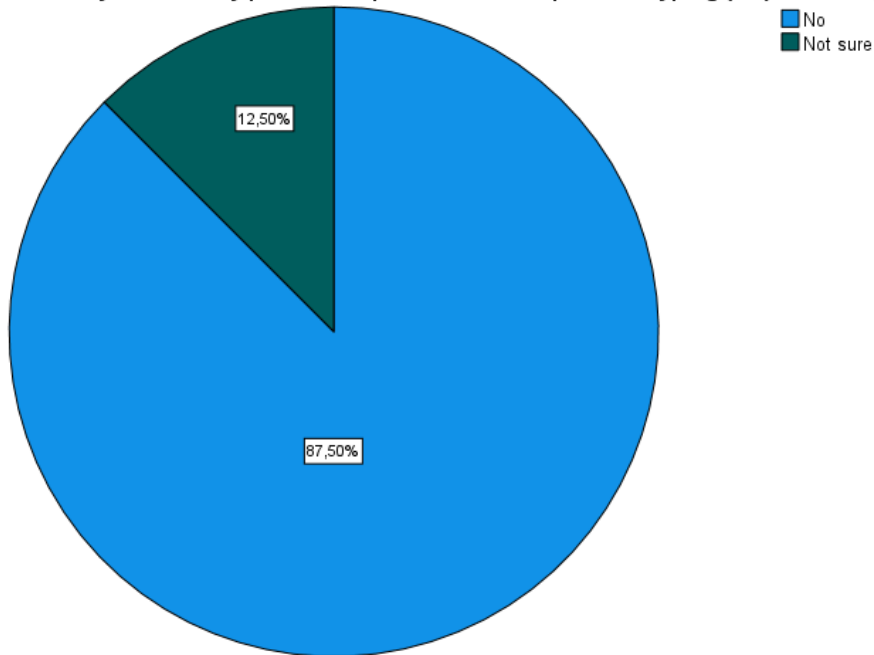
N	Valid	8
	Missing	7

08. Do you have any practical experience with Rapid Prototyping (RP) technologies?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	7	46,7	87,5	87,5
	Not sure	1	6,7	12,5	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		
Total		15	100,0		



08. Do you have any practical experience with Rapid Prototyping (RP) technologies?



09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

Of the 8 academics:

- 4 stated that their university is not equipped to incorporate PR into their curriculum
- 4 stated that they are not sure if their university is equipped to incorporate PR into their curriculum

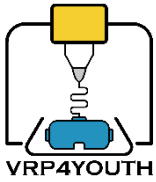
Statistics

09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

N	Valid	8
	Missing	7

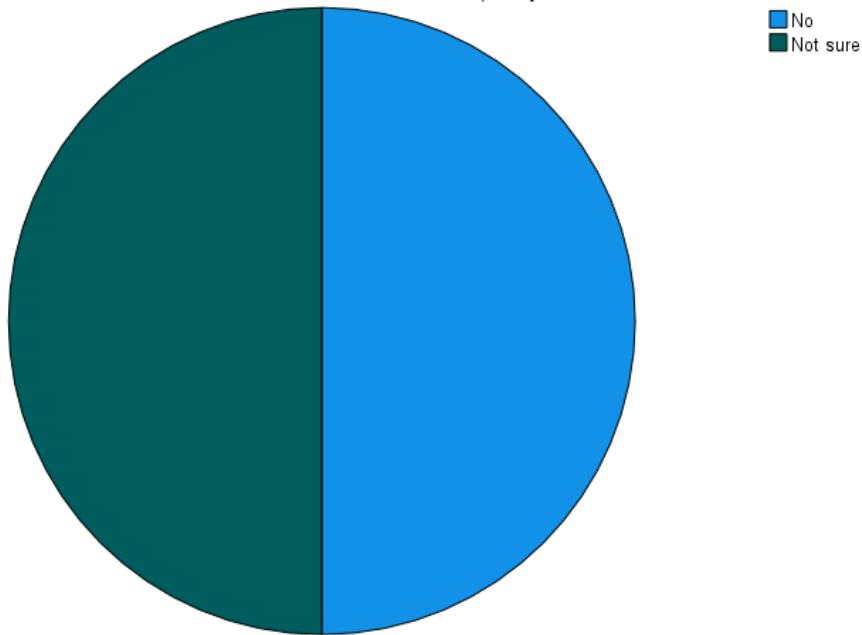
09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?

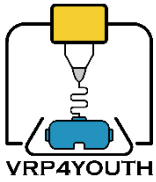
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	4	26,7	50,0	50,0
	Not sure	4	26,7	50,0	100,0
	Total	8	53,3	100,0	



Missing	3	7	46,7		
Total		15	100,0		

09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?





09. a) What equipment is available?

Of the 8 academics, none indicated equipment available at their university

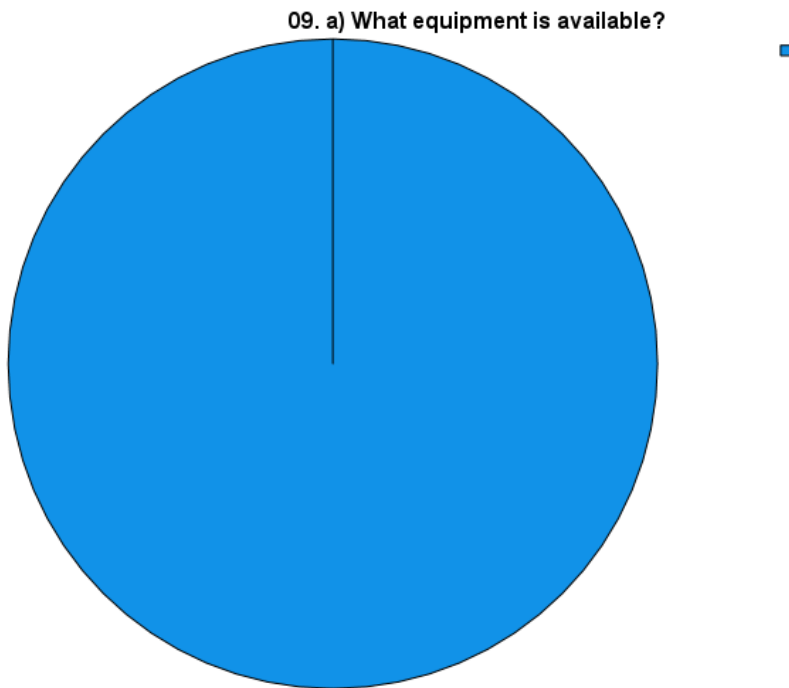
Statistics

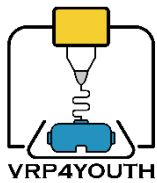
09. a) What equipment is available?

N	Valid	15
	Missing	0

09. a) What equipment is available?

	Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	15	100,0	100,0	100,0





10. Is there a possibility for cooperation between courses and private companies using RP?

Of the 8 academics:

- 2 stated that there is the possibility of collaborating with private companies using RP
- 3 stated that they are not sure whether there is a possibility of collaborating with private companies using RP

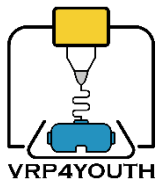
Statistics

10. Is there a possibility for cooperation between courses and private companies using RP?

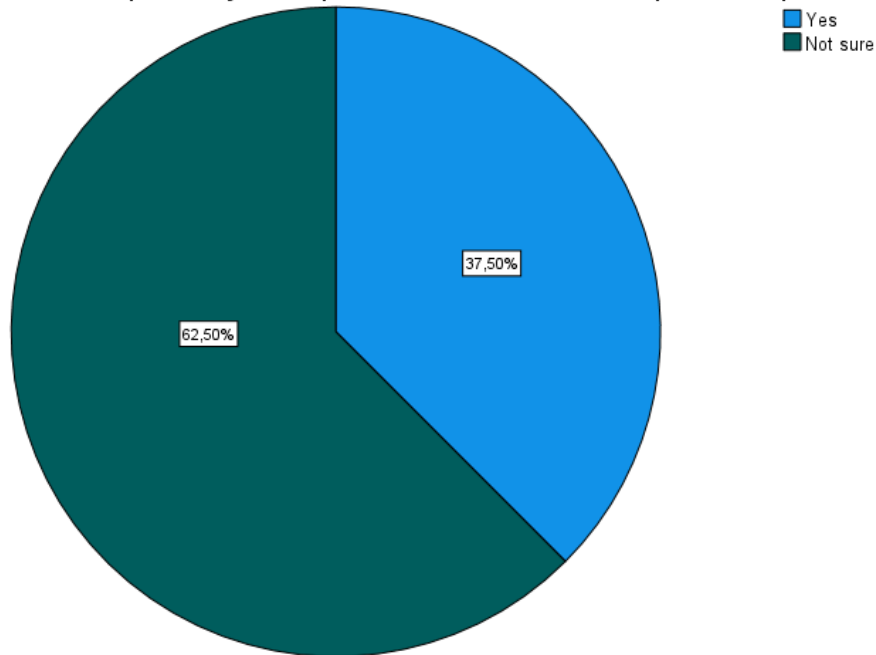
N	Valid	8
	Missing	7

10. Is there a possibility for cooperation between courses and private companies using RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	3	20,0	37,5	37,5
	Not sure	5	33,3	62,5	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		
Total		15	100,0		



10. Is there a possibility for cooperation between courses and private companies using RP?



11. Do you have an RP curriculum established at your university at the moment?

Of 8 academics:

- 5 stated that no RP curriculum is currently established at their university
- 3 stated that they were not sure whether an RP curriculum was currently established at their university

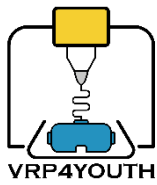
Statistics

11. Do you have an RP curriculum established at your university at the moment?

N	Valid	Missing
	8	7

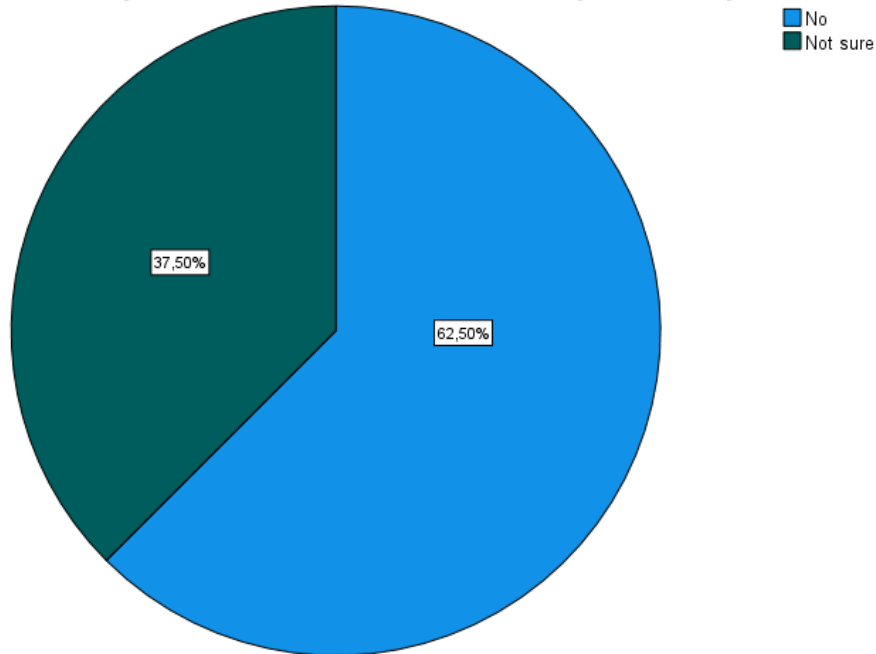
11. Do you have an RP curriculum established at your university at the moment?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	5	33,3	62,5	62,5
	Not sure	3	20,0	37,5	100,0
	Total	8	53,3	100,0	
Missing	3	7	46,7		



Total	15	100,0		
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11. Do you have an RP curriculum established at your university at the moment?



Results of the answers provided by the 5 representatives of companies in the sector

01. What is your gender?

Of the 5 industry representatives

- 2 claimed to be female
- 1 claimed to be male
- 2 did not reply

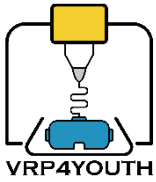
Statistics

01. What is your gender?

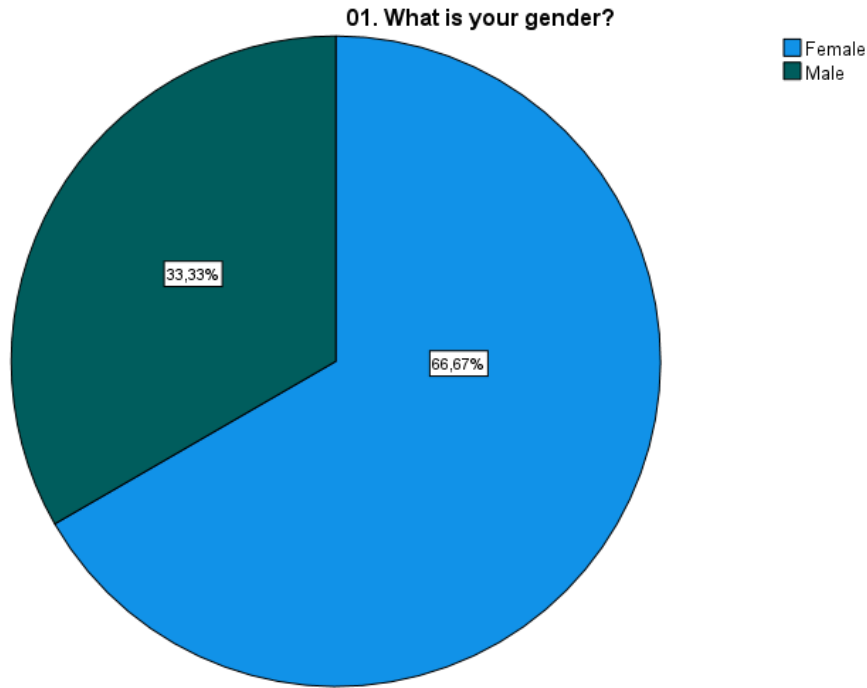
N	Valid	3
	Missing	12

01. What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Female	2	13,3	66,7	66,7
	Bad	1	6,7	33,3	100,0



Total	3	20,0	100,0
Missing System	12	80,0	
Total	15	100,0	



02. In which sector does your company operate?

Below are the answers of the 5 representatives of companies in the sector, regarding the sectors in which their companies operate.

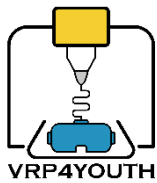
Statistics

02. In which sector does your company operate?

N	Valid	5
	Missing	10

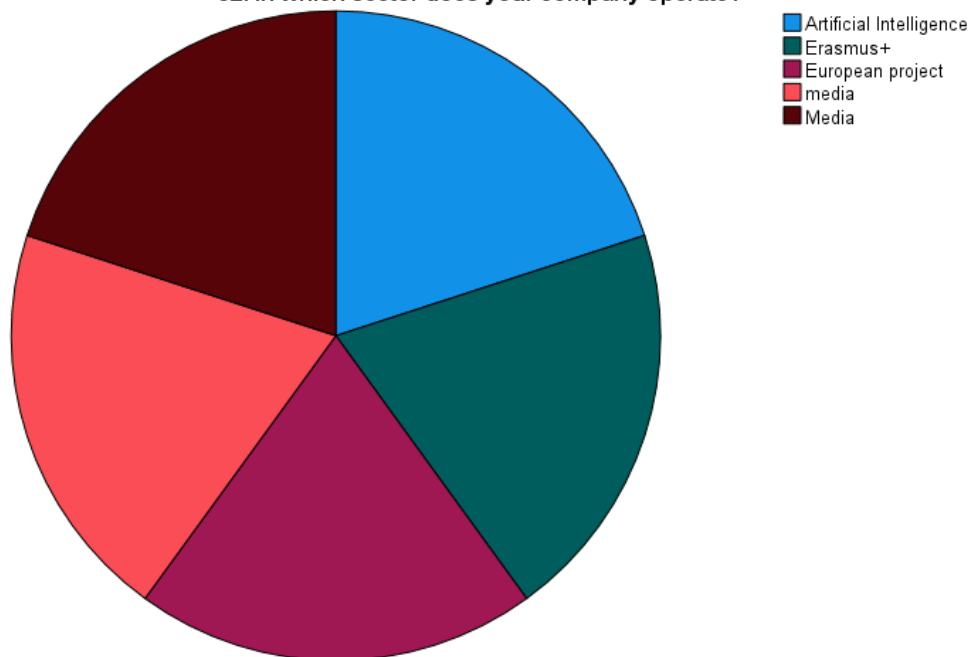
02. In which sector does your company operate?

Frequency	Percent	Valid Percent	Cumulative Percentage
-----------	---------	---------------	-----------------------



Valid	Artificial Intelligence	1	6,7	20,0	20,0
	Erasmus+	1	6,7	20,0	40,0
	European project	1	6,7	20,0	60,0
	media	1	6,7	20,0	80,0
	Media	1	6,7	20,0	100,0
	Total	5	33,3	100,0	
Missing	6	10	66,7		
Total		15	100,0		

02. In which sector does your company operate?



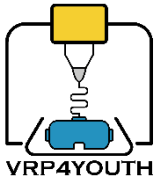
03. Have you ever heard about Virtual Reality (VR)?

Of the 5 industry representatives, all said they had heard about Virtual Reality (VR)

Statistics

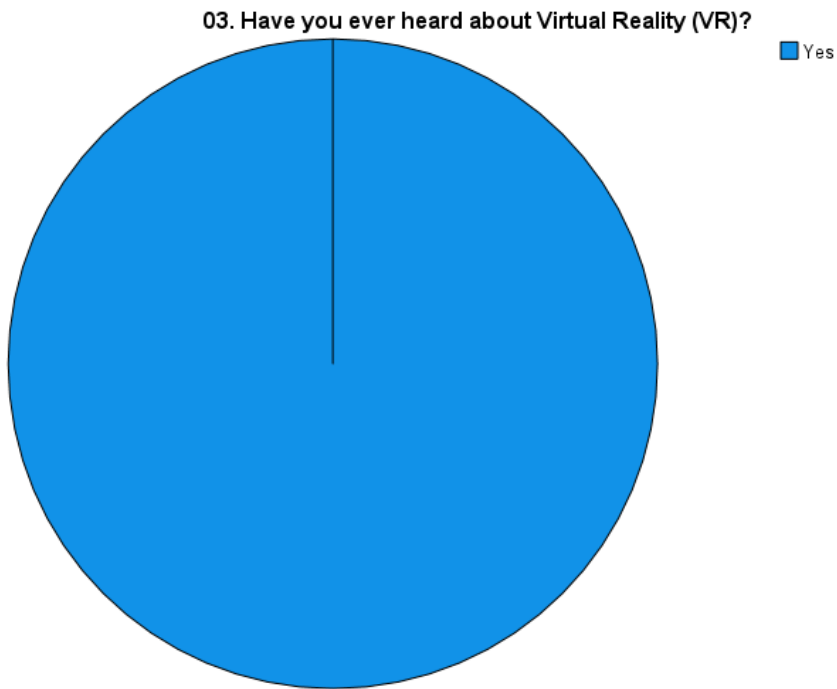
03. Have you ever heard about Virtual Reality (VR)?

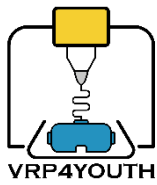
N	Valid	5
	Missing	10



03. Have you ever heard about Virtual Reality (VR)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	5	33,3	100,0	100,0
Missing	2	10	66,7		
Total		15	100,0		





04. Do you know any practical purpose of Virtual Reality (VR)?

Of the 15 industry representatives, all stated that they knew some practical purpose of Virtual Reality (VR)

Statistics

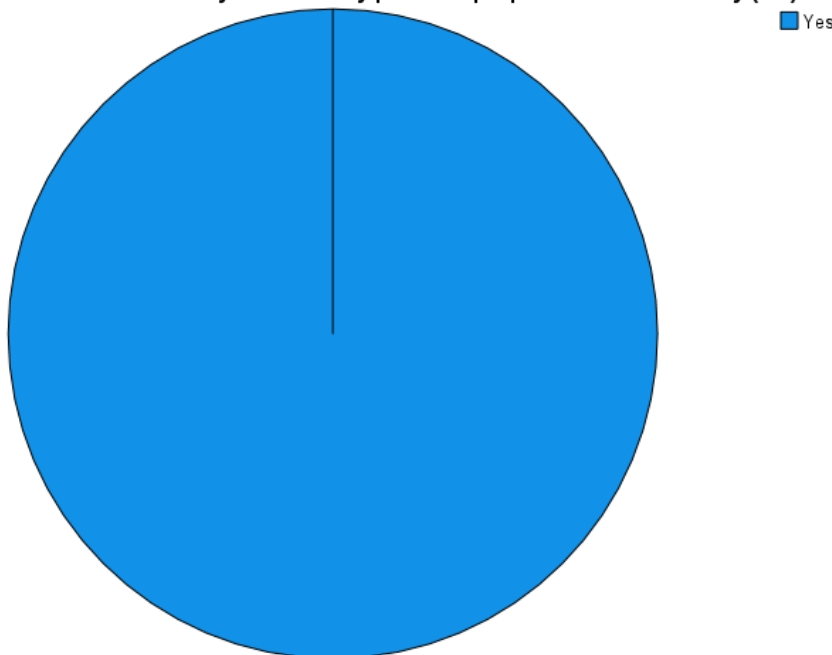
04. Do you know any practical purpose of Virtual Reality (VR)?

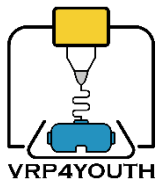
N	Valid	5
	Missing	10

04. Do you know any practical purpose of Virtual Reality (VR)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	5	33,3	100,0	100,0
Missing	2	10	66,7		
Total		15	100,0		

04. Do you know any practical purpose of Virtual Reality (VR)?





05. Are there any VR-focused applications in your company?

Of the 5 industry representatives:

- 2 stated that there are applications focused on Virtual Reality (VR) in their company
- 3 have stated that there are no Virtual Reality (VR)-focused applications in their company

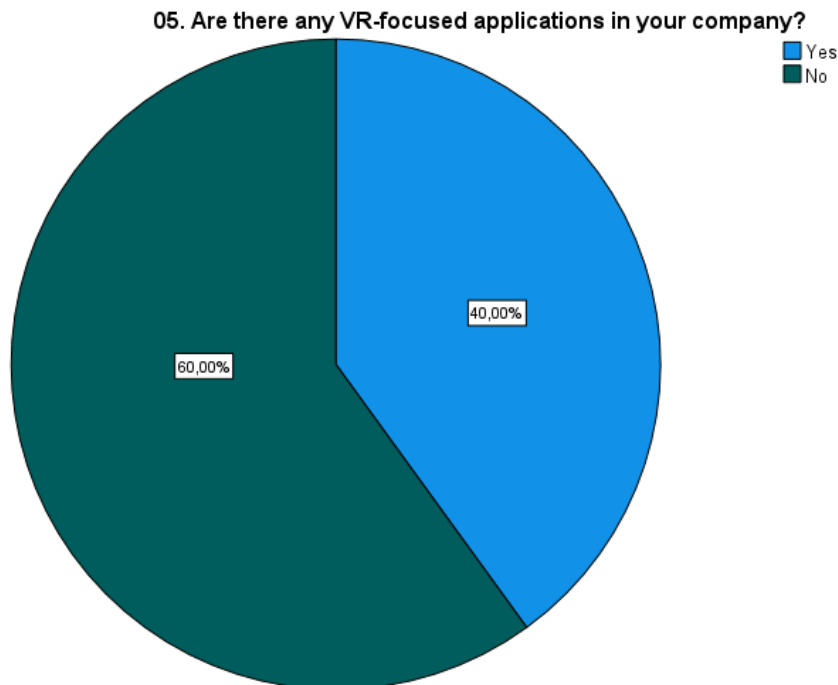
Statistics

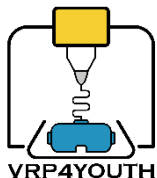
05. Are there any VR-focused applications in your company?

N	Valid	5
	Missing	10

05. Are there any VR-focused applications in your company?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	40,0	40,0
	No	3	20,0	60,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		





06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, consoles, etc., for example)?

Of the 5 industry representatives:

- 1 stated that their company has adequate equipment for VR-centred applications
- 4 stated that their company does not have adequate equipment for VR-centred applications

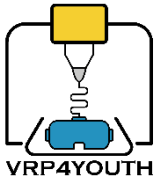
Statistics

06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, consoles, etc., for example)?

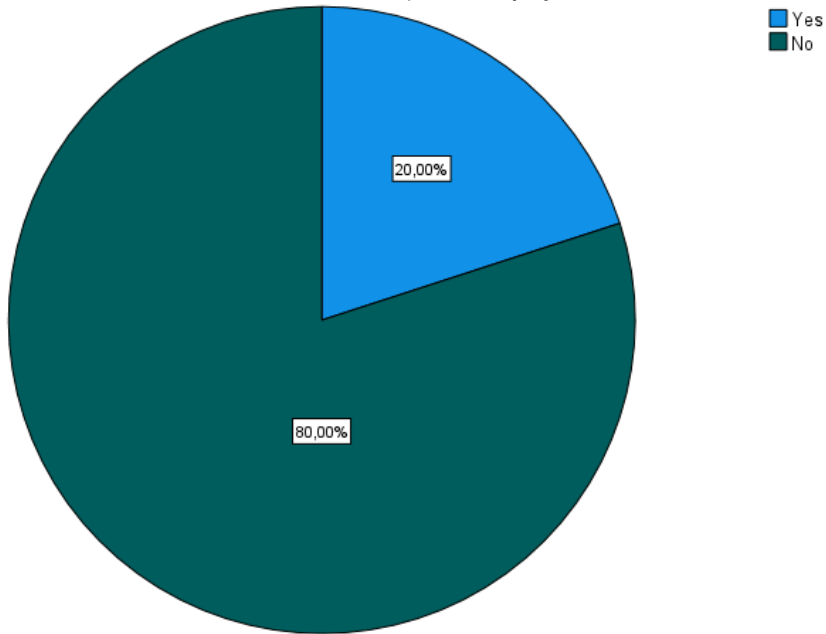
N	Valid	5
	Missing	10

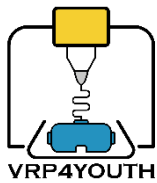
06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, consoles, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	6,7	20,0	20,0
	No	4	26,7	80,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		



06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?





07. Do you receive service support from different companies for VR-focused applications?

Of the 5 company representatives in the industry:

- 1 stated that they receive support from different companies for VR-focused applications
- 3 stated that they do not receive support from different companies for VR-focused applications
- 1 stated that he was not sure about receiving support from different companies for VR-focused applications

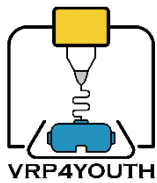
Statistics

07. Do you receive service support from different companies for VR-focused applications?

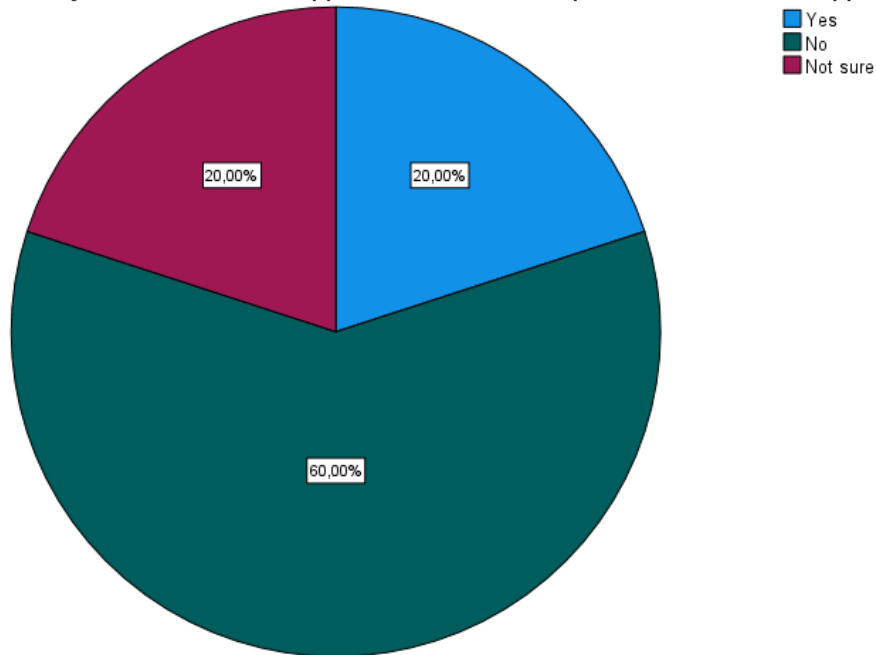
N	Valid	5
	Missing	10

07. Do you receive service support from different companies for VR-focused applications?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	1	6,7	20,0	20,0
	No	3	20,0	60,0	80,0
	Not sure	1	6,7	20,0	100,0
	Total	5	33,3	100,0	
Missing	4	10	66,7		
Total		15	100,0		



07. Do you receive service support from different companies for VR-focused applications?



08. Are there VR Integrated RP applications in your company?

Of the 5 industry representatives:

- 3 stated that there are no VR-integrated RP applications in their company
- 2 stated that they are not sure whether there are VR-integrated RP applications in their company

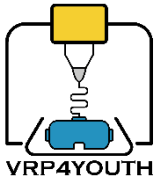
Statistics

08. Are there VR Integrated RP applications in your company?

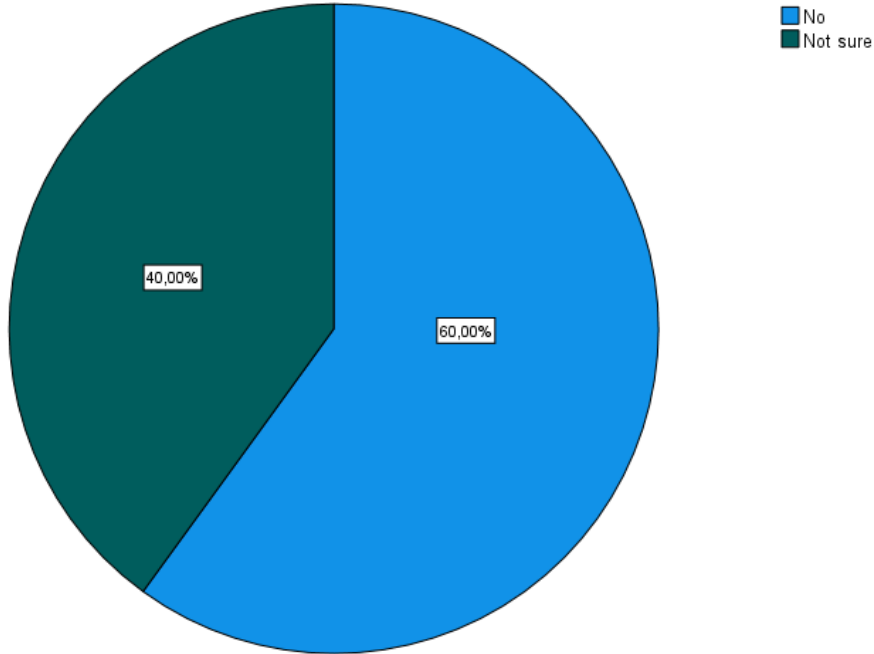
N	Valid	5
	Missing	10

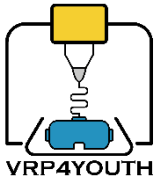
08. Are there VR Integrated RP applications in your company?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	3	20,0	60,0	60,0
	Not sure	2	13,3	40,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		



08. Are there VR Integrated RP applications in your company?





09. Have you ever heard about Rapid Prototyping (RP)?

Of the 5 industry representatives:

- 2 stated that they had already heard of rapid prototyping (RP)
- 3 stated that they had never heard of rapid prototyping (RP)

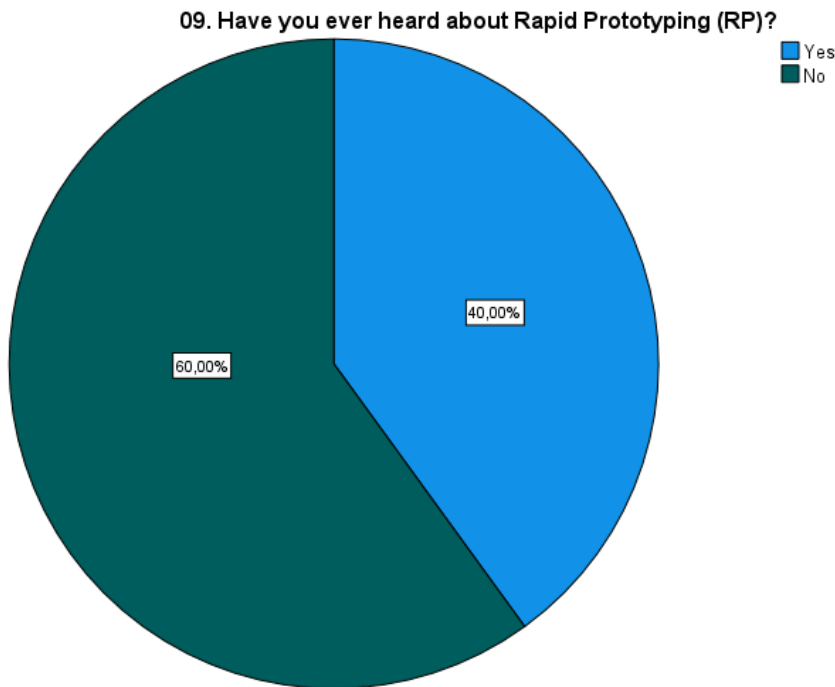
Statistics

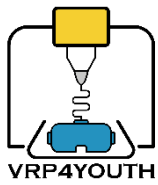
09. Have you ever heard about Rapid Prototyping (RP)?

N	Valid	5
	Missing	10

09. Have you ever heard about Rapid Prototyping (RP)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	40,0	40,0
	No	3	20,0	60,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		





10. Do you know any practical purpose of RP?

Of the 5 industry representatives:

- 2 stated that they knew some practical purpose of rapid prototyping (RP)
- 3 stated that they did not know any practical purpose of rapid prototyping (RP)

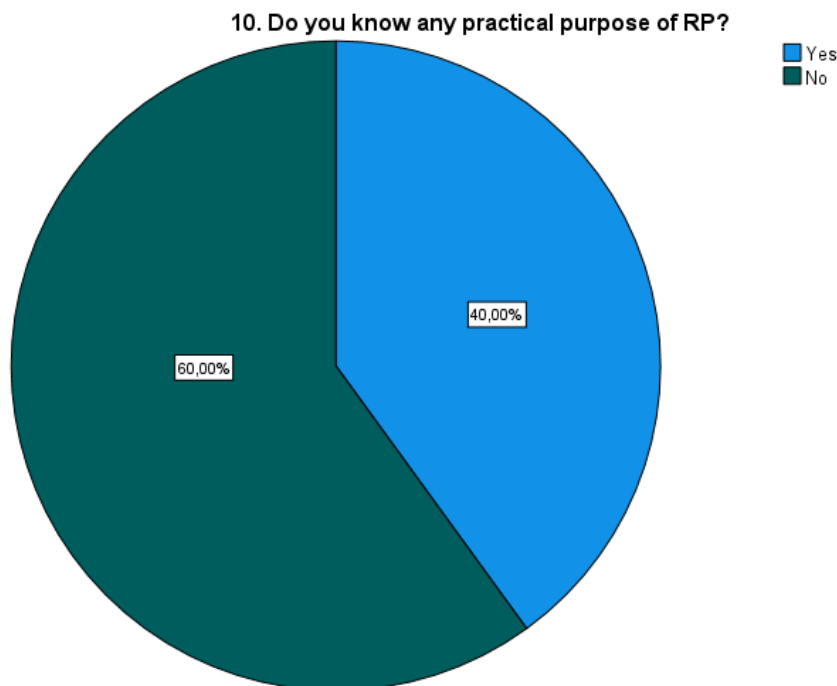
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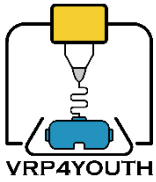
10. Do you know any practical purpose of RP?

N	Valid	5
	Missing	10

10. Do you know any practical purpose of RP?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	Yes	2	13,3	40,0	40,0
	No	3	20,0	60,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		





11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

Of the 5 company representatives, all stated that there are no RP-focused applications in your company

Statistics

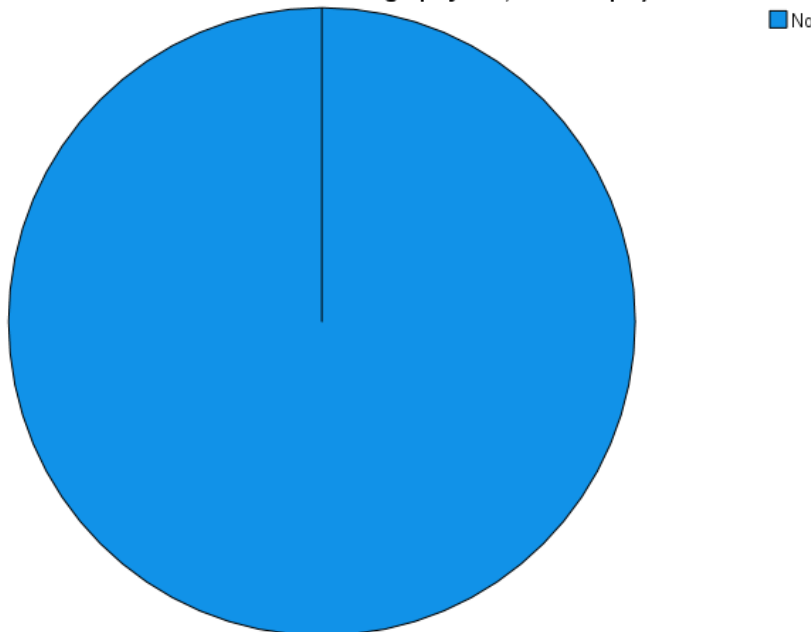
11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

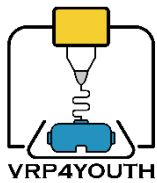
N	Valid	5
	Missing	10

11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	5	33,3	100,0	100,0
Missing	2	10	66,7		
Total		15	100,0		

11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?





12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

Of the 5 representatives of companies in the sector:

- 4 stated that their company does not have adequate equipment for applications focusing on rapid prototyping (RP)
- 1 stated that they are not sure whether their company has adequate equipment for applications focusing on rapid prototyping (RP)

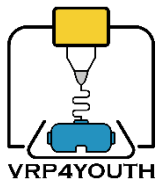
Statistics

12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

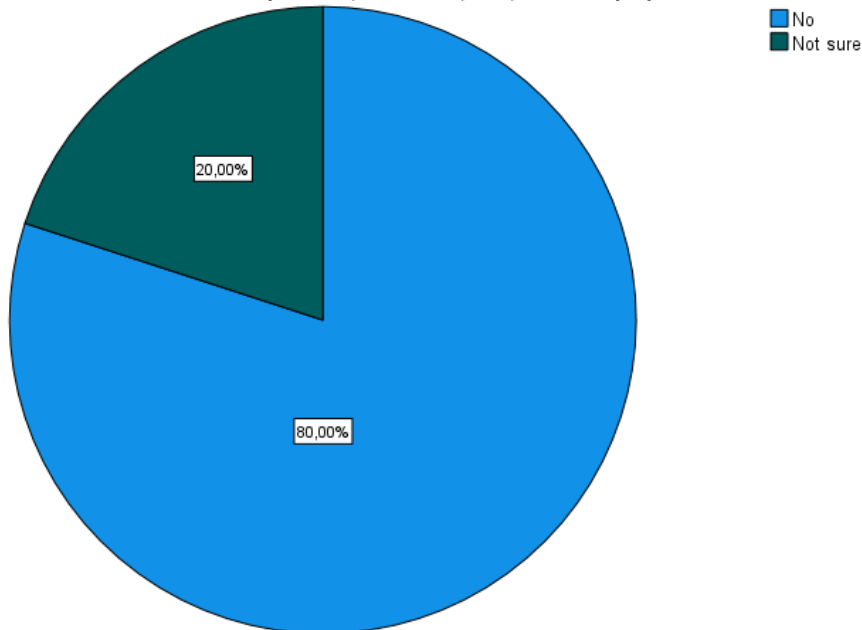
N	Valid	5
	Missing	10

12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?

		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	4	26,7	80,0	80,0
	Not sure	1	6,7	20,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		
Total		15	100,0		



12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?



13. Do you receive service support from different companies for RP-focused applications?

Of the 5 company representatives in the sector:

- 4 stated that they do not receive support from different companies for applications focused on rapid prototyping (RP)
- 1 stated that he was not sure about receiving support from different companies for applications focused on rapid prototyping (RP)

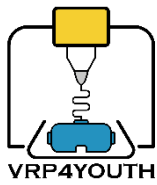
Statistics

13. Do you receive service support from different companies for RP-focused applications?

N	Valid	Missing
	5	10

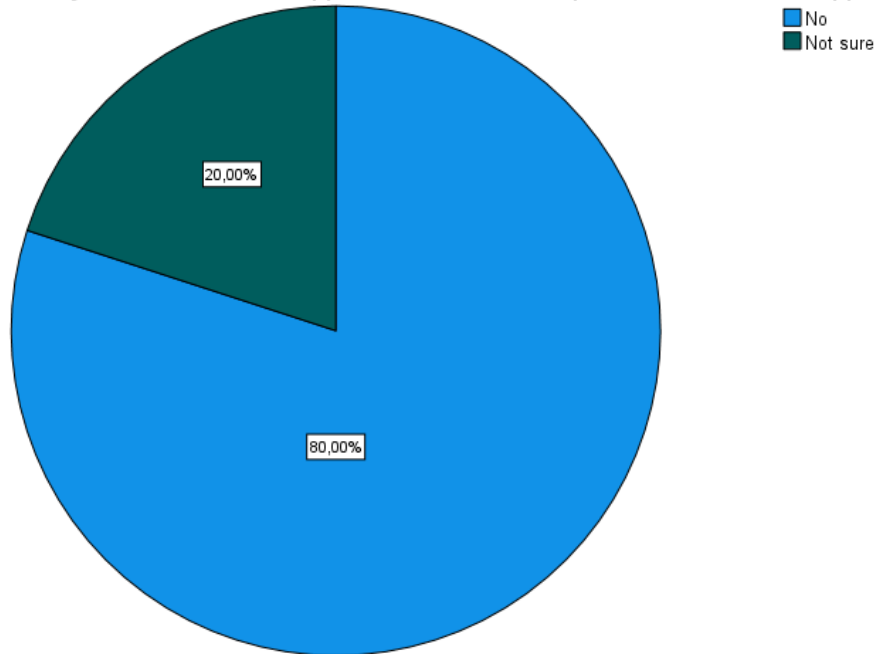
13. Do you receive service support from different companies for RP-focused applications?

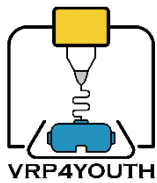
		Frequency	Percent	Valid Percent	Cumulative Percentage
Valid	No	4	26,7	80,0	80,0
	Not sure	1	6,7	20,0	100,0
	Total	5	33,3	100,0	
Missing	3	10	66,7		



Total	15	100,0		
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13. Do you receive service support from different companies for RP-focused applications?





4. Focus Groups in Italy

Moderator

The moderator was for GODESK Mr. Antonino Imbesi, with the following characteristics

- A business consultant
- Over 1,000 hours as a trainer
- A lot of experience in KA2 Projects, with many of them also related to AR

Participants' Profile

Gender: 7 Adult (4 men and 3 women)

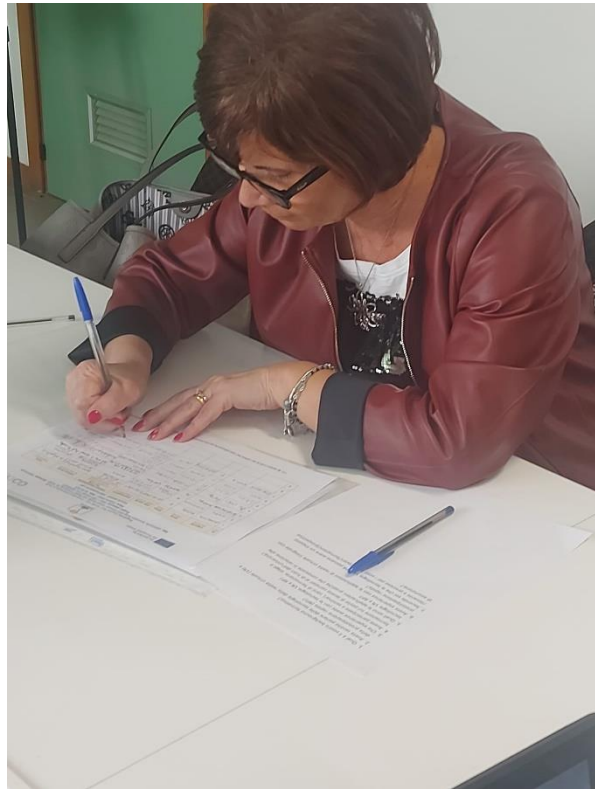
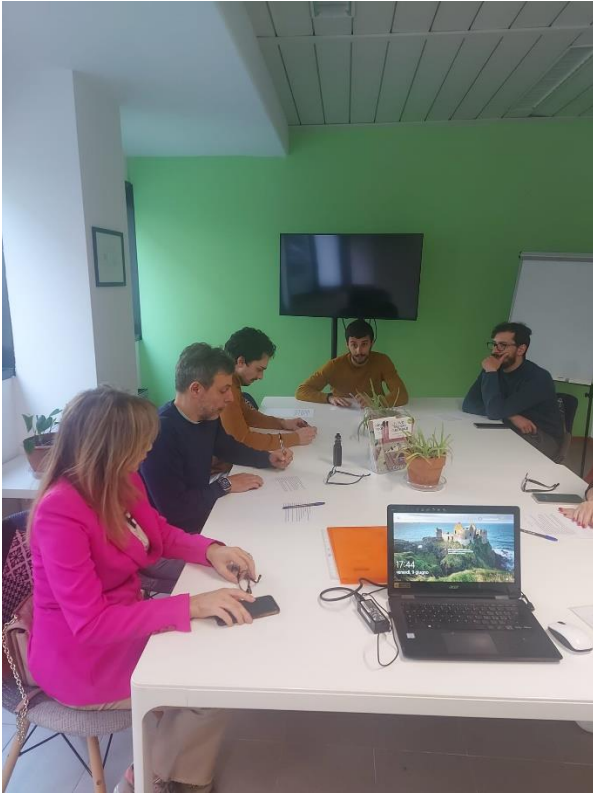
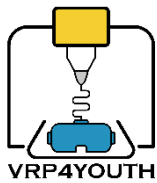
Age: 20-55 years old

Type of participants:

- 1 academician
- 3 representatives of companies working in the sector
- 3 University students

Photos

Below some photos of the focus group.



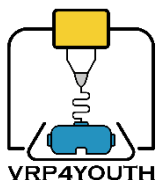
Date of the activity

The Focus Group was developed on 09/06/2023 in the offices of Godesk in Potenza.

List signed

All the participants signed a list with personal details to have another prove of their effective participation to the Focus Group activities.

Below a photo of the list signed.



Co-funded by
the European Union



Programme: Erasmus Plus - KA220-YOU - Cooperation partnerships in Youth
 Title: VRP4Youth: Innovative Integration between Virtual Reality and Rapid Prototyping for Youth – Acronym: VRP4Youth
 Project reference: 2022-1-TR01-KA220-YOU-000089257
 Place: Potenza (Italy) – Date: 09.06.2023

FOCUS GROUP - PARTICIPANTS LIST

Nr. (Nr.)	Cognome (Surname)	Nome (Name)	Sesso (Sex)	Data nascita (Date of birth)	Organizzazione (Organization)	Indirizzo Organizzazione Via e città (complete address – street and town)	Indirizzo Email (E-mail address)	Firma (Signature)
1.	LAGROTTA	ANNA	F	18/04/1969	EURO-NET	VICOLO LUIGI LA VISTA, 3 - POTENZA -	anna.lagrotta@gmail.com	<i>Anna Lagrotta</i>
2.	IMBESI	GIOVANNA	F	13.01.2003	UNIVERSITA' SAPIENZA	ROMA	giovanna.imbesi@gmail.com	<i>Giovanna Imbesi</i>
3.	BUONPASTORE	MATTEO	M	10/01/1995	UNIBAS	POTENZA, VIA DELL'ATELIERO LUCANO	matteo.buonpastore@gmail.com	<i>Matteo Buonpastore</i>
4.	DE CARLO	PIETRO	M	21/12/2000	UNIBAS	POTENZA, VIA DELL'ATELIERO LUCANO	decarlopietro@gmail.com	<i>Pietro De Carlo</i>
5.	LORENZO	MICHELE	M	09/07/1973	SPARKLY	POTENZA, VIA DELLA TECNICA, 15	mlorenz@sparkly.it	<i>Michele Lorenzo</i>
6.	TEDESCHI	NICHÉGE	F	11/01/1992	SPARKLY	POTENZA, VIA DELLA TECNICA, 15	nichige@sparkly.it	<i>Nichége Tedeschi</i>
7.	SCAIRONE	MARIA	F	26/08/1978	UNITE	TERAMO, VIA R. BALZARINI, 1	m.scairone@unite.it	<i>Maria Scairone</i>
8.								
9.								

P.A. My signature in the list also confirms that I have authorized the use of my personal details in accordance with the GDPR regulation of European privacy

How was it conducted

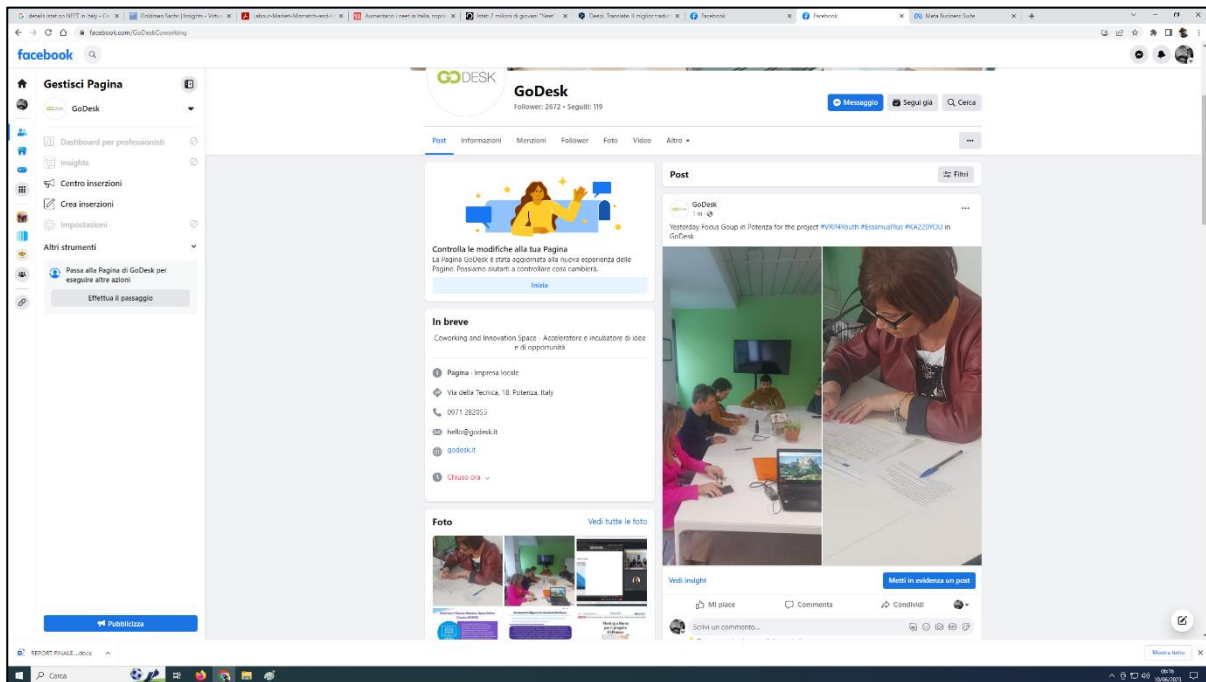
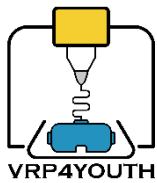
The moderator:

- introduced the purpose of the focus group,
- reminded the participants that the focus group was directed to promote gender equality and to encourage equal participation from all participants.
- explained the structure of the focus group discussion,
- provide the participants with an overview of the questionnaire to be discussed
- encouraged participants to share their experiences, feedbacks and opinions openly and honestly.

Post on Facebook

The Focus Group was promoted on Facebook in 2 accounts (personal one of Imbesi Antonin and company page of Godesk).

Below the screenshot:



Questions done and answers received:

Below is a summary of the answers received during the focus group from each participant

1) What is your educational background?

P1 - Secondary school and university teacher and head of an organisation working in the field

P2 - Student at Sapienza University of Rome

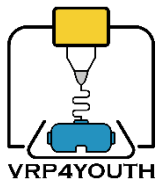
P3 - I studied Computer Science and Technology at the University of Basilicata and currently study Computer Engineering

P4 - Computer Science and Technology at UNIBAS

P5 - Phd. Comparative Politics

P6 - Graduated in Computer Science and Technology. I am now a developer at Sparkly SRL

P7 - University lecturer at the University of Teramo. Degree in Food Science and Technology. PhD in Food Science



2) Have you heard of virtual reality (VR) and rapid prototyping (RP) technologies?

P1 - As an organisation, we have implemented projects in the field of augmented reality and others in virtual reality. Both new technologies have been applied in European projects of the Erasmus+ programme

P2 - I am familiar with both technologies and some of their applications. I consider their knowledge and use fundamental in today's labour market

P3 - Yes of both

P4 - Yes

P5 - Work in the field of augmented reality

P6 - Yes, I work in a similar field to VR. However, I am not familiar with rapid prototyping

P7 - I have only heard of virtual reality. Of rapid prototyping I have no knowledge

3) What experiences do you have with VR and RP technologies?

P1 - Experience in the creation/organisation of multimedia content

P2 - Unfortunately, I have no direct experience yet

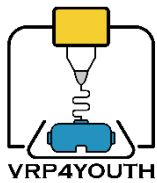
P3 - Mainly video games (VR) and rapid prototyping mostly in academia

P4 - No experience with these technologies.

P5 - A lot of experience although I don't call myself a real technician

P6 - I have tried VR several times for gaming or interactive experiences. No rapid prototyping experience

P7 - No experience with the technologies mentioned



4) Have you participated in seminars, training courses, internships or related on-the-job training outside the university?

P1 - Yes, we have organised several courses and lectures on augmented reality

P2 - To date, I have not yet had the opportunity to participate in such seminars/courses

P3 - No

P4 - No

P5 - Rather field experience

P6 - Not in this field

P7 - No participation either inside or outside the university

5) What practical applications do you know of in relation to VR and RP technologies?

P1 - Video games, web applications, educational content

P2 - Google Street view, New York Times VR, VR Roller Coaster and video games like Pokemon Go

P3 - On visors: HTC Vive, Oculus Riet, Apple Vision Pro and Metaverse application

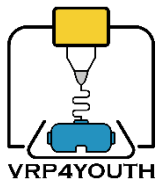
P4 - Metaverse, video games, visors

P5 - Making prototypes of 3D glasses

P6 - Experience in advertising products, job training, games

P7 - A visualisation of reality, however I have no knowledge of practical applications

6) Do you have experience with virtual reality applications integrated with rapid prototyping?



P1 - I attended a seminar related to the design of low-carbon printed houses.

P2 - I have no experience

P3 - No

P4 - No

P5 - No

P6 - No

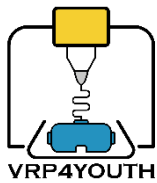
P7 - No experience

7) Do you think VR and PR technologies can have a relevant and valuable impact on your future jobs/training/employment prospects? Give your suggestions and opinions

P1 - I believe that exploring the potential offered by VR and RP for the creation of immersive learning experiences can complement normal teaching activities and foster the development of students' digital skills, enhancing their potential. Companies could work alongside universities in building an educational offer consistent with the idea of 'new' learning. There is a need to streamline the study and make it more modern and attractive in certain areas such as STEM: this will also affect the recruitment process, ensuring that innovation and growth continue to strengthen an ever-expanding market.

P2 - VR and RP technologies already have and will also have an impact on society and the world of work in the future. It would be necessary, however, in my opinion, to find the right balance between this 'super-reality' proposed by the new technologies and the real reality that tends, in fact, to gradually fade away. They are, in my opinion, transversal technologies that will be applied in the various fields according to the individual situations and the development of the job market.

P3 - In my opinion it will be an important part of many people's lives in the future. I can certainly say that the use of AR or VR is actually developing according to the needs of companies and, in the future, their knowledge could be asked as a required skill in many



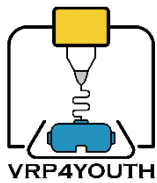
jobs. Through the use of digital tools, a learner can become an active participant to the lesson and find more job opportunities for sure.

P4 - I don't know at the moment. Probably in the future, yes. For sure it will always be easier using these technologies to save time, to plan better travels and to learn more, also because we can use them using only a mobile phone or a tablet.

P5 - Absolutely. In fact, it will be the future way of working, at least in design and digital areas, especially because these tools for the new generations should be as easy and intuitive as using a mobile phone. Of course, this means that companies, schools and universities have to invest in this direction, changing the rules of the lessons and creating new ways of learning, which can use more and better new technologies.

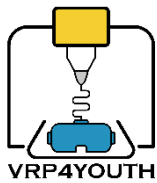
P6 - Yes, for technical training in the workplace. Compared to the past we live in a new reality in which every is increased and changed. It is clear that these are tools that can facilitate a lot learning and create new job opportunities. But, of course, we have to take into consideration that the problem is not the technology, that can be easily learned, but the content to be learned to have a good knowledge and real opportunities.

P7 - I think so. It would be necessary to go deeper into the areas of applicability and exploit the potential of these new resources. Probably the university should do more in this direction because the didactics, using these tools or digital technologies in general can become more interactive, certainly facilitating the learning of a topic and making it more interesting for a learner. Increasingly, companies are realising how important it is to remain attractive to the labour market. In an economic context in which the crisis tends to some extent to freeze initiatives and investments aimed at the inclusion of talent, it becomes even more strategic to keep the focus on the development of internal talent, while being aware that the more professionalised young people become, the more their attractiveness to the external market increases.

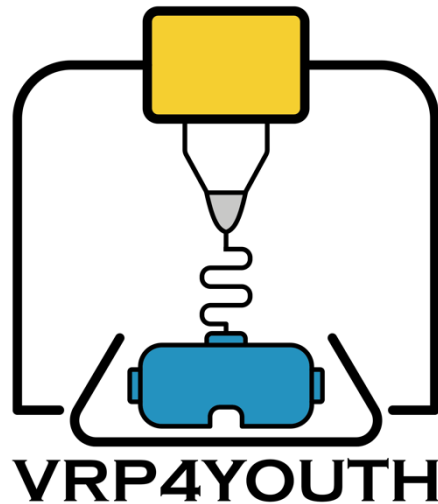


4. References

- Goldman Sachs Research- 2021
- IDC's Worldwide Semiannual Augmented and Virtual Reality Spending Guide - 2020
- The Future Of Productivity: Main Background Papers - by Müge Adalet McGowan and Dan Andrews - OECD Economic Department Working Paper no.1209 - 2015
- ISTAT statistic - 2021



Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)
2022-1-TR01-KA220-You-000089257
WP2 – Research Report on the Needs of Youth Regarding VR and RP



Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

Project Number: 2022-1-TR01-KA220-YOU-000089257

Work Package 2

Research Report on the Needs of Youth Regarding VR and RP

PARTNER

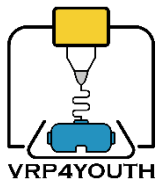
Instituto Politécnico do Porto
(Portugal)



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Report Contents

- Work package 2 includes an introduction about the state of the art regarding VR and RP affecting their employment in related industries in the partners country;
- Research data collected from unemployed youth, academicians, and the representatives of related industries through surveys;
- The implementation and analyses of a focus group meeting with unemployed youth, sector representatives, and academicians;
- The transcription of the focus group;
- The raw data of the survey.

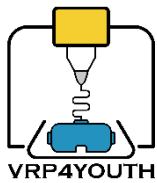


Table of Contents

1. Theoretical Background

1.1 VR and RP in Portugal

Portugal has been at the centre of some experiences in Virtual and Augmented Reality, especially for entertainment.

The Virtual Reality & Augmented Reality Association (VRARA), presented a map in Lisbon, where it shows a growing ecosystem, already with about 30 companies, which are classified by activity. "With this initiative, we can verify that there are many companies, in an ecosystem that integrates universities, and training centres and that already dynamizes several events", explained in a certain newspaper, the co-president of the Lisbon Chapter of VRARA. According to him, it is believed that, with the map they presented, they will be able to communicate to foreign investors that Portugal can host Competence Centres in this area. And he pointed out that at this moment they already have enough talent and national VR/RA experience.

(trans.*Realidade Virtual*, n.d.)

Reinforcing the popularity of VR for entertainment, it is possible to find at Porto city center a 300m² fully dedicated to VR. Viral VR offers a wide variety of experiences and equipment to its visitors.

Despite the strength of entertainment, it is possible to see in the figure below that there is a wide variety of markets using VR as a tool.

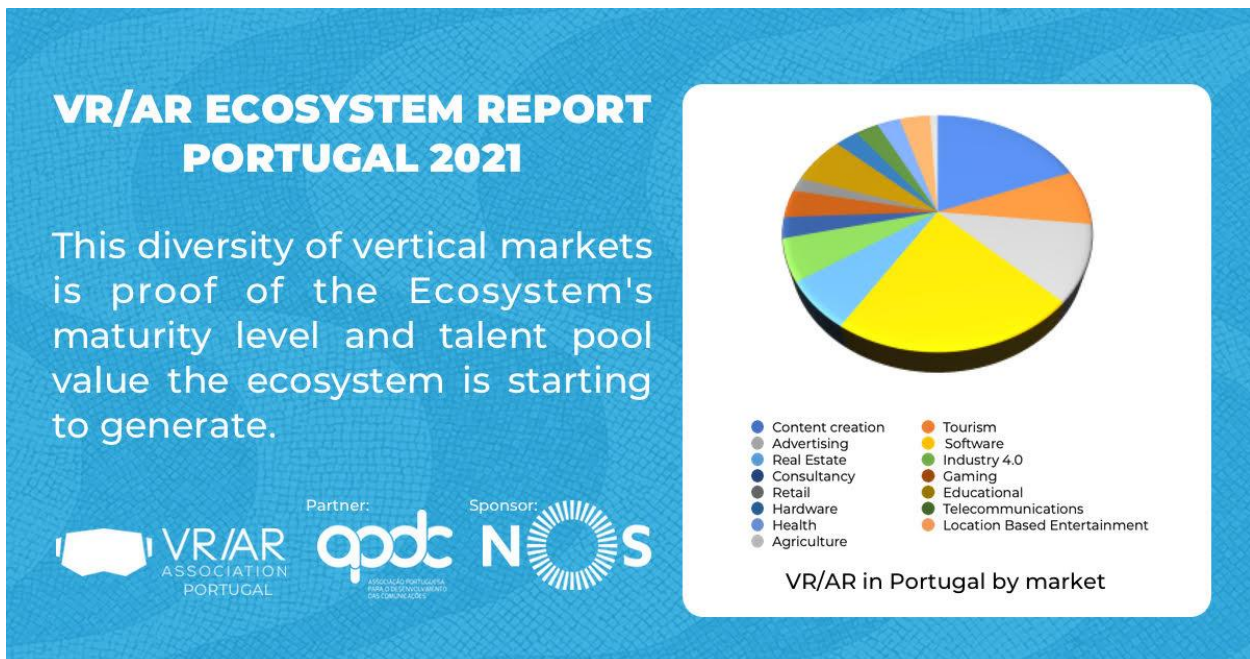
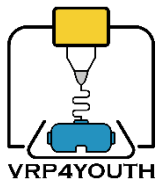


Figure 1

This figure, from the 2021 VR/AR Association Portugal report (Teunen et al., 2021), shows the distribution of the use of VR in different fields of expertise.

According to this report, most of the companies dedicated to VR are startups and small companies which are mostly located in the Lisbon area.

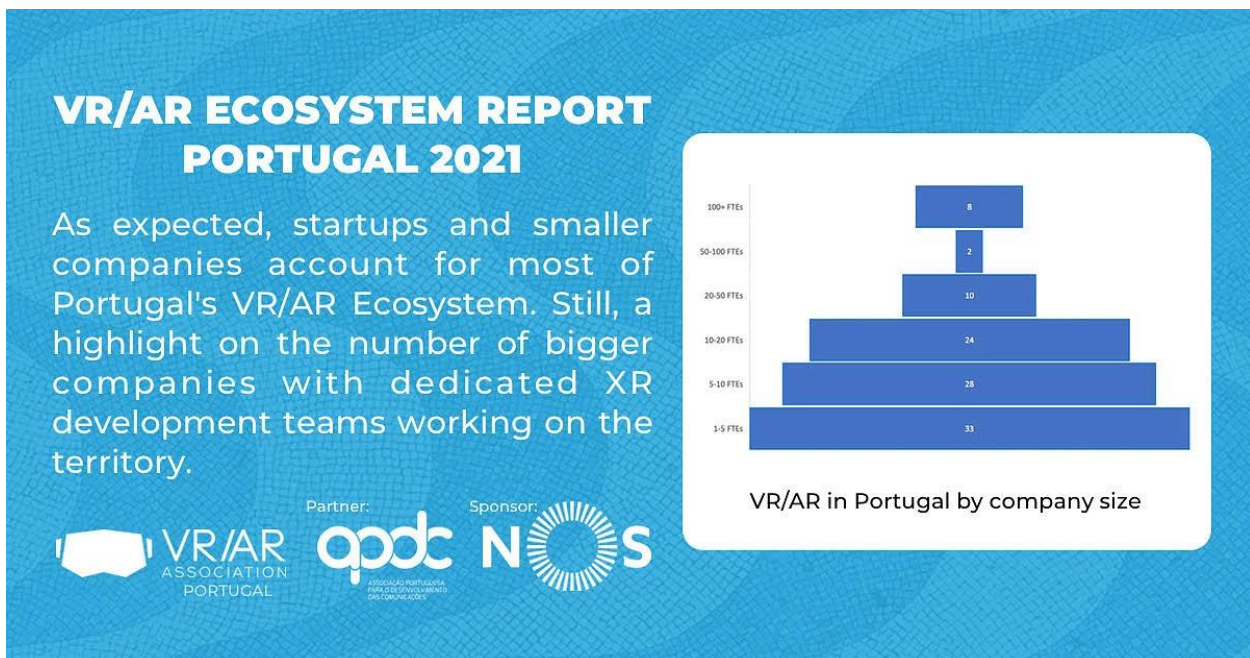


Figure 2

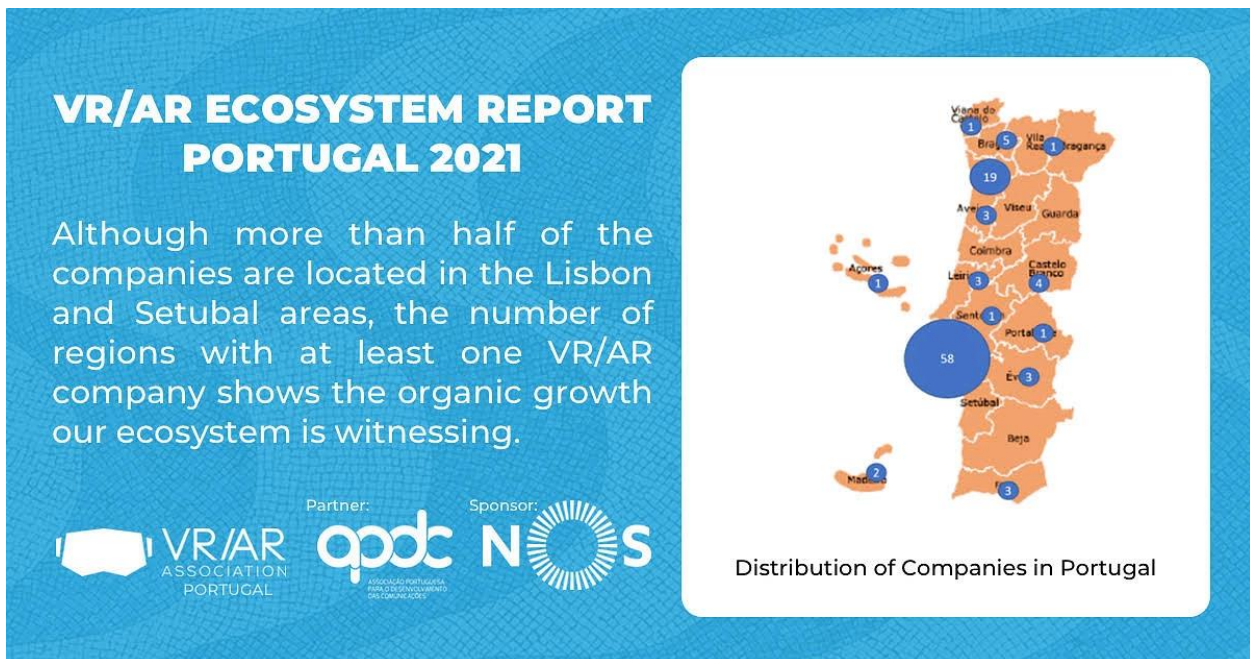
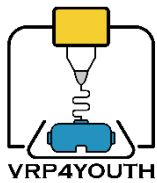


Figure 3

The importance of VR for the labor market is also shown by the fact that this is a growing topic in Academia as it is proven by the several existing laboratories dedicated to researching and teaching VR.

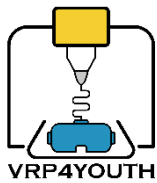
Some examples:

- ✓ [Laboratório de reabilitação Psicossocial \(Psychosocial Rehabilitation Laboratory\)](#) - School of Health of the Polytechnic of Porto and the Faculty of Psychology and Education Science of the University of Porto.
- ✓ [Laboratório de Realidade Virtual \(Virtual Reality lab\)](#) - Lisbon School of Architecture
- ✓ [VR-BIM A+: Laboratório de Realidade Virtual BIM para a Indústria da Arquitetura, Engenharia e Construção \(BIM Virtual Reality lab for Architecture Industry, Engineering, and construction\)](#) - Minho School of Engineering
- ✓ [Laboratório de Computação Gráfica e Ambientes Virtuais \(Laboratory of Computer Graphics and Virtual Environments\)](#) - Institute for Systems and Computer Engineering, Technology and Science

As for Rapid Prototyping it is possible to find companies providing services in RP for different areas, especially industry.

Companies such as:

- ✓ [DT2 New Concept – The Rapid Manufacturing Center](#)
- ✓ [ISQ](#)
- ✓ [SOLIDTECH](#)

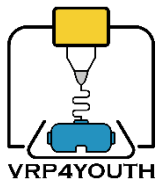


- ✓ [Iigus motion plastics](#)

are some examples of those whose main activity is RP and the creation of different solutions for their clients.

In terms of training in this field one can find different types of vocational training specifically dedicated to tasks related to RP. Some universities offer some Curricular Units in RP, as is the case of the University of Aveiro with the Curricular unit of [Rapid Prototyping Techniques](#) in the field of Mechanical Engineering.

A fully dedicated course on RP can be attended at the University of Algarve: the Postgraduate Course in Design and Rapid Prototyping.



2. Results and Discussion of the Survey Implementation

The survey aimed to gather insights from three key groups: sector representatives, academicians, and unemployed youth. A total of 35 participants took part in the survey, with 5 unemployed youth, 24 academicians, and 6 sector representatives providing valuable insights.

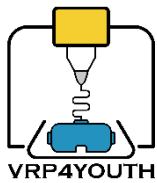
2.1. Participant Demographics

Among the 5 unemployed youth who participated in the survey, 3 were females and 2 were males. These young participants held degrees primarily in engineering, translation, and social sciences. The 24 surveyed academicians consisted of 11 males, 12 females, and one person who did not identify with traditional gender roles. Their fields of expertise ranged from multimedia to social sciences. The 6 sector representatives comprised 3 males and 3 females, and they primarily operated in the logistics and social sector industries.

2.2. Knowledge and Practical Experience – Virtual Reality

The survey findings revealed that all unemployed youth participants had knowledge about VR technology, and all of them were aware of its practical benefits. However, only 60% of them were familiar with the practical benefits of RP. Interestingly, 60% of the participants were unsure if their university curriculum included a VR-oriented course, and 40% were not even aware of the existence of such a course. Additionally, only 20% of the unemployed youth had attended VR and/or RP-oriented courses or training programs.

Among the academicians, 54% reported having practical experience with VR technologies. About 33% stated that their departments lacked equipment for VR technology, while 38% indicated the presence of RP technology equipment, such as VR Glasses. Approximately 79% of the surveyed academicians identified VR-oriented cooperation opportunities with companies, while 21% were uncertain about RP-oriented cooperation opportunities. It is worth noting that 21% of the universities where the academicians worked did not have VR-integrated RP applications.



The survey found that 83% of sector representatives possessed knowledge about VR technology, while 50% had knowledge about the practical applications of RP. In terms of applications, only 16% of sector representatives stated that their companies had VR-focused applications, while 67% had no knowledge of RP-focused applications. Moreover, 100% of these representatives received support from different companies for VR-oriented applications.

2.3. Knowledge and Practical Experience – Rapid Prototyping

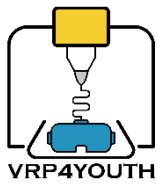
Regarding rapid prototyping, the survey revealed that 80% of the unemployed youth had never heard of it and were unable to identify any applications. Additionally, 40% were unsure if there were any higher education courses available on the subject. Only about 17% of the participants were able to recognize 3D printing as a rapid prototyping system.

Among the academicians, 21% had heard of rapid prototyping, and only 8% had knowledge of its implementation in their institution's curriculum, specifically mentioning 3D printing and CNC. However, 75% were uncertain about this information in their higher education institution's curriculum. About 54% of the academicians acknowledged the possibility of future cooperation between institutions and/or companies in rapid prototyping.

The sector representatives indicated a lack of knowledge about rapid prototyping, with 83% stating that they did not know of it. Consequently, 83% of the surveyed representatives were unaware of any practical purposes or applications of rapid prototyping. Only 17% reported having rapid prototyping available in their companies for use, and they did not receive any support from other companies.

2.4. Conclusion

These findings highlight the limited knowledge and awareness of VR and RP technologies among the surveyed participants, particularly in the context of rapid prototyping. The lack of dedicated courses and practical application opportunities in universities and institutions poses a challenge for both unemployed youth and academicians. To address these limitations, it is crucial to develop targeted training programs, workshops, and curriculum enhancements that focus on VR, RP, and rapid

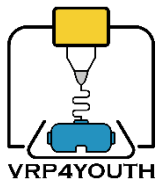


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prototyping. Additionally, fostering collaborations between academia and industry can help bridge the gap and ensure the practical integration of these technologies in various sectors.



3. Results of the Focus Group Implementation

14h00 | June 9, 2023 | São Mamede de Infesta, Porto

The focus group aims to gather insights on using and adopting Virtual Reality (VR) and Rapid Prototyping (RP) technologies among unemployed youth, academicians, and sector representatives. The focus is on identifying the needs and challenges young individuals face regarding these technologies and their impact on employability in various industries.

3.1. Objectives

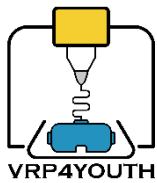
- Assess the current state and identify areas of improvement in bridging the skills gap for young individuals.
- Understand the practical applications of VR and RP technologies known to the participants.
- Explore the participants' experiences with VR and RP technologies, including any training or exposure they have had.
- Evaluate the perception of VR and RP technologies and their potential impact on future job prospects and training opportunities.

The focus group has followed a semi-structured format; the moderators followed predefined guidelines and a set of questions. However the conversation was flexible and allowed for spontaneous exploration of emerging themes and ideas. The focus is on capturing participants' thoughts and generating in-depth insights.

This group consisted of two unemployed youths, one academician, and two sector representatives, a total of five people. It encouraged the equal participation of both men and women to promote gender equality, being composed of 3 men and two women with higher education studies.

3.2. Key Findings

The focus group discussions on virtual reality (VR) and rapid prototyping (RP) revealed several key findings regarding the application and awareness of these technologies, particularly in the context of the classroom and educational settings.

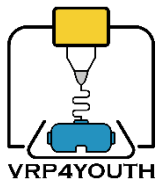


1. **Classroom Application:** The focus group participants consistently expressed a high interest in exploring VR technology's application within the classroom. Many participants highlighted its potential to enhance teaching and learning experiences by providing immersive and interactive educational content. They acknowledged the value of VR in creating engaging simulations, and hands-on experiences that could deepen students' understanding of complex concepts.

One participant stated, " *We did a pilot project that was precisely to use virtual reality to enhance oral skills learning. In this case, in a group of students of the degree course in consultancy and translation in English, I don't remember if it was the first or the second year. Still, the students were invited to use virtual reality to make a short presentation of 2 minutes maximum in front of a virtual audience, therefore, using this Virtual speech. We have already published two papers on this. It was done to understand what benefits this platform could bring us, but in fact, what pleased me the most was precisely, on the one hand, to realise that the students, although a little suspicious at first, actually managed to quickly adapt to this virtual audience, to this virtual reality and somehow, guided in this case, with the presence of 2 people in the room - Pedro, who did all the technical part and me, who was explaining more or less than the goal is more to actually use the machine in our favour, so, to overcome that fear of speaking. In this case it was a virtual audience so they didn't have to have those problems of shame and embarrassment, which are normal and often these barriers are very difficult to overcome in a language class. In my case of using, of doing so, in an English course, for example. So, to cut a long story short: I was very interested in it, I thought it worked very well. We don't use all the features of Virtual Speech. We only used the classroom context and the evaluation parameters. They also gave us some very positive indications, in fact, very connected to the measurable aspects...isn't it?...the pitch as well as the filler words, which were, in a way, also gave us, as researchers, some indications, not precisely to the students, because they didn't have access to the feedback at the time. Still, they gave us some indications and I think it is a very interesting strategy and that we... and that we will probably continue to use in the classroom. "*

2. **Limited Awareness of Rapid Prototyping:** In contrast to VR, the participants' knowledge and awareness of rapid prototyping (RP) technology were significantly limited. Only one participant was familiar with RP and its practical applications, being connected to the undergraduate program of this participant. This finding suggests a gap in understanding and awareness of RP among the focus group participants.

One participant shared, " *That's what rapid prototyping is all about. We used it a lot in a product design course to more quickly and more efficiently prototype our products, our concepts. This. It was used to test and then build to develop as much as we could. At the time we used several, we had several tools at our disposal, namely thermoforming, we also had a CNC, the 3D printer also and a laser cutting machine and we used a lot of this kind of tools to produce whatever we had to produce.*



They don't exactly teach us how to use the machines, because there was always a laboratory technician who worked with them. We were taught how to do that.

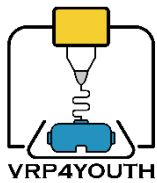
When I studied jewellery, I took some courses there and one of them was 3D modelling using the rhinocéros software and we even talked about the issue of rapid prototyping within the jewellery area. But it was very light; it wasn't as in-depth as my degree."

- 3. Intentions for Further Investigation:** Despite the limited awareness of RP, several participants expressed an interest in exploring and conducting research on the technology. They acknowledged the potential of VR and RP for rapid product development, prototyping, and iterative design processes in an academic context. Participants recognised the need for additional information and training to fully comprehend the benefits and possibilities of RP in various industries.

A participant emphasised, " It arose from a bit of market research, trying to understand what already existed in the sense of developing skills, of speaking in public. And throughout this research, in addition to various programs with online, face-to-face, hybrid formats, etc., the use of virtual reality to measure certain speech metrics appeared to me as a hypothesis. It was even through a study by a university in Canada, if I'm not mistaken, where they used a proprietary program developed by them, a set of metrics to assess things related to public speaking, such as, for example, eye contact or expression, body language, the number of words per minute, the fluency of speech, the volume of speech, that's it. And it was through that study that this notion, let's say, came about. This knowledge of the application of virtual reality... "

These key findings highlight the enthusiasm for integrating VR into educational settings, particularly classrooms, and the need to raise awareness and knowledge about RP. Based on these findings, it is recommended to promote the adoption of VR in education and provide resources and training to enhance understanding and utilisation of RP. Future efforts should focus on disseminating information about RP and its practical applications to bridge the gap in awareness among potential users.

The analysis of the focus group findings reveals several patterns, trends, and insights regarding the participants' knowledge, experiences, and perceptions of virtual reality (VR) and rapid prototyping (RP) technologies in the context of higher education.

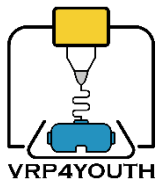


1. **Limited Awareness of Dedicated Courses:** Despite the existence of various experiences with VR in higher education, participants showed a lack of knowledge regarding the availability of dedicated courses focused exclusively on VR and RP. This finding suggests a gap in participants' understanding of the formal education opportunities related to VR and RP technology. The focus has primarily been on research rather than practical applications or specialized training.
2. **Research-Centric Experiences:** The focus group participants shared that their experiences with VR in higher education have predominantly revolved around research activities. This indicates a strong emphasis on using VR technology for academic investigations and exploratory purposes rather than its integration into practical and applied learning contexts. The lack of exposure to practical applications may hinder participants' understanding of VR's potential benefits beyond research settings.
3. **Potential Implications for Practical Learning:** The participants' limited awareness of dedicated VR and RP courses and the research-centric nature of their experiences highlight an opportunity to expand the integration of VR and RP into practical learning contexts. Offering specialized courses or training programs focused on the practical applications of VR technology could bridge the gap between research and real-world implementation, preparing students for industry demands and future careers.
4. **Need for Information Dissemination:** The findings emphasize the importance of disseminating information about existing VR and RP courses and their availability in higher education institutions. By raising awareness of these dedicated programs, students and educators can better understand VR and RP technology's learning opportunities and career prospects. This can lead to increased interest, engagement, and enrolment in VR and RP-related courses.

Overall, the findings indicate the importance of promoting practical applications of VR and RP in higher education, disseminating information about dedicated courses, and bridging the gap between research and hands-on learning. By addressing these aspects, institutions can better equip students with the necessary skills and knowledge to leverage VR and RP technology effectively in their academic and professional journeys.

3.3. Recommendations

Based on the findings and analysis from the focus group, several recommendations and actionable insights can be proposed to address the identified issues and capitalise on the opportunities related to VR and RP technology in higher education.



Firstly, there is a need to consolidate knowledge and disseminate more information about VR and RP. Comprehensive and accessible resources should be provided to participants and the wider academic community, covering both theoretical and practical aspects of VR and RP. Workshops, seminars, and online resources can facilitate knowledge sharing, and creating a repository of case studies and best practices can inspire educators and students to explore VR and RP applications.

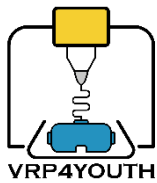
Secondly, it is crucial to integrate VR and RP into real-world contexts to bridge the gap between academia and industry. Collaborations with industry partners, internships, and practical projects can provide students with hands-on experience and allow them to apply VR and RP technology in authentic work environments. Establishing partnerships with VR and RP-focused companies can provide access to cutting-edge technologies and foster collaborative projects.

Thirdly, the inclusion of VR and RP-related courses in curricula is recommended to ensure a systematic and comprehensive approach to VR and RP education. Dedicated courses or modules should cover the fundamentals of VR and RP technology, its practical applications across disciplines, and design principles for immersive experiences. Collaborating with industry experts can help align courses with current trends and demands.

Faculty development and training programs on VR and RP technology are essential to equip educators with the necessary skills and knowledge to teach and incorporate VR and RP into their courses effectively. Workshops, professional development sessions, and hands-on experience opportunities can empower faculty members to confidently integrate VR and RP tools and methodologies into their teaching practices.

Lastly, institutions should establish mechanisms for continuous evaluation of VR and RP programs and their effectiveness. Feedback from students, faculty, and industry partners can inform necessary adjustments, improvements, and future actions. Regular assessment of the curriculum, instructional methods, and available resources will ensure that VR and RP education remains relevant and aligned with industry advancements.

Implementing these recommendations will foster a culture of innovation, enhance students' employability, and effectively prepare them for the evolving demands of the professional world. The consolidation of knowledge, integration into real-world contexts, inclusion in curricula, faculty development, and continuous evaluation will contribute to a comprehensive and impactful VR and RP education ecosystem.



3.4. Limitations

The focus group findings shed light on significant limitations and challenges surrounding adopting virtual reality (VR) and rapid prototyping (RP) technologies within the academic community. One fundamental limitation is academic professionals' lack of knowledge and predispositions to adapt concepts to new technologies, resulting in limited availability and openness to change. This reluctance to embrace new technologies hinders the integration of VR and RP into academic settings.

To address this limitation, it is crucial to provide training, workshops, and educational programs that familiarise academic professionals with VR and RP technologies. These initiatives should aim to build comfort and proficiency with the technologies, enabling educators to confidently incorporate them into teaching practices.

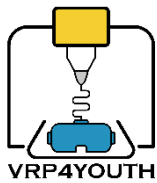
Additionally, financial support is necessary to adapt existing spaces and laboratories to accommodate VR and RP technologies. Adequate funding can help create immersive environments, purchase necessary equipment, and establish dedicated areas for experimentation and research.

By overcoming the limitations mentioned above, educational institutions can capitalize on the transformative potential of VR and RP technologies. These technologies offer unique opportunities to enhance teaching and learning experiences, allowing for more engaging and interactive educational practices. Integrating VR and RP into curricula can facilitate immersive simulations, virtual field trips, and hands-on prototyping experiences, enabling students to develop practical skills and knowledge.

Addressing the lack of knowledge, predispositions, and infrastructure constraints is crucial to fully leverage the potential of VR and RP technologies in academia. By investing in training, workshops, and financial support, educational institutions can empower educators, create immersive learning experiences, and bridge the gap between academia and industry, ultimately preparing students for the demands of a rapidly evolving technological landscape.

3.5. Conclusion

In conclusion, the focus group provided valuable insights into the use and adoption of virtual reality (VR) and rapid prototyping (RP) technologies among young individuals, highlighting several key findings and recommendations.



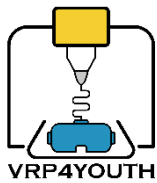
The findings revealed that young participants already have exposure to VR, but not so much to RP technologies and express a strong interest in further applying them in their daily lives. However, it was evident that there is a lack of comprehensive university courses that specifically focus on these technologies. Existing programs only touch upon these topics in a general manner, failing to provide in-depth knowledge and practical application opportunities.

This insight holds relevance not only for young professionals but also for academicians, as both groups expressed the need for specialised training and knowledge enhancement in the field of VR and RP. The focus group emphasised the importance of consolidating knowledge, disseminating information, and creating opportunities for practical experience and application of these technologies.

To address these findings, it is recommended that universities consider developing dedicated courses or modules that cover VR and RP comprehensively. These courses should go beyond introductory discussions and provide hands-on experiences, practical applications, and industry collaborations. Additionally, workshops and training programs should be offered to enhance familiarity and proficiency with the technologies.

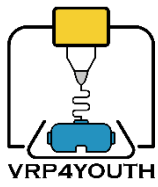
The significance of the focus group cannot be understated, as it provided firsthand insights into the perspectives, experiences, and needs of young individuals regarding VR and RP technologies. The findings and recommendations derived from this research will serve as a foundation for future efforts in curriculum development, training initiatives, and resource allocation, ultimately bridging the gap between academia and the practical applications of VR and RP.

By addressing the key findings and implementing the recommended actions, educational institutions can empower young professionals and academicians to leverage the potential of VR and RP technologies effectively. This will not only enhance their skill sets and employability but also foster a culture of innovation and prepare them for the ever-evolving technological landscape.



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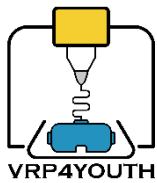
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5. Attachments

5.1. Focus Group Transcription

Orador 1

Ora boa tarde. Mais uma vez, queria informar que vamos gravar esta sessão com o intuito de ficar com o áudio da sessão para fazer coisas futuramente. A transcrição do que for dito nesta sessão e pergunto se toda a gente dá consentimento para a realização desta gravação. Quem não consentir, por favor que diga agora.

Orador 2

Eu consinto.

Orador 3

Então vou só fazer uma pequena introdução a este projeto. Nós estamos a desenvolver este focus group no âmbito do projeto VRP4youth. Este projeto tem como intuito levantar as dificuldades sentidas jovens, no âmbito da realidade virtual e da prototipagem rápida, de forma a aumentar as suas qualificações para ingresso depois no mercado de trabalho. Nós queremos só dizer é que não existem respostas erradas aqui. Isto é meramente uma conversa para perceber quais é que são os vossos conhecimentos, para ter alguma ideia se já tiveram algum tipo de contato com um tipo de realidade, quer com outro tipo de prototipagem sempre ligado a estas temáticas. Sintam-se completamente à vontade para dar a vossa opinião, seja ela positiva ou negativa a favor da tecnologia, está bem? O que eu vos ia pedir para começarmos, era só para se apresentarem nesta apresentação, basta apenas o nome e as habilitações literárias só para termos alguma base do vosso percurso.

Orador 1

Podemos já... e para orientar, vamos começar aqui por quem está... vou começar pelo Afonso, que visualmente quem da esquerda para a direita. Afonso, força.

Orador 5

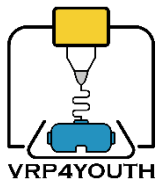
OK, OK. Sem problema, boa tarde a todos antes de mais. O meu nome é Afonso. Tenho 23 anos, e neste momento estou a frequentar o segundo ano de mestrado em Gestão e Desenvolvimento de Recursos Humanos no ISCAP.

Orador 3

Muito bem, Artur.

Orador 6

Olá o meu nome é Artur boa tarde a todos, e eu sou licenciado em línguas e secretariado, ramo de tradução e interpretação especializadas aqui no ISCAP.



Orador 3

Temos a Ana?

Orador 7

Olá o meu nome é Ana sou designer gráfica tenho Mestrado em design feito na ESMAD com o Ricardo, terminado em 2020.

Obrigado, Graça Chorão.

Orador 2

Peço desculpa. Eu estou a ouvir um bocadinho mal, mas acho que, desconfio que é daqui dos meus phones. Bom, boa tarde, o meu nome é Graça Chorão e sou docente do ISCAP, sou da área da tradução, em particular da área da tradução audiovisual. E não vou dizer a idade.

João, força.

Orador 8

Olá, sou o João, tenho 23 anos e estou agora a terminar o curso de TESP em tecnologias aplicadas à comunicação internacional.

Orador 1

OK, obrigadíssimo.

Orador 3

Muito bem, e então agora, de uma forma muito inicial o que nós queremos perguntar, era se já ouviram falar da realidade virtual... se todos já ouviram... aqui o importante é que falassem mesmo porque depois a única coisa que vai ser transcrita será o áudio.

Orador 2

É melhor serem vocês a dar a indicação de quem fala primeiro, acho que se evita-se estes silêncios, creio eu.

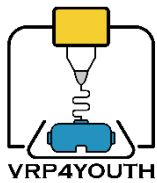
Orador 3

OKOK.

Orador 1

Manda ver aí está melhor.

Orador 3



Sim sim, vamos tentar manter mais ou menos a mesma ordem, Afonso já ouviu falar em realidade virtual?

Orador 5

Sim, já já ouvi falar. Já tinha tido previamente uma experiência informal em contexto de jogo, digamos assim, com amigos, mas no caso estou a utilizar neste momento a realidade virtual para desenvolver o meu projeto de intervenção para finalizar o mestrado em gestão e desenvolvimento de recursos humanos. Estou a utilizar um programa que existe, uma aplicação mais propriamente dentro da realidade virtual, chamada de Virtual Speech, que é um programa que serve para avaliar o discurso em público dos participantes do utilizador no fundo dos óculos de realidade virtual e estou a utilizar esse programa como uma das componentes do meu projeto de intervenção, que consiste num programa para desenvolver as competências de public speaking, de falar em público de estudantes e antigos estudantes do ISCAP.

Orador 3

Mas diga-me uma coisa, no curso não havia nenhuma unidade curricular de realidade virtual?

Não

E como é que surgiu esta aproximação com a tecnologia?

Orador 5

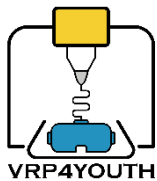
Surgiu de uma pesquisa um pouco de mercado, de procurar perceber o que é que já existia no sentido de desenvolver competências, de falar em público. E ao longo dessa pesquisa, além de diversos programas com formatos online, presenciais, híbridos, etc, apareceu-me como uma hipótese, a utilização da realidade virtual para medir certas métricas do discurso. Foi até através de um estudo de uma universidade no Canadá, se não me engano, em que utilizaram um programa próprio desenvolvido por eles, um conjunto de métricas para avaliar coisas relacionadas com falar em público, como, por exemplo, o contato visual ou a expressão, a linguagem corporal, o número de palavras por minuto, a fluência do discurso, o volume do discurso, pronto. E foi através desse estudo que surgiu essa noção, digamos assim. Esse conhecimento da aplicação da realidade virtual nesse sentido, e depois foi uma pesquisa, descobri que existem vários programas nesse sentido e acabei por optar pelo Virtual Speech, como tinha dito há pouco, para desenvolver o meu projeto.

Orador 3

OK, e a nível de formações, chegou a tirar alguma formação para complementar a sua investigação ou foi autodidata?

Orador 5

Não foi tudo de forma bastante forma autodidática. No entanto, no ano passado também, esqueci-me de mencionar, houve uma aluna que estava a fazer um projeto, a desenvolver o seu estágio associado ao gabinete Alumni, que estava relacionado com as potencialidades da realidade virtual para a formação. E, com essa aluna, o ano passado eu cheguei a fazer uma sessão de cerca de 1 hora e 30 e



ela também me ajudou na fase inicial do processo, que é a Sofia, a Sofia Ribeiro que neste momento, acho que está no terceiro ano da licenciatura em recursos humanos. Ela fez uma formação muito básica de utilização do dos óculos, coisas como para que é que servem os botões, como é que se pode ligar desligar os óculos contraindicações um bocadinho exploração de alguns menus. Mas tirando essa esse contato e essa ajuda que tive da parte dela, numa fase inicial, foi tudo muito autodidata e ...aprendendo fazendo no fundo. Foi um bocadinho isso.

Orador 3

OK pronto. Já voltamos a falar consigo novamente pronto, obrigado, e agora passamos para o. Artur. Artur, também já ouviu falar da unidade virtual?

Orador 6

Ouvir falar, já ouvir falar e tenho uma noção do que é que será, mas contacto, só na verdade, só tive contato através do Afonso e do Pedro. Mas nunca antes tinha sequer colocado uns óculos e nem utilizado, por isso, basicamente a resposta é não.

Orador 3

Mas conhece alguma utilidade prática da realidade virtual, algo no qual ela possa ser inserida?

Orador 6

Sei que... Conhecer assim diretamente com contato direto, não, nós vamos estando atualizados através daquilo que da informação que temos na Internet. Sei que existem imensas aplicações e as áreas onde ela pode ser aplicada também é imensa, mas assim um contato direto não, e estou um pouco a navegar na maionese, em termos do que é que no futuro nos vai trazer, tendo em conta que a informação é extensa e isso acoplado à inteligência artificial provavelmente será... está mesmo aí ao virar da esquina?

Orador 3

Sim. E, não sei se tem conhecimento a nível de ensino superior de algum curso que possa existir, já engloba unidades escolares de...

Orador 6

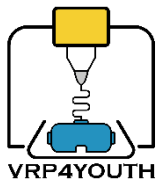
Olha ainda esta semana, salvo erro via alguém da Universidade do Porto, falar em cursos muito direcionados, agora... vamos para a realidade virtual e talvez para a inteligência artificial, Eu não sei se englobava os 2 ou se era só a inteligência artificial, por isso não, não te vou dizer, conheço porque.

Orador 3

Não, mas já existe essa ideia..

Orador 6

Sim, sim, essa aplicação eventualmente já estará a ser desenvolvida, claro.



Orador 3

OK pronto obrigado Artur, como o contato não é assim grande, não vou perguntar se já teve formações na área porque suponho que não seja o caso, pois não?

Não, não, não.

Obrigado. Já voltamos novamente a falar. E agora passo para Ana, olá Ana novamente queria saber se já ouviu falar da liberdade virtual, qual é que foi o seu contacto com a realidade virtual, se já teve algum contacto?

Orador 7

Nunca tive formações nem cursos desse género. Durante o mestrado, tu, Ricardo, fizeste um projeto baseado também em realidade virtual e essa foi provavelmente a relação mais próxima que tive com, com o conceito. De resto como utilizadora, não sei se, por exemplo, no Google Maps, quando deitamos o bonequinho lá para as ruas e aparece a imagem, não sei se isso é considerado realidade virtual. Se for sim, é algo que eu faço, bastantes vezes até, mas o resto utilização dos óculos para jogar ou para o que for nunca fui utilizadora desse tipo.

Orador 3

Mas a Ana consegue imaginar o consegue ter noção de das aplicações que podemos ter para a realidade virtual?

Orador 7

Sim, desde a indústria do entretenimento até mesmo a indústria imobiliária, por exemplo. Nós podemos muito bem visitar uma casa que esteja para venda a partir do conforto do nosso próprio espaço, e isso será, à partida uma boa cena, não é? Se estivermos a falar de uma casa, sei lá no Dubai, que vamos comprar (que ninguém vai comprar, mas) nesses casos assim que será mais difícil, seja por causa da localização ou outra questão, qualquer seria uma das hipóteses, parece uma ferramenta muito útil para este tipo de...

Orador 3

A nível de cursos de instituições de ensino superior tem conhecimento de algum que possa existir ou de algo mais geral, com unidades curriculares inseridas nesta área.

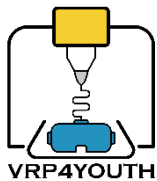
Orador 7

Acho que não acho que nunca ouvi falar de nenhuma.

Orador 3

OK, obrigado, já voltamos a falar mais um bocadinho e passamos agora para Graças Chorão, fazendo novamente as mesmas questões, gostaríamos de saber se já ouviu falar de realidade virtual.

Orador 2



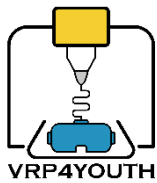
Sim, ora bom eu, o primeiro contacto que tive, além do uso básico dos óculos para jogos que já tinha visto em, já nem me lembro onde, mas creio eu se não, se não nos meus filhos, amigos dos meus filhos, foi em ... na Finlândia, acho que já não me lembro bem Forli, não em Turku. Pronto, numa visita à universidade, lá em que nos deram a... fizeram algumas demonstrações de utilização da realidade virtual e da realidade aumentada em contexto didático, portanto, neste caso no ensino superior. Creio, eu, se não me engano, que tinha a ver com aplicações na área da engenharia, mas que na altura já me chamaram atenção para isso que podiam ser utilizados em diferentes contextos educacionais. Curiosamente, uns dias depois, uns meses depois o Pedro Duarte, que aqui está, chamou-nos a atenção que havia, que tinha encontrado, que tinha descoberto uma aplicação, precisamente o Virtual Speech, porque tinha essa faceta de ser utilizado para promover, para desenvolver diferentes contextos, diferentes situações e que podia ser interessante adaptá-lo ao.. nesse caso a ma situação de sala de aula, pronto. E, então já não me lembro novamente dos pormenores de quem avançou com o quê, mas em 2021, certo Pedro? 2021, 22.

Orador 1

22 acho assim.

Orador 2

Fizemos um projeto piloto que foi precisamente utilizar a realidade virtual para potenciar a aprendizagem das competências orais. Neste caso, num universo de alunos da licenciatura em assessoria e tradução nas disciplinas de inglês, não, já não me lembro se era do primeiro ou do segundo ano, m que os alunos eram convidados a utilizarem, portanto, a realidade virtual para fazer uma apresentação breve de 2 minutos no máximo de frente para um público virtual, portanto, utilizando esse tal Virtual speech. Nós já publicamos inclusive 2 artigos sobre isto. Foi feito com o intuito mais de percebermos quais seriam os benefícios que esta plataforma nos podia trazer, mas na verdade, o que mais me agradou foi precisamente, por um lado, perceber que os alunos, embora um bocadinho desconfiados no início, conseguiram, na verdade, adaptar-se facilmente a esse público virtual, a essa realidade virtual e de alguma maneira, guiados neste caso, com a presença de 2 pessoas na sala do Pedro que fez a parte toda técnica e eu que ia explicando mais ou menos que o objetivo é mais a utilizar de facto a máquina em nosso favor, portanto, para ultrapassar aquele receio de falar. à frente de um público real e neste caso era um público virtual e, portanto, não tinham que ter aqueles problemas de vergonha de embaraço, pronto, que são normais e muitas vezes estas barreiras são muito difíceis de ultrapassar numa aula de língua. No meu caso de utilizar, de o fazer, num curso de inglês, por exemplo. Pronto, para abreviar: interessou-me muito, achei que funcionou muito bem. Nós não utilizamos as funcionalidades todas do Virtual Speech. Utilizamos só o contexto de sala de aula e os parâmetros de avaliação. Também nos deram algumas indicações muito positivas, na verdade, muito ligada aos aspetos mensuráveis...não é?... o pitch as filler words pronto, que foram, de alguma maneira, também nos deram algumas indicações a nós, enquanto investigadores, não propriamente aos alunos, porque eles na altura não tiveram acesso ao feedback, mas deram-nos algumas indicações e creio que é uma estratégia muito interessante e que nos... e que nós provavelmente vamos continuar a utilizar em sala de aula. Tanto quanto possível até promovendo uma certa prática autónoma por parte dos alunos, ou seja, providenciar o acesso fácil aos óculos de realidade virtual e às aplicações,



de maneira que o aluno de forma autónoma e responsável possa beneficiar dessa realidade virtual na sua plenitude. E não conseguimos fazê-lo este ano, como pena minha, mas e do Pedro também, mas tem sido muita coisa, mas digamos que esse é o projeto. Não a médio, mas já a curto prazo a implementar.

Orador 3

Então, já temos aqui um curso que vai começar a implementar as estratégias de realidades, sejam elas atualmente.

Orador 2

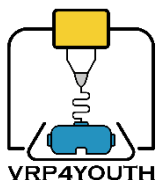
Sim, sim, sim. Nesse ano, nesse ano, utilizamos em 2 em 3 turmas, aliás. Pronto foi como, digamos, como modelo. Foi só numa atividade, portanto, numa das competências da utilização de uma língua que foi na oralidade, obviamente. Eu acho que podem ser utilizadas em muitas mais na verdade, este foi só um cheirinho, digamos, e só não utilizamos mais e só não utilizamos este ano, precisamente porque o programa não estava disponível e que estava a ser solicitado noutras áreas, mas o nosso objetivo será que, pelo menos em contexto obrigatório, vamos dizer assim, todos os alunos utilizem a realidade virtual, pelo menos uma a 2 vezes por semestre. O ideal, e isso vai depender de muitos fatores, como imaginam, é que de facto haja uma sala de realidade virtual em que os alunos lá está com de forma autónoma possam ir praticar. Isto será um ideal, precisamente com tendo em vista o objetivo que nós queremos implementar, eles a ultrapassarem essas barreiras psicológicas e emocionais que todos temos de falar em frente de um público e que possam utilizar de forma gratuita, autónoma e sempre que necessário. Portanto, na verdade, esse será o objetivo.

Orador 3

OK só uma questão, finalizar. Na experiência que teve na Finlândia, considera essa experiência como se fosse uma mostra, ou uma formação muito breve sobre a RV? Tinha falado, referido há pouco, que tinha tido uma experiência com realidade virtual na Finlândia, correto?.

Orador 2

Sim posso explicar sim, na altura a aquilo estava inserido numa semana Internacional, portanto os colegas como digo, eu acho que era da área de engenharia, não tenho a certeza pronto, e então o que nos estiveram a mostrar foi precisamente a utilização da realidade virtual para a aplicação determinados de procedimentos. Se não me engano, até tinha a ver com higiene e segurança no trabalho, porque lembro-me que era precisamente a utilização do extintor de fogo e tínhamos que ir apagar o fogo. Pronto e que era muito engraçado, portanto, eles nós colocarmos os óculos. Primeiro, tive aquela sensação de vertigem, não é?... de ter que me adaptar ao local e de algum receio de... que nós estávamos de pé numa sala rodeados de pessoas a fazerem a mesma, a mesma atividade. E depois de ter ultrapassado esse esse receio foi muito interessante porque nós, na verdade, tínhamos uma experiência quase... É uma experiência imersiva, quase real. Ou seja, nós, embora segurando nos manípulos dos da realidade virtual, na verdade, sentimos que estávamos a segurar no extintor e então tínhamos que andar atrás dos locais que estavam supostamente a arder, a apagar um incêndio e, portanto, a atividade só terminava quando, na verdade, o incêndio estava extinto. E essa foi uma



situação muito, muito, muito interessante, que me que me despertou interesse pronto, mais do que tudo, não aprendi propriamente nada, muito, muito interessante, mas despertou o interesse e. Então acho que faz sentido, fez-nos sentido na altura de estarmos isso com os alunos de de inglês, obviamente num contexto diferente, mas acho que faz sentido, desde que haja na realidade as aplicações adequadas e adaptáveis aos nossos objetivos, não é porque às vezes não é fácil e estas aplicações, pelo menos esta que que nós temos utilizado o Virtual Speech que o Afonso já referiu, não são propriamente muito em conta, portanto, temos sempre a questão do preço a pagar e tudo o que isso implica, não é?

Orador 3

Obrigado, já voltamos a falar novamente e agora passamos para o João. Boa tarde, João já ouviu falar de realidade virtual.

Orador 8

Boa tarde. Sim, no decorrer do meu do meu estágio curricular tive a oportunidade de aprofundar alguns conhecimentos na ferramenta do vive VR e pude entrar em contacto com algumas aplicações, alguns softwares que nos podem ajudar e podem ser importantes sendo implementados, por exemplo, no ISCAP, assim como o Speech Trainer, como já foi aqui referido, a aplicação Mondely, que é uma aplicação que que nos ensina, que nos coloca em situações reais para aprender línguas, têm cerca de 30 línguas ou 40 línguas que podemos aprender e coloca-nos em situações reais para praticar. E temos também no spatial que poderá vir a trazer uma função de zoom, mas proporcionar-nos uma reunião imersiva a que pode levar até 40 pessoas e foi mais ou menos esta a minha experiência com o vive VR nos últimos meses.

Orador 3

Diga-me uma coisa, João. Esta sua experiência foi no decorrer do estágio ou também já teve algum contacto durante o seu curso?

Orador 8

Não, não foi só no decorrer do estágio, foi só no decorrer do estágio.

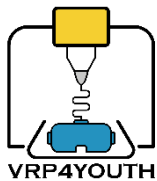
Orador 3

E então já consegue ter alguma perceção de uma utilização prática da realidade virtual?

Orador 8

Sim, sim, sim, a realidade virtual como como fui analisando nos últimos tempos, tem várias funções práticas em contexto de sala de aula que podemos podemos utilizar para criar situações que nos possam aparecer futuramente na nossa, na nossa profissão, ao longo do nosso dia a dia, e aí sim, tenho várias vantagens e seria uma mais-valia por exemplo, implementar a realidade virtual em certas em certos contextos de sala de aula.

Orador 3



Ao longo deste tempo, foi tendo algum tipo de formação de workshop dentro desta área?

Orador 8

Não, não foi forma autodidata. Foi fui aprendendo e aprofundando meus conhecimentos também para ajudar no, por exemplo, o GAIE que que trabalha com esse tipo de ferramentas e juntos criamos uns tutoriais de utilização e de algumas formas de facilitar o uso da ferramenta.

Orador 3

OK muito bem e tem conhecimento de algum curso a nível do ensino superior que seja direcionado para a realidade virtual ou então que tem algum tipo de unidades curriculares dentro dessa área?

Orador 8

Assim a primeira vista não, não me ocorre nenhum que eu conheça.

Orador 3

OK obrigado João. Já voltamos a falar novamente. E agora vamos passar para um novo conceito que é o da prototipagem rápida este aqui é normal que não seja tão conhecido porque é algo bastante recente, mas que também gostaríamos de ter a vossa opinião e começámos pelo Afonso só para saber se já teve ou se conhece. Se já teve, não desculpe, se já ouviu falar se tem esse de prototipagem rápida?

Orador 5

Não, nunca ouvi falar. Não faço ideia do que seja, mas gostava de saber e perceber até que ponto é que está ligado com esta questão aqui da realidade virtual.

Orador 3

OK muito bem neste caso, como nunca ouviu falar, eu vou deixar para o fim e já voltamos a falar sobre esse assunto, está bem, obrigado. E no caso do Artur, já ouviu falar de prototipagem rápida?

Orador 3

Está sem som.

Orador 6

Também nunca ouvi falar, por isso estou aberto.

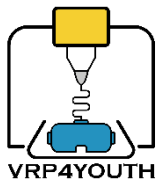
Orador 1

Ok.

Orador 3

OK, obrigado Ana, não sei se já ouviu falar de prototipagem rápida?

Orador 7



Sim na licenciatura design de produto e era uma grande parte do curso para falar sobre prototipagem rápida.

Orador 3

Consegue nos dizer mais ou menos em que consiste a aplicação de prototipagem rápida para si? Qual é o seu conceito?

Orador 7

A prototipagem rápida é isso mesmo. Nós usávamos muito num curso de design de produto para prototipar de forma mais rápida e mais eficiente os nossos produtos, os nossos conceitos. Isto. Servia para testar e para, pronto, construir desenvolver o máximo que conseguíamos. Na altura usávamos várias, tínhamos várias ferramentas à nossa disposição, nomeadamente termoformação, também tínhamos uma CNC, a impressora 3D também e uma máquina de corte a laser e usávamos muito este tipo de ferramentas para produzir o que tivéssemos a produzir.

Orador 3

Então, neste caso, já tem conhecimento de cursos no ensino superior que utilizem prototipagem rápida que é o caso do seu?

Orador 7

Sim, Não nos ensinam propriamente a usar as máquinas, até porque tinha sempre um técnico no laboratório que mexia nas máquinas de facto, nós não tínhamos essa autorização, mas tínhamos a questão de preparar o que fosse para cortar ou para imprimir em 3D já tínhamos esse conhecimento connosco. Ensinaram-nos a fazer isso, portanto.

Orador 3

E tirando esse contacto durante a licenciatura, teve mais algum tipo de formação nessa área?

Orador 7

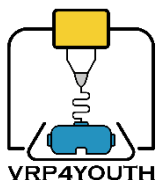
Não...Cheguei a ter sim, desculpa a cheguei a ter sim no SINDOR em Gondomar quando estudei joalheria, cheguei a fazer lá uns cursos e um deles foi de modelação 3D utilizando o software rhinocéros e chegamos a falar sobre a questão de prototipagem rápida dentro da área de joalheria. Mas foi muito leve, não foi assim tão profundo quanto na licenciatura.

Orador 3

Obrigada até já. Agora passamos para Graça, faço a mesma função se já ouviu falar de prototipagem rápida.

Orador 2

Aí eu confesso a minha ignorância. Eu já vi há alguns protótipos feitos nessas impressoras 3D, aliás, com um interesse muito determinante para a, neste caso, para os cegos com a utilização de maquetes e sobretudo para a utilização museológica, portanto, para replicar quadros ou estátuas feitas em



maquetes, para que depois os cegos a consigam tocar e sentir as obras de arte. Já vi de facto essas máquinas em funcionamento, já vi o resultado. Não faço ideia como como é que funciona, mas, tal como Afonso disse, tenho muito interesse em perceber. e saber mais.

Orador 3

Muito bem, obrigado e passamos por último para o João. Não sei se já ouviu falar em prototipagem rápida.

Orador 8

Não, não, também não ouvi falar. Nunca me apareceu nesse contexto, mas não, não conheço.

Orador 3

Então, a prototipagem - já falaram todos – a prototipagem rápida é o que a Mafalda descreveu, é uma solução rápida para testarmos o nosso produto, para percebermos se poderá ou não ser produzido. De uma forma muito rápida queríamos perceber, e como a maioria não tem qualquer conhecimento de prototipagem rápida calhar até será mais para Mafalda, se conhece algum tempo de aplicação ou aplicação de realidade virtual integradas com prototipagem rápida. Não sei se no caso da joalharia, algo que possa ter alguma aplicação, isto de acordo com o que foi falando.

Orador 7

A em relação à realidade virtual, acho que não. Nunca ouvi falar de nada ligado.

Orador 3

OK, isto é só para ter uma ideia, se já existe essa ligação, porque muitas das vezes trabalham-se as duas, mas nunca fazem este cruzamento, é isso que também estamos aqui a estudar, a inclusão da realidade virtual no momento da prototipagem rápida em que preparamos determinadas peças, através, por exemplo, de instruções, Ok? Pronto, da nossa parte, as nossas questões estão esclarecidas, não sei se tem alguma questão da vossa parte.

Orador 1

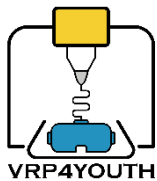
Ou algum comentário, alguma nota queiram acrescentar a esta conversa.

Orador 7

Na minha cabeça está a passar a impressão 3D de edifícios utilizando cimento. Não sei se a realidade virtual poderá interligar, por exemplo, com ainda há bocado se falava sobre a realidade virtual aplicada à indústria imobiliária, talvez seja por aí construir a maquete na realidade virtual e depois com a utilização de prototipagem rápida através do cimento...

Orador 3

Já existem, já existem alguns projetos entre a maquetização de, por exemplo casas, prédios, como falou em que a prototipagem rápida funciona para as pessoas terem uma ideia em pequena escala do daquilo que estão a comprar, em que depois há de haver algo que vem compensar esta maquete no sentido



em que as pessoas conseguem visitar as instalações como se estivessem dentro dessa maquete, e é assim que elas se conseguem complementar no caso da arquitetura design de interiores, hoje em dia, e sim uma das soluções que andam sempre lado a lado. E obrigada Ana.

Orador 2

E eu acho que estas estas soluções é na verdade da realidade virtual vão desenvolver-se de uma forma exponencial. Aliás, o Pedro Duarte mostrava-me há uns dias que inclusive, suponho que é o Virtual Speech que já interage também com o chat GPT e que consegue até simular a conversa e o feedback de alguém. Ora, isto a nível no meu caso, portanto, na minha experiência pessoal, isto é uma vantagem incomensurável, não é? Porque até agora precisávamos sempre de alguém para, por exemplo, para interagir, para ter um diálogo, para poder, de alguma maneira, potenciar essa capacidade de comunicação. Com essa possibilidade até existir alguém a responder do outro lado, não é? Alguém que no fundo é a máquina, mas isso é creio eu que vai ser um benefício ainda maior para a realidade virtual. Aliás, estou desejosa de ver como é que isso funciona e de poder implementar, porque estou convencida que a nível, pelo menos do contexto educativo e neste caso no ensino superior, em que os alunos supostamente têm obrigação de serem muito mais autónomos, e de trabalharem de forma assíncrona, portanto, grande parte do trabalho não será feito em sala de aula. Portanto, acho que é uma vantagem muito grande. E creio eu que a tendência será diversificar e cada vez mais a aparecer noutros nichos e, portanto, é esperar para ver e para ir para testar.

Orador 3

Exatamente, é essa a trajetória que estamos a ver a acontecer e com as empresas também a usar estratégias, seja de realidade virtual, como aumentada... ainda esta semana tivemos um lançamento por parte da Apple , vamos ver o denominador comum, não é? Agora se tínhamos grandes dúvidas, vamos ter o acesso de forma muito mais fácil, vai permitir que ela cresça muito mais.

Orador 2

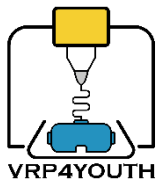
Exatamente.

Orador 1

E o objetivo deste projeto será também promover esse uso. O feedback que estamos a ter da vossa parte para este projeto para perceber o que está a ser feito, o que é que já há e que perceção têm, e depois há também um inquérito que é outro instrumento para tentar avaliar o que é que está a ser feito e como é que, como o qual é o da arte, digamos assim, para depois promover precisamente as potencialidades destes dois tipos de ferramentas e da interligação entre ambos. Promover também a formação nesta área, e o vosso feedback também nos dá a perspetiva de que efetivamente há potencialidades e devemos ver como é que vamos explorar, como vão ser exploradas também ao nível da formação. Há mais algum comentário não?

Orador 2

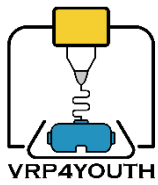
Só para terminar, eu acho que o interessante, seria primeiro implementar, não sei se uma formação, mas pelo menos, amos chamar uma sessão de formação breve para explicarmos, sobretudo aos



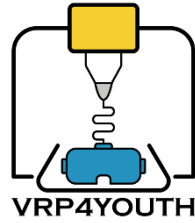
professores, quais são as potencialidades, porque de facto, muitas vezes tudo nos aparece à frente de forma quase ocasional. Neste caso, foi o Pedro até que me chamou a atenção, porque, caso contrário, provavelmente, não o saberia ou teria, ainda que trabalhar mais para chegar lá e, portanto, uma formação nessa área. Depois explicar talvez que esta tecnologia é, (não é?) não é um quebra-cabeças, especialmente para pessoas assim, já de uma geração anterior à vossa, à de todos que estão aqui, que é o meu caso. Às vezes temos um bocadinho, uma certa reticência em utilizar estas tecnologias e, portanto, acho que seria interessante a vossa geração explicar e até deixo já aqui o repto ao Afonso que está a fazer a sua tese nesta área, pois quem sabe, no ISCAP querer fazer uma sessão ou 2 sessões para mostrar que, de facto, as potencialidades estão aí que podem ser utilizadas em contexto educacional. E o segundo aspeto, e não sei se isto faz muito sentido, o que eu vou dizer, mas nós temos que pensar um pouco para além do que já existe no mercado Ou seja, há aplicações, mas pelo que eu percebo, pelo que eu sei, muitas destas aplicações podem ser alteradas e desenvolvidas para determinados contextos e, portanto, talvez vermos de que modo, eventualmente com algumas luzes de programação, umas coisas muito fáceis que depois nos ajudem a utilizar a melhorar e a aperfeiçoar e alterar a “customize”, como dizem os ingleses, estas aplicações àquilo que nos interessa. Porque muitas vezes há muitas aplicações e eu há bocado, estava aqui a fazer uma pesquisa rápida, mas depois às vezes têm até demasiados elementos e confundem e complicam, portanto, muitas vezes conseguir a ir para lado só da utilização da realidade virtual, muito focalizada naquilo que nos interessa para não estarmos a dispersar e a perder tempo com elementos que às vezes não são tão relevantes.

Orador 3

Obrigado pelo contributo de todos. Foi bastante elucidativo para nós também, para perceber realmente a qual é a perceção seja do mundo académico profissional estudantil. E agora nós vamos trabalhar os resultados tanto do Focus Group como dos inquéritos, de forma de tentarmos tirar o maior partido e proveito para também ter uma produção de investigação com resultados para a comunidade. Queremos agradecer imenso pelo tempo que despenderam connosco.

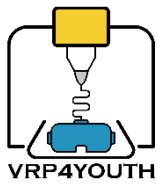


5.2. Survey Results, Raw Data

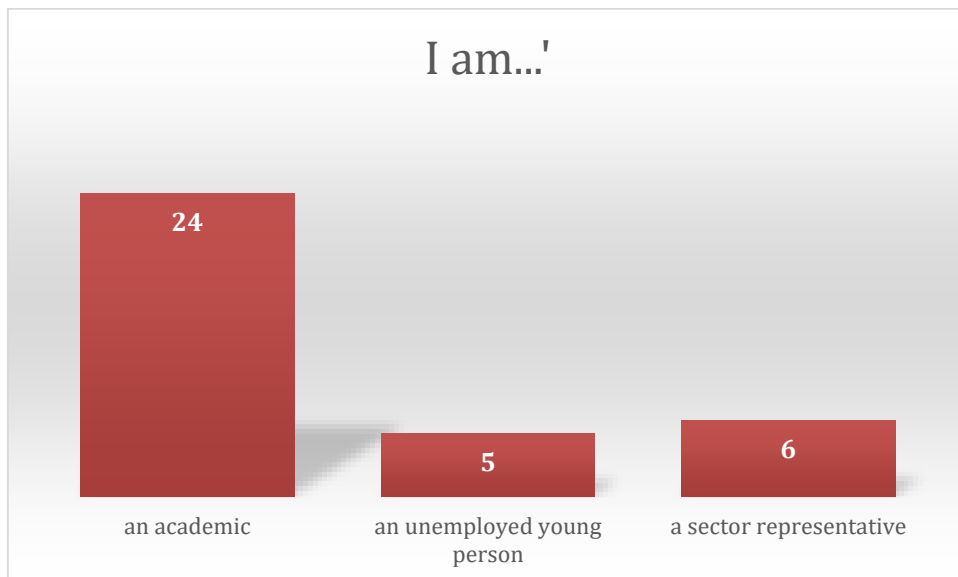
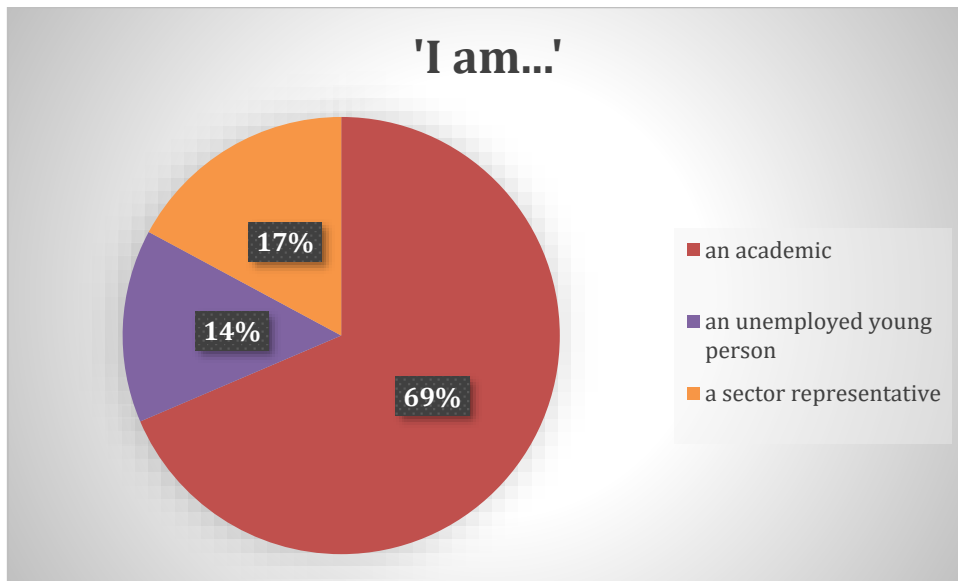


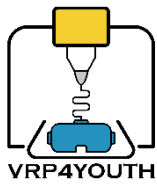
Survey results

Portugal



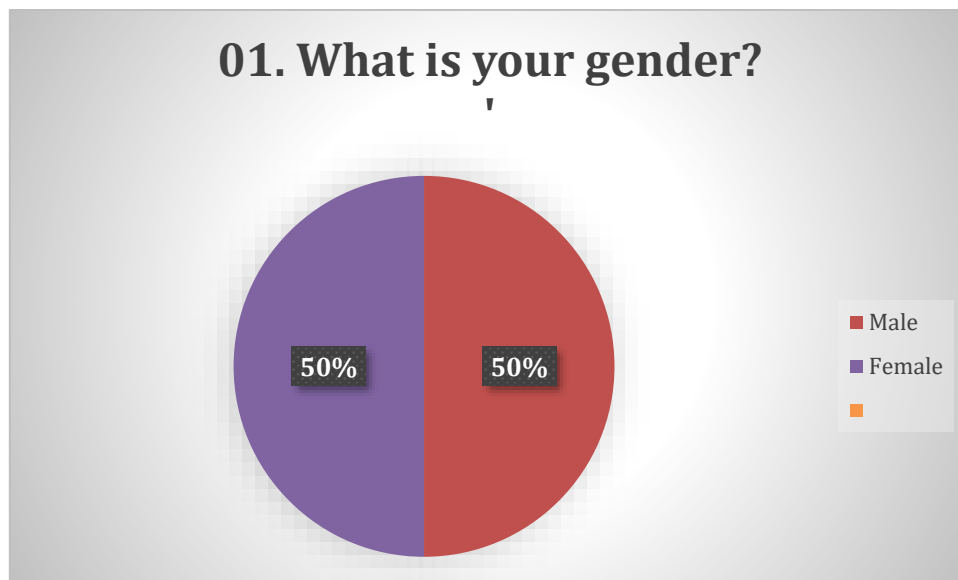
I am...	Count of I am...
an unemployed young person	24
a sector representative	6
an academic	6
Grand Total	36

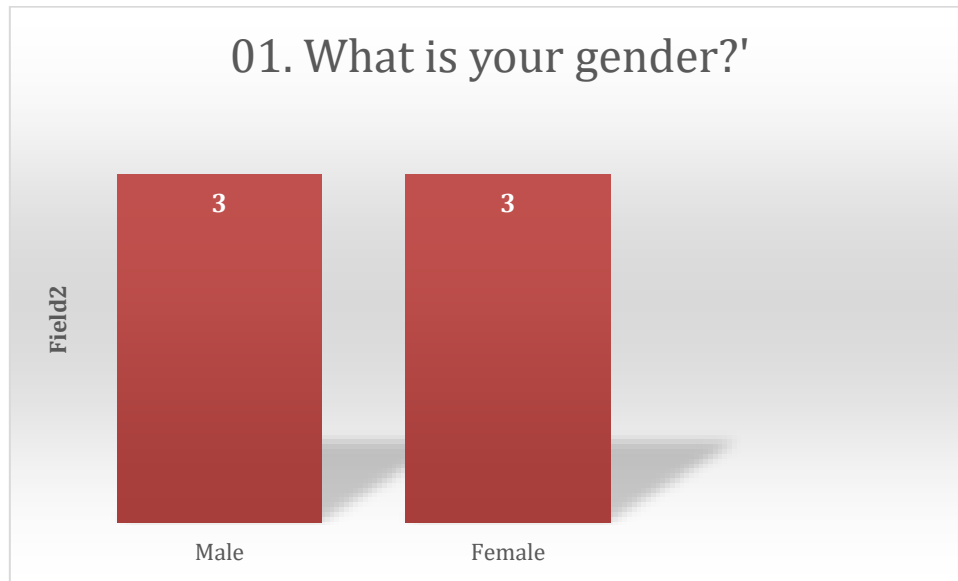
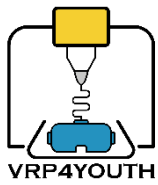


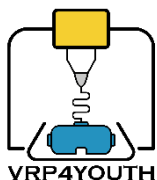


Sector Representatives

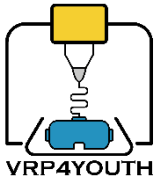
01. What is your gender?	Count of 01. What is your gender?
Male	3
Female	3
N/A	6
Grand Total	33



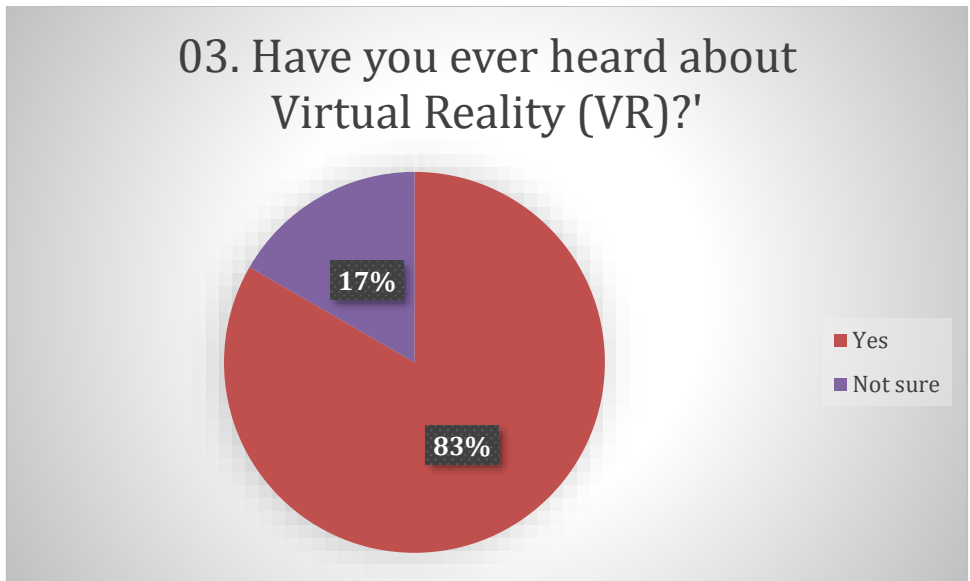


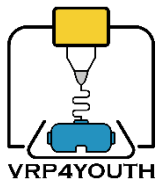


02. In which sector does your company operate?	Count of 02. In which sector does your company operate?
Transportes e logística	1
Gestão de imóveis próprios	1
Economia Social	1
NÃO CREIO QUE SEJAMOS REPRESENTANTES DO SECTOR - COMERCIO POR GROSSO DE PRODUTOS DE TI	
Responsabilidade Social	1
Transportes	1
Grand Total	6

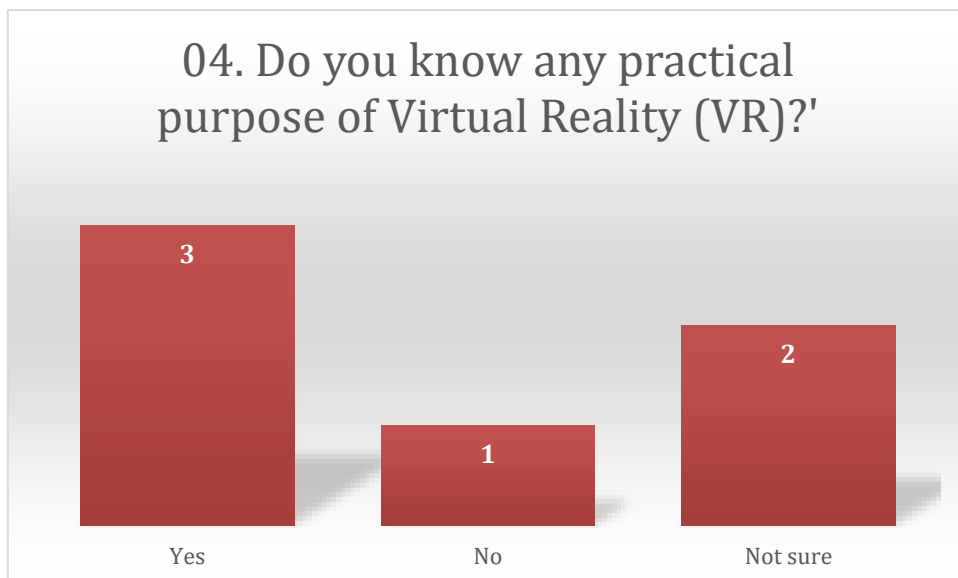
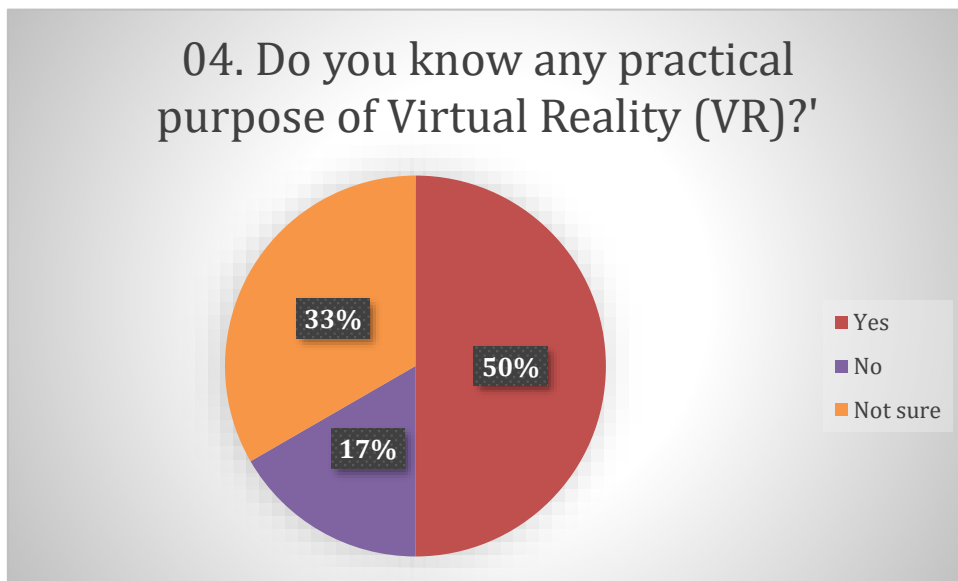


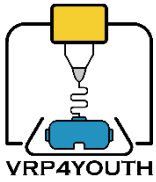
03. Have you ever heard about Virtual Reality (VR)?	Count of 03. Have you ever heard about Virtual Reality (VR)?
Yes	5
No	0
Not sure	1
Grand Total	6



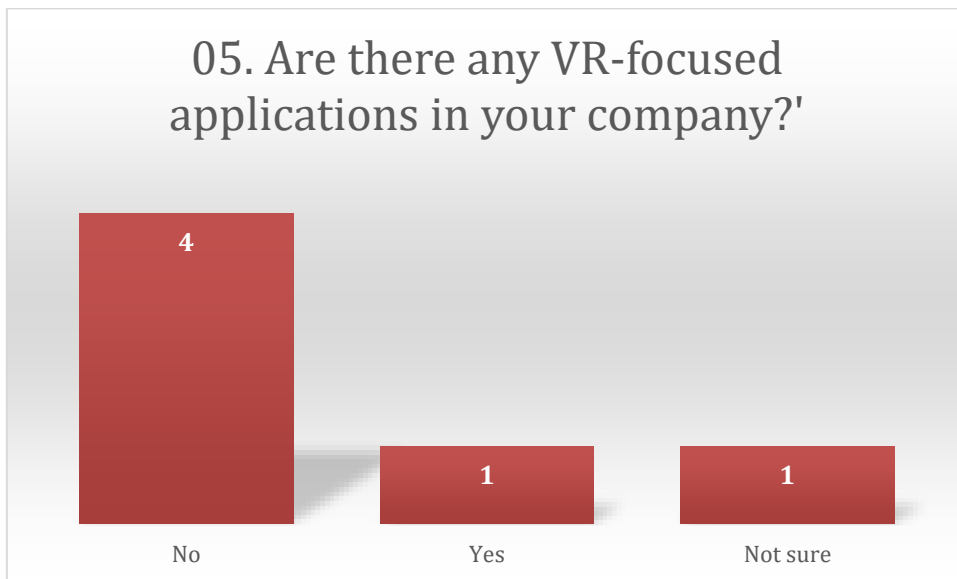
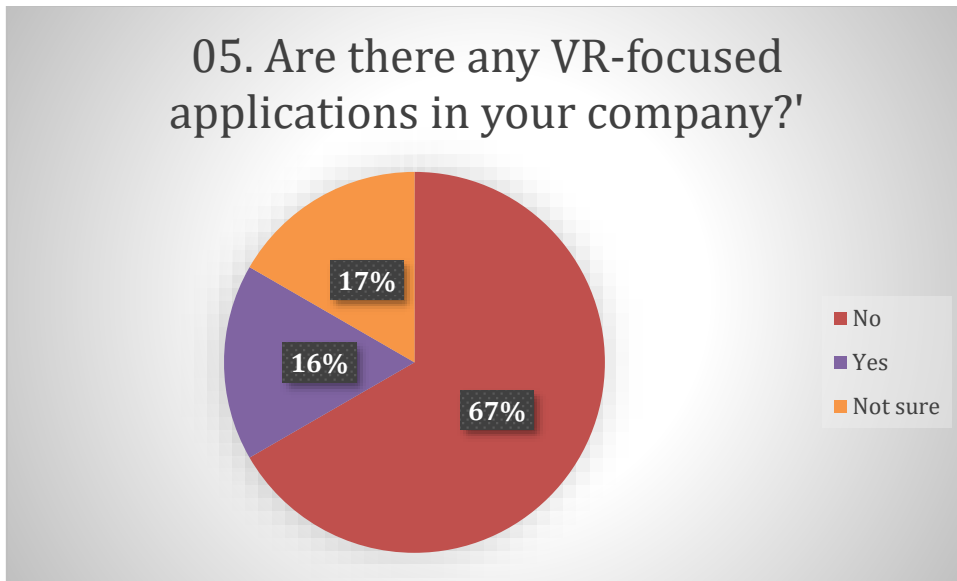


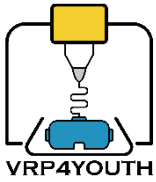
04. Do you know any practical purpose of Virtual Reality (VR)?	Count of 04. Do you know any practical purpose of Virtual Reality (VR)?
Yes	3
No	1
Not sure	2
Grand Total	6



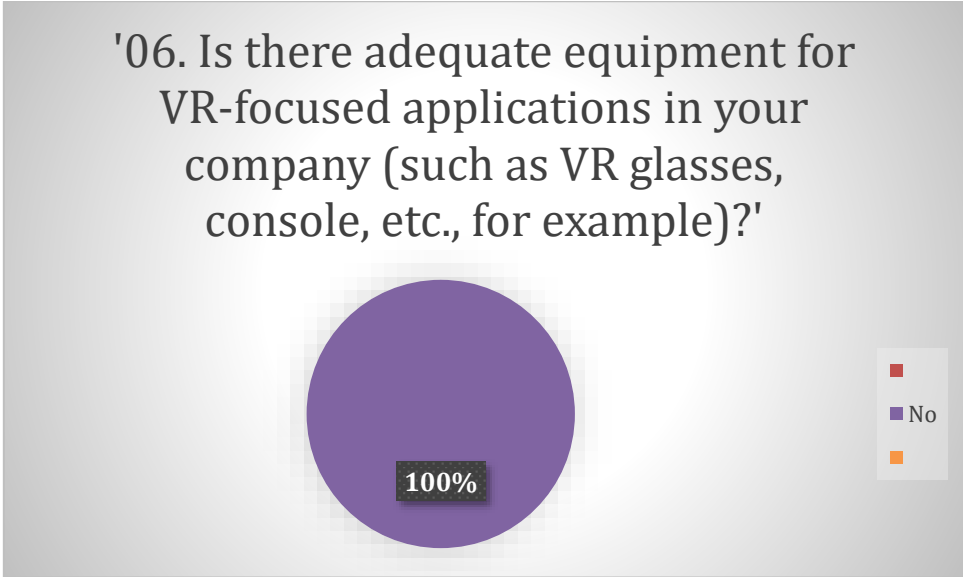


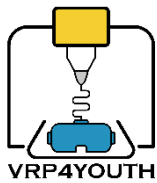
05. Are there any VR-focused applications in your company?	Count of 05. Are there any VR-focused applications in your company?
No	4
Yes	1
Not sure	1
Grand Total	6



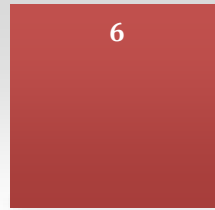


06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?	06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?
Yes	0
No	6
Not sure	0
Grand Total	6

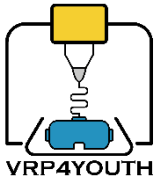




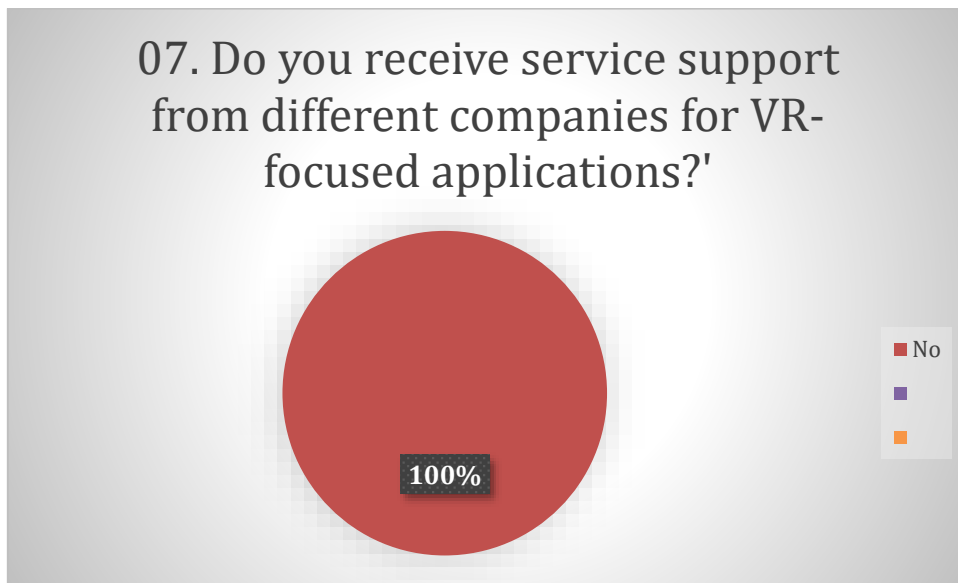
'06. Is there adequate equipment for VR-focused applications in your company (such as VR glasses, console, etc., for example)?²

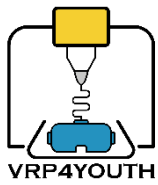


No

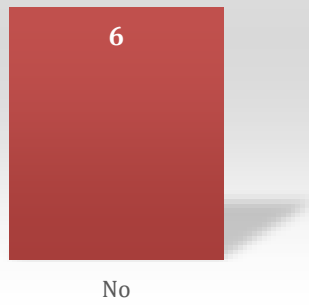


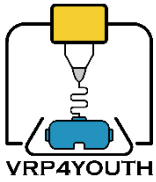
07. Do you receive service support from different companies for VR-focused applications?	Count of 07. Do you receive service support from different companies for VR-focused applications?
No	6
Yes	0
Not sure	0
Grand Total	6



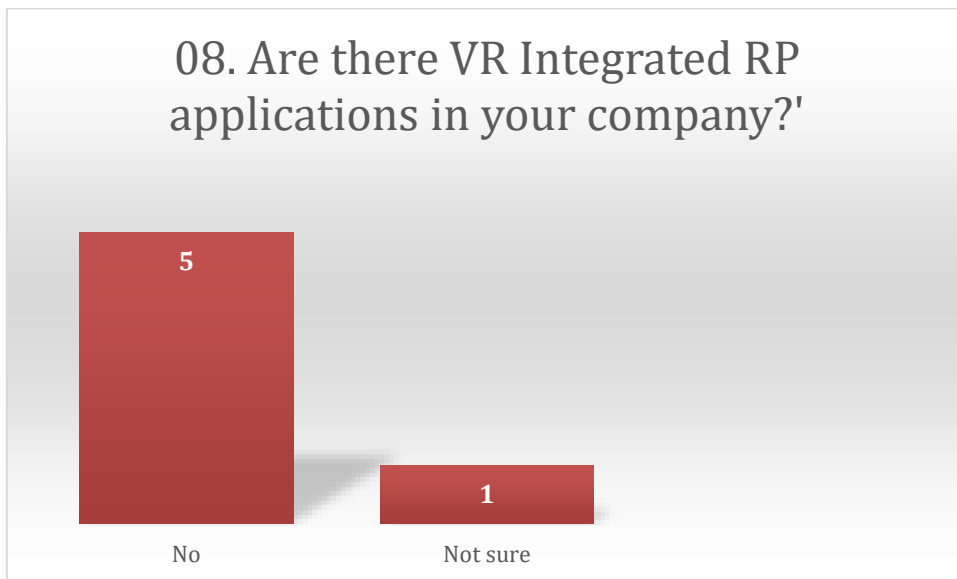
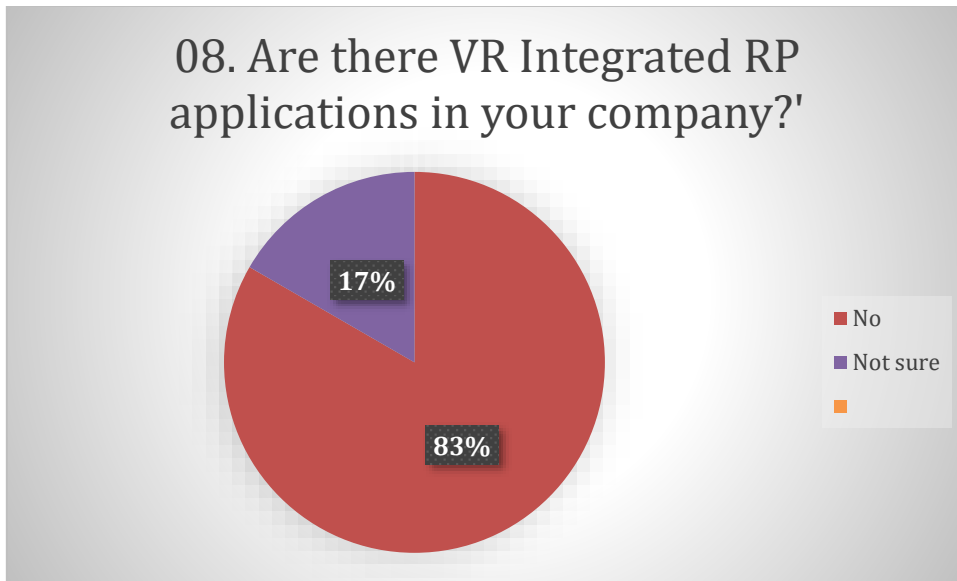


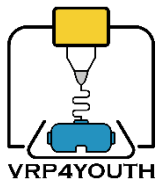
07. Do you receive service support from different companies for VR-focused applications?'



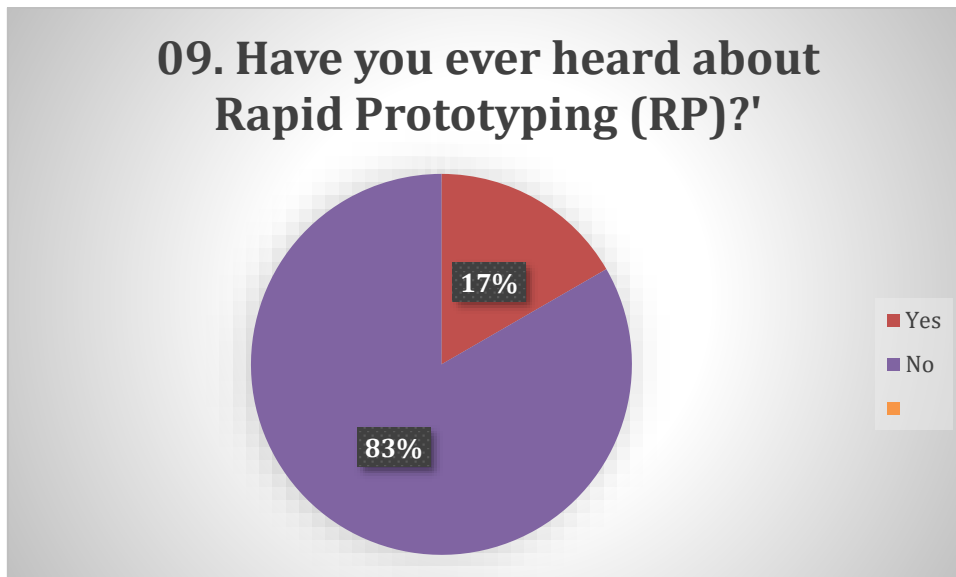


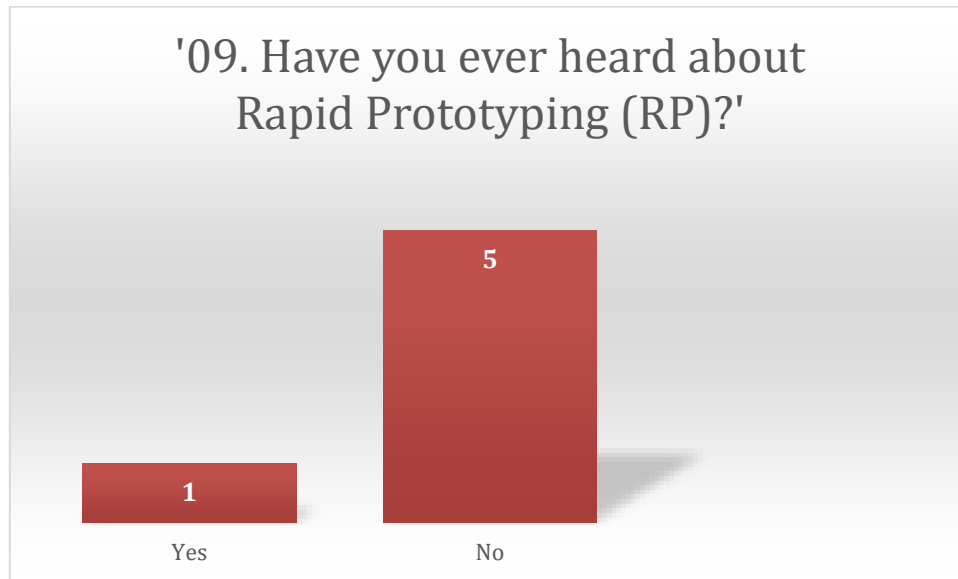
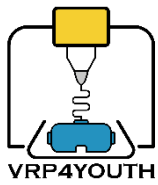
08. Are there VR Integrated RP applications in your company?	Count of 08. Are there VR Integrated RP applications in your company?
No	5
Not sure	1
Yes	0
Grand Total	6

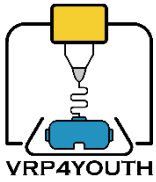




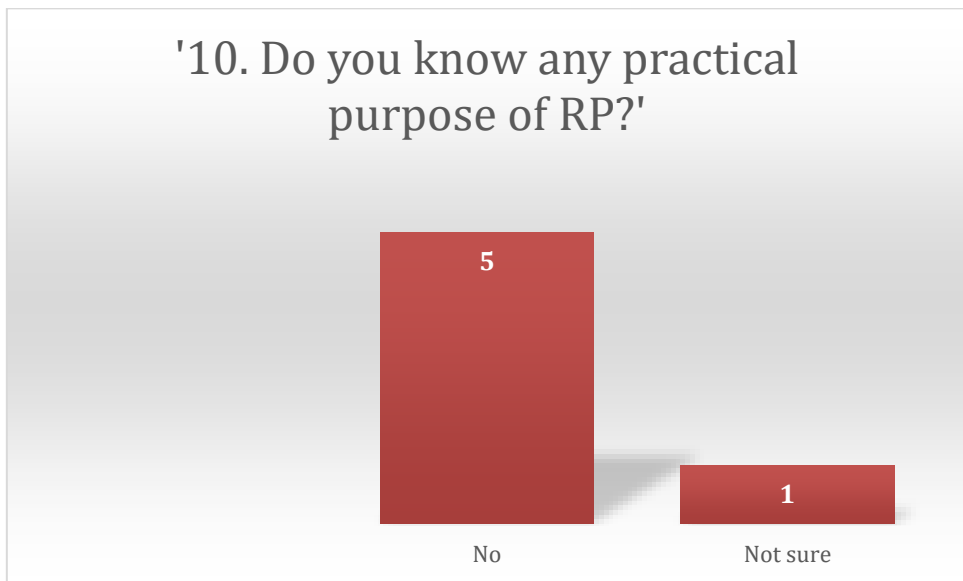
09. Have you ever heard about Rapid Prototyping (RP)?	Count of 09. Have you ever heard about Rapid Prototyping (RP)?
Yes	1
No	5
Not sure	0
Grand Total	33

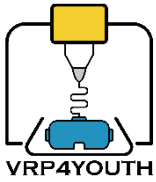




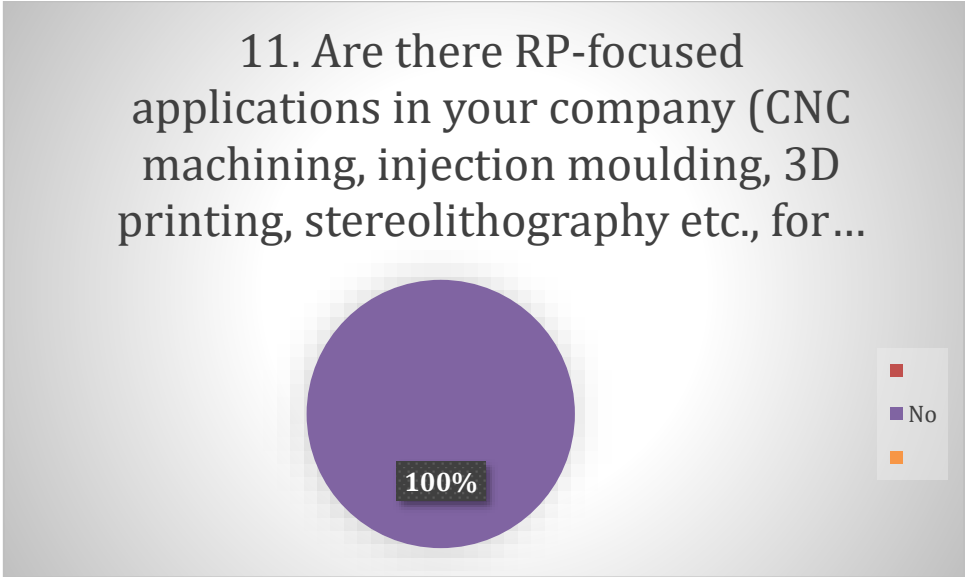


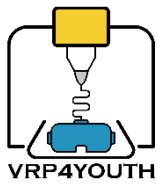
10. Do you know any practical purpose of RP?	Count of 10. Do you know any practical purpose of RP?
Yes	0
No	5
Not sure	1
Grand Total	6





11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?	Count of 11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for example)?
Yes	0
No	6
Not sure	0
Grand Total	6

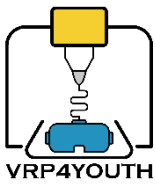




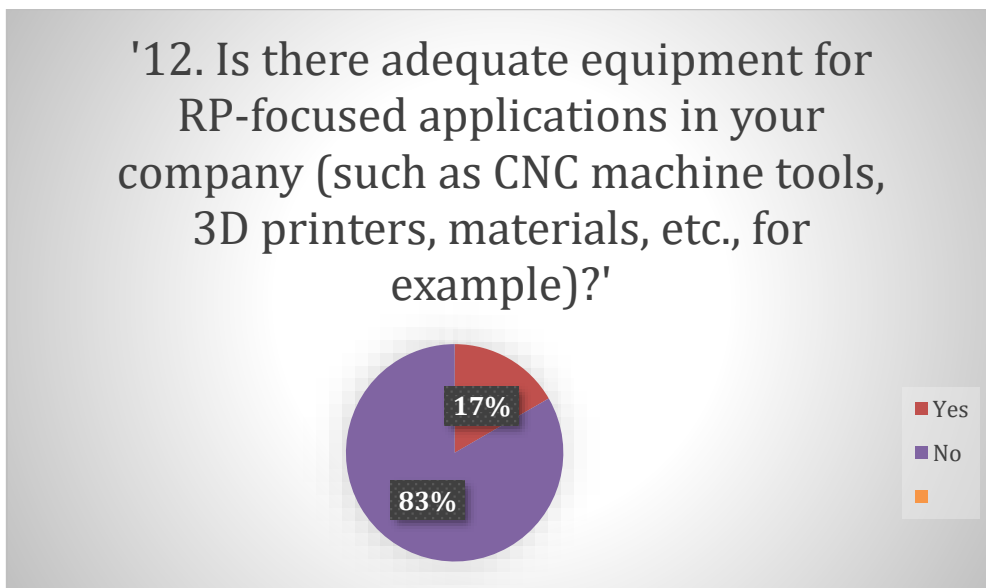
'11. Are there RP-focused applications in your company (CNC machining, injection moulding, 3D printing, stereolithography etc., for...

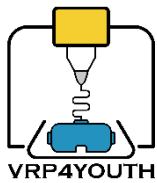


No

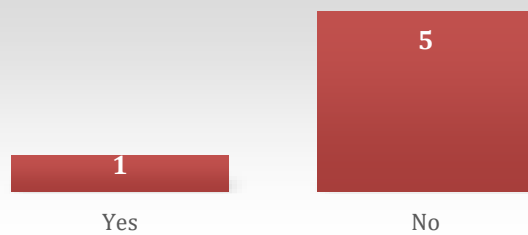


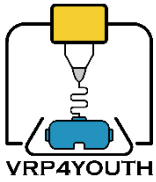
12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?	Count of 12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?
Yes	1
No	5
Not sure	0
Grand Total	6



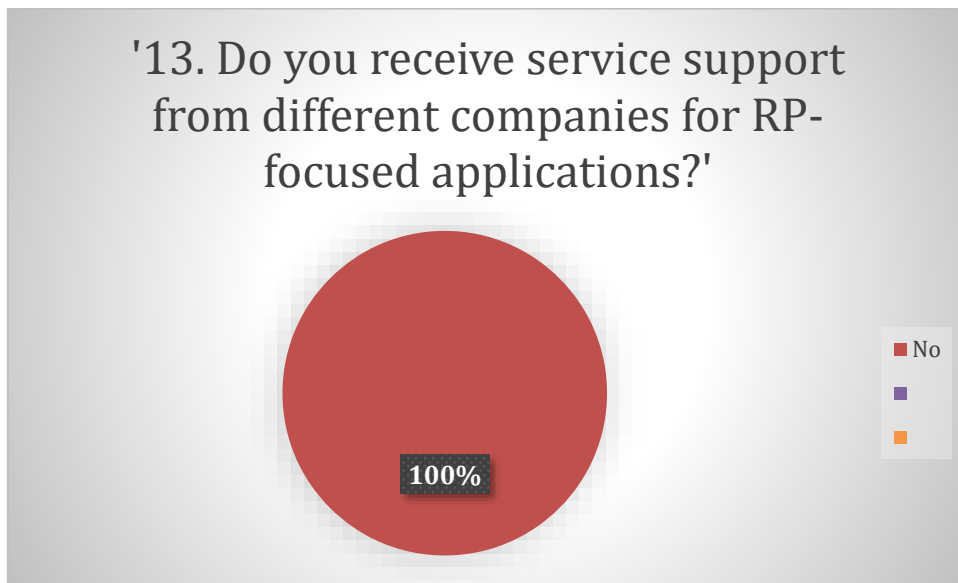


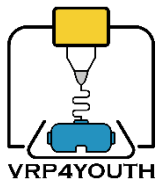
'12. Is there adequate equipment for RP-focused applications in your company (such as CNC machine tools, 3D printers, materials, etc., for example)?'





13. Do you receive service support from different companies for RP-focused applications?	Count of 13. Do you receive service support from different companies for RP-focused applications?
No	6
Yes	0
Not sure	0
Grand Total	33

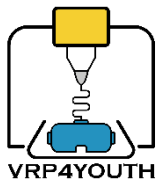




Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

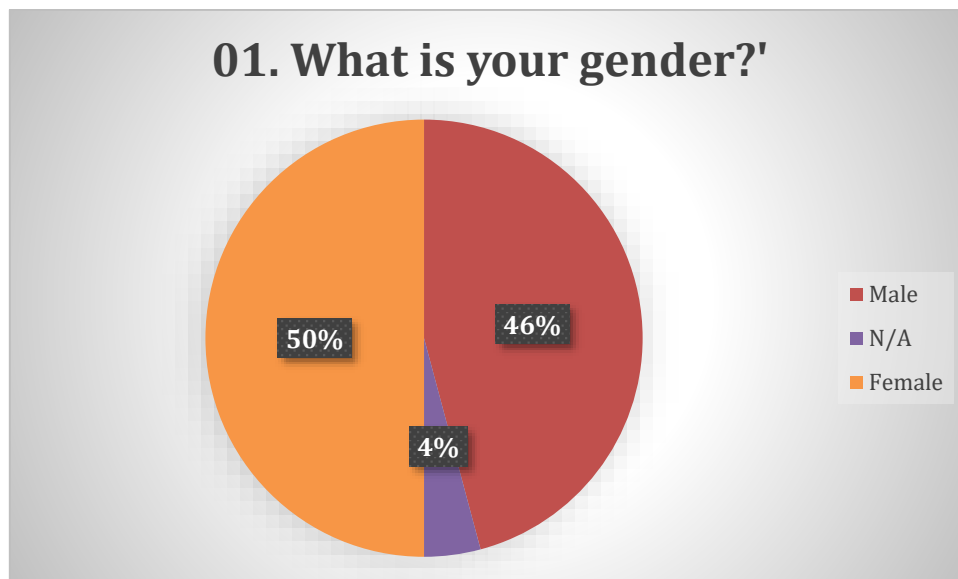
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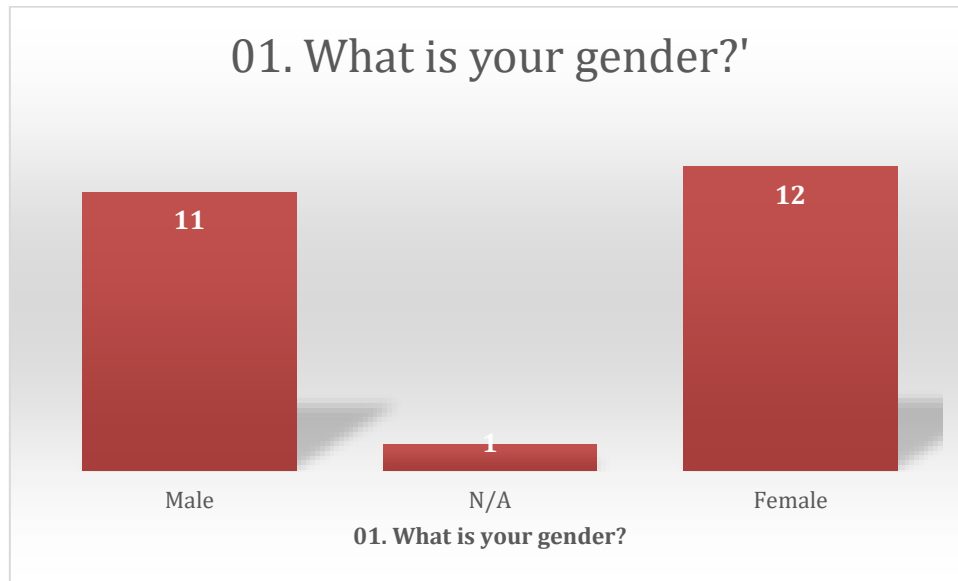
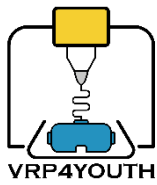
WP2 – Research Report on the Needs of Youth Regarding VR and RP

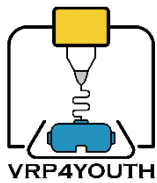


Academics

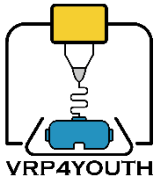
01. What is your gender?	Count of 01. What is your gender?
Male	11
N/A	1
Female	12
Grand Total	24



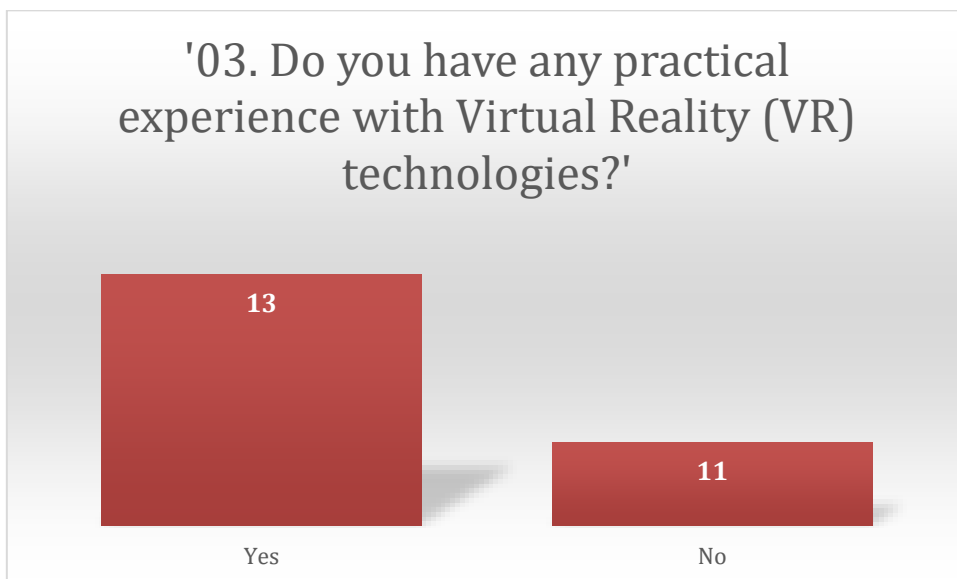
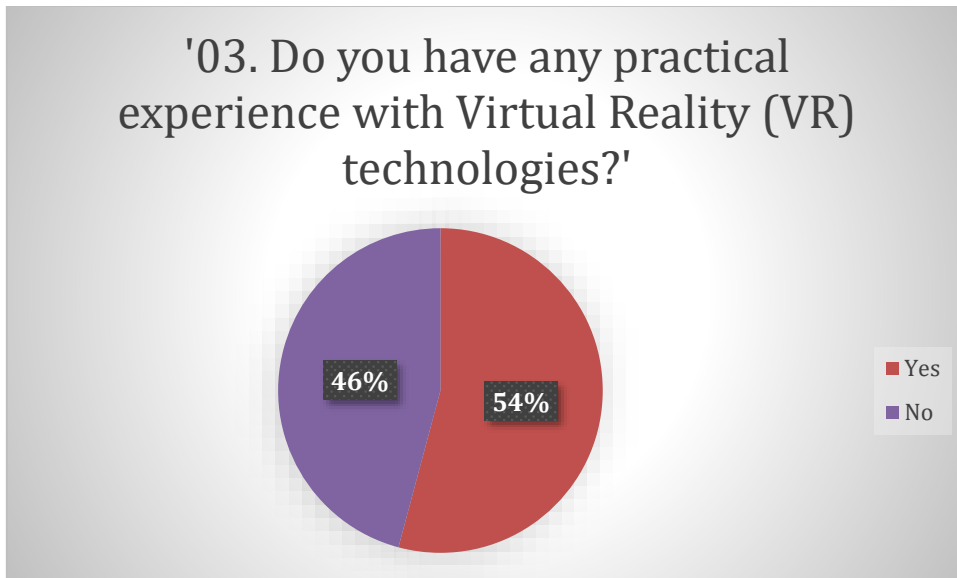


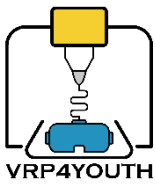


02. In which department are you an academic?	Count of 02. In which department are you an academic?
Docência	3
MATEMÁTICA	2
Línguas	2
Multimédia	2
Saúde	2
Gestão	2
Engenharia Informática	1
Marketing e Comunicação	1
Marketing	1
Terapia Ocupacional	1
Docente Ensino Superior	1
Cinema-media artes	1
docencia	1
Docente do Departamento de Multimédia	1
TIC	1
Gestão e Comunicação	1
Humanidades	1
Grand Total	24

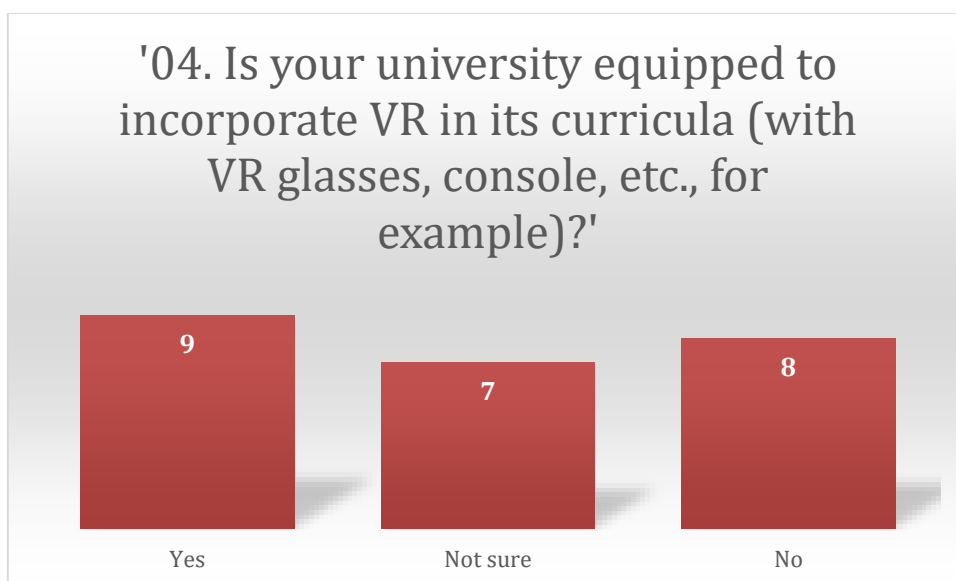
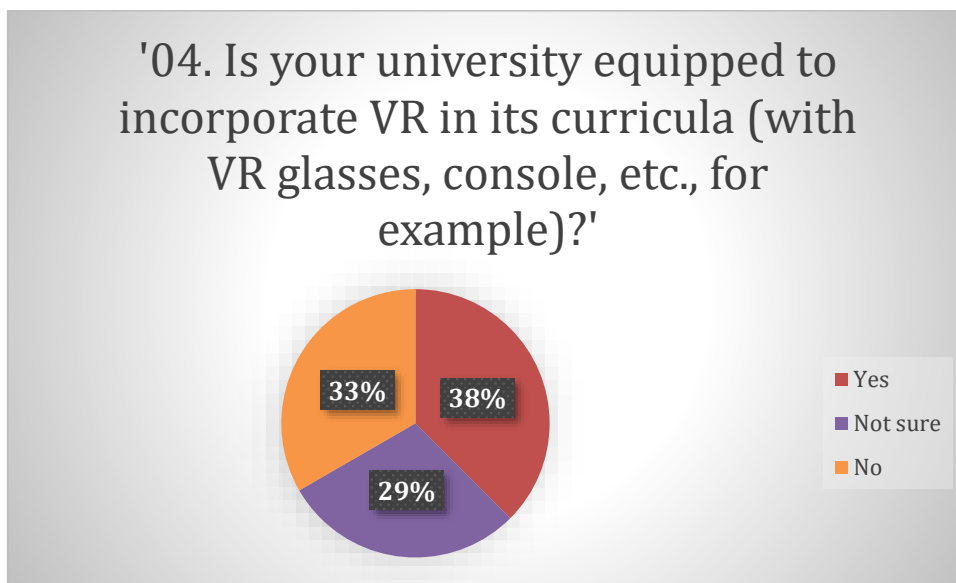


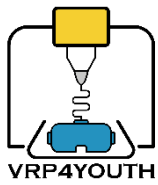
03. Do you have any practical experience with Virtual Reality (VR) technologies?	Count of 03. Do you have any practical experience with Virtual Reality (VR) technologies?
No	11
Yes	13
Grand Total	24





04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?	Count of 04. Is your university equipped to incorporate VR in its curricula (with VR glasses, console, etc., for example)?
Yes	9
Not sure	7
No	8
Grand Total	24

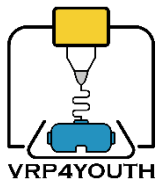




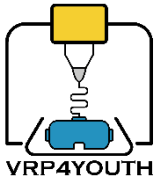
Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

2022-1-TR01-KA220-You-000089257

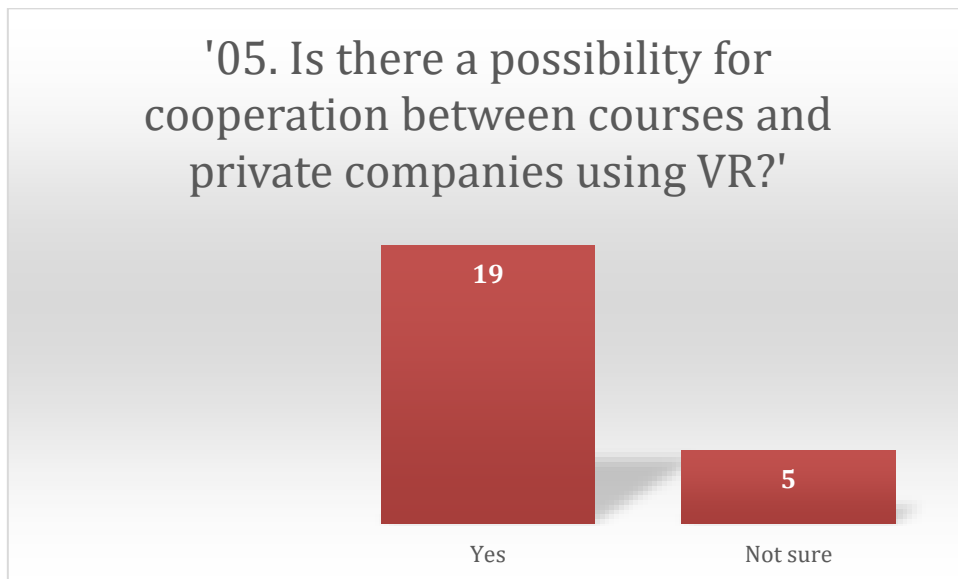
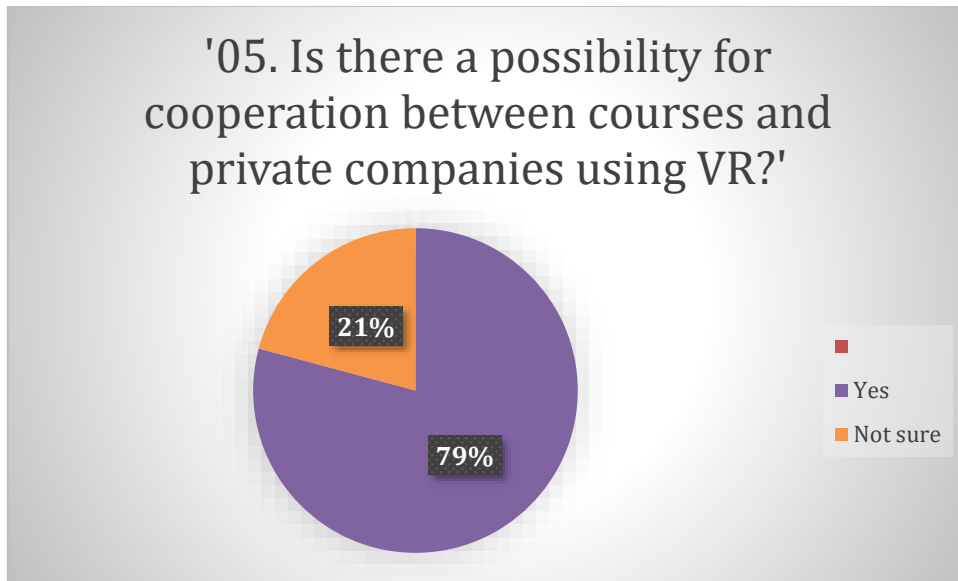
WP2 – Research Report on the Needs of Youth Regarding VR and RP

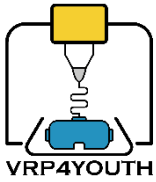


04. a) What equipment is available?	Count of 04. a) What equipment is available?
Oculus e sw	1
Oculos VR	1
HTC Vive, Oculus Quest e Quest 2	1
Meta Quest, Oculus Rift e HTC Vive Pro	1
Óculos. Plataformas. Vário equipamento de software e hardware.	1
Microsoft Hololens 2 HTC Vive Pro HTC Vive Flow HTC Vive Oculus Rift Oculus Quest HTC VIVE Pro Wireless HTC VIVE Vive Tracker ManusVR Haptic Samsung Gear VR	1
Oculus Quest, HTC Vive Pro	1
Óculos de RV	1
óculos e outros que não sei precisar.	1
(blank)	
Grand Total	9

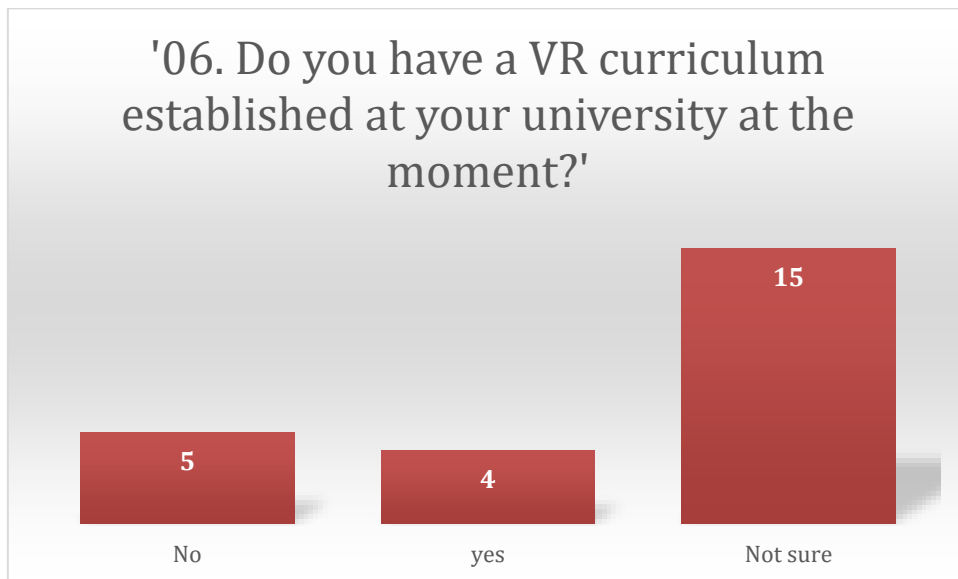
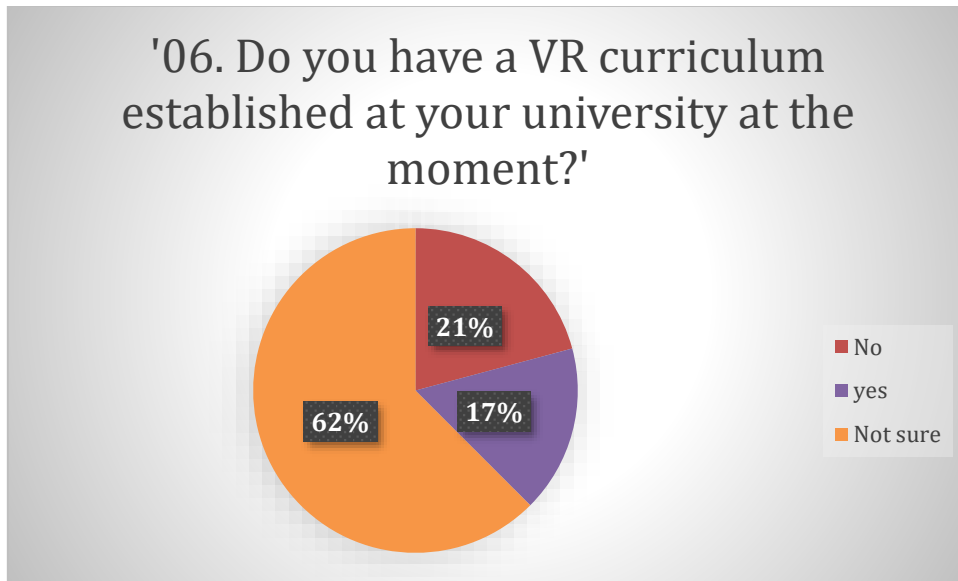


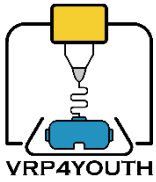
05. Is there a possibility for cooperation between courses and private companies using VR?	Count of 05. Is there a possibility for cooperation between courses and private companies using VR?
No	0
Yes	19
Not sure	5
Grand Total	24



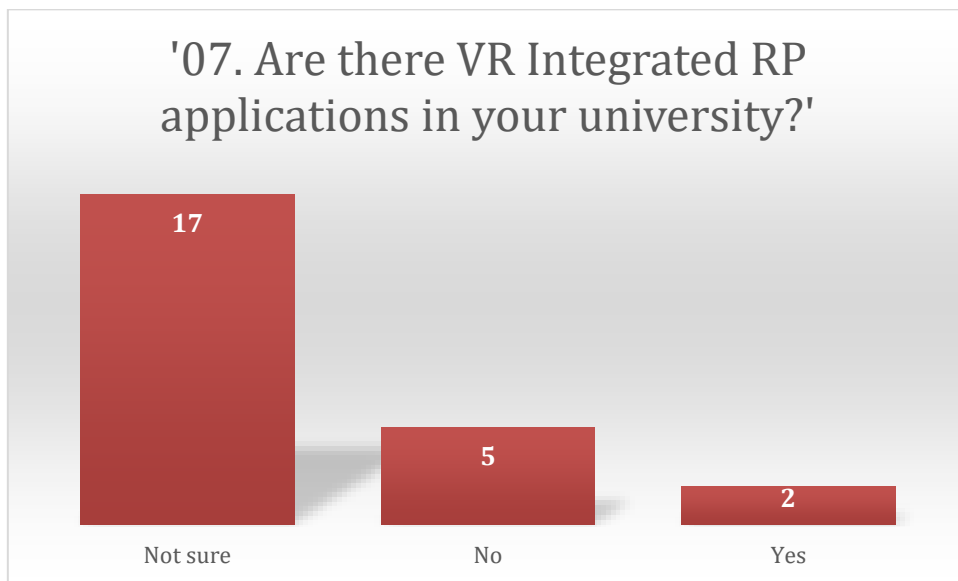
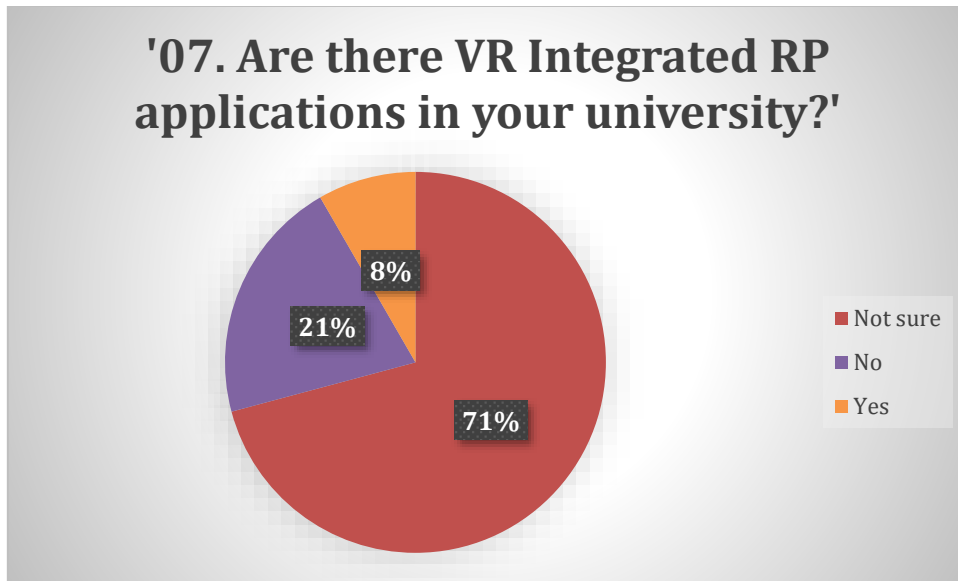


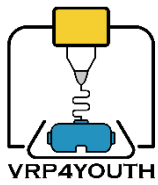
06. Do you have a VR curriculum established at your university at the moment?	Count of 06. Do you have a VR curriculum established at your university at the moment?
No	5
Yes	4
Not sure	15
Grand Total	24





07. Are there VR Integrated RP applications in your university?	Count of 07. Are there VR Integrated RP applications in your university?
Not sure	17
No	5
Yes	2
Grand Total	24

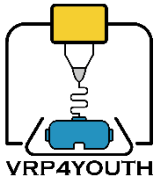




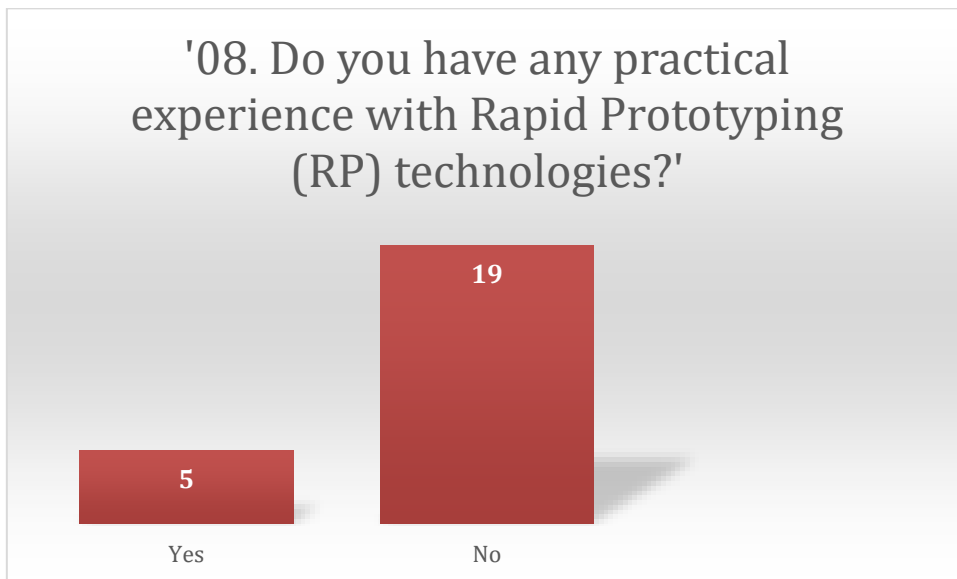
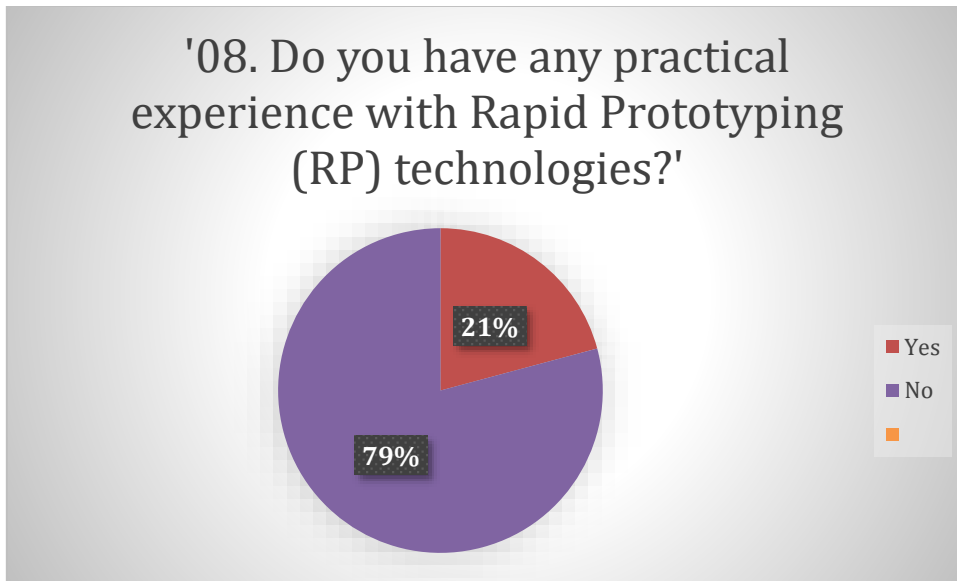
Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

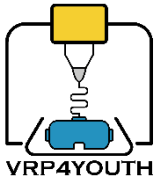
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WP2 – Research Report on the Needs of Youth Regarding VR and RP

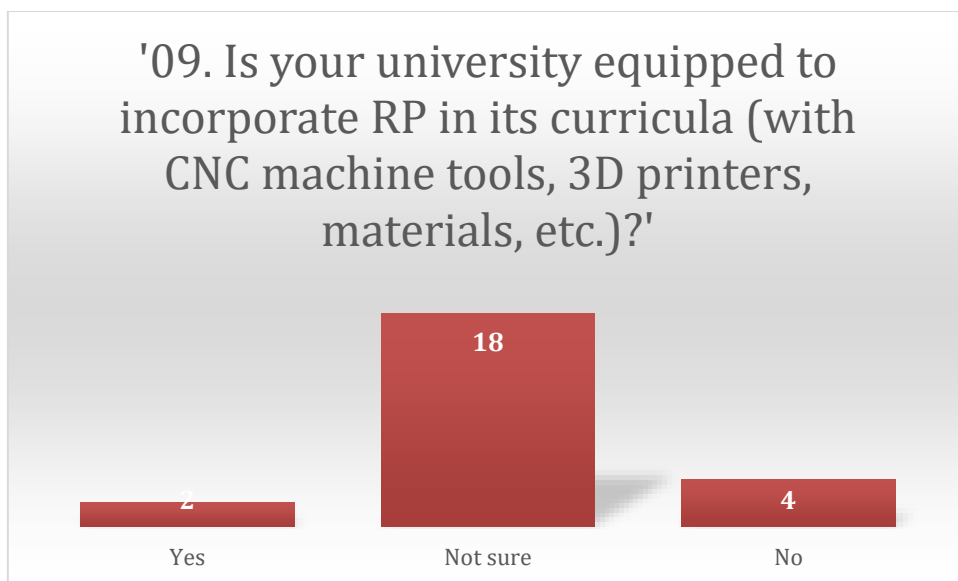
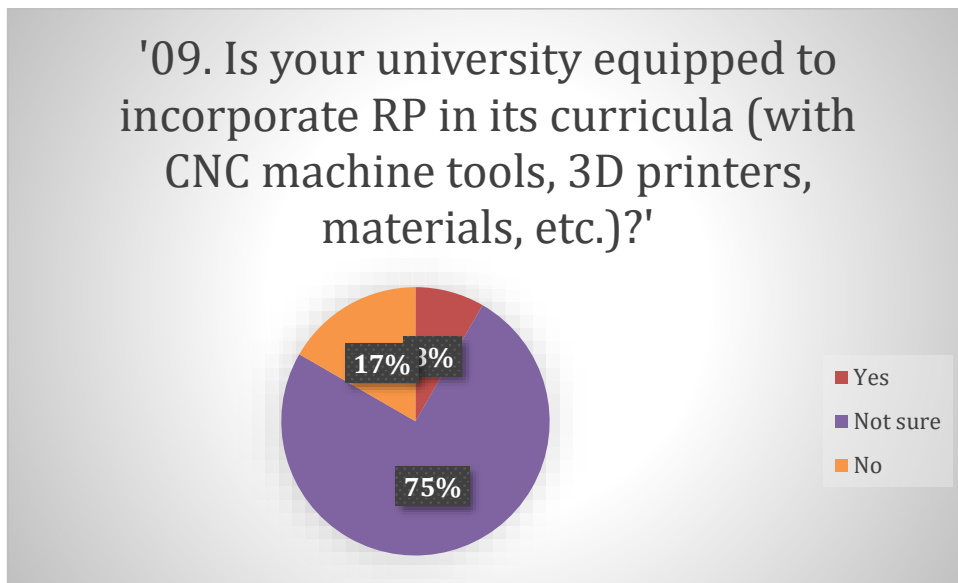


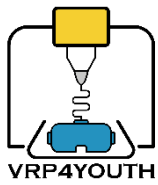
08. Do you have any practical experience with Rapid Prototyping (RP) technologies?	Count of 08. Do you have any practical experience with Rapid Prototyping (RP) technologies?
Yes	5
No	19
Not sure	0
Grand Total	24



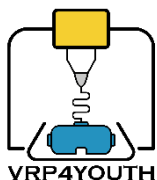


09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?	09. Is your university equipped to incorporate RP in its curricula (with CNC machine tools, 3D printers, materials, etc.)?
Yes	2
Not sure	18
No	4
Grand Total	24

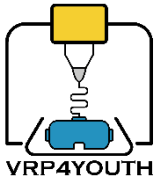




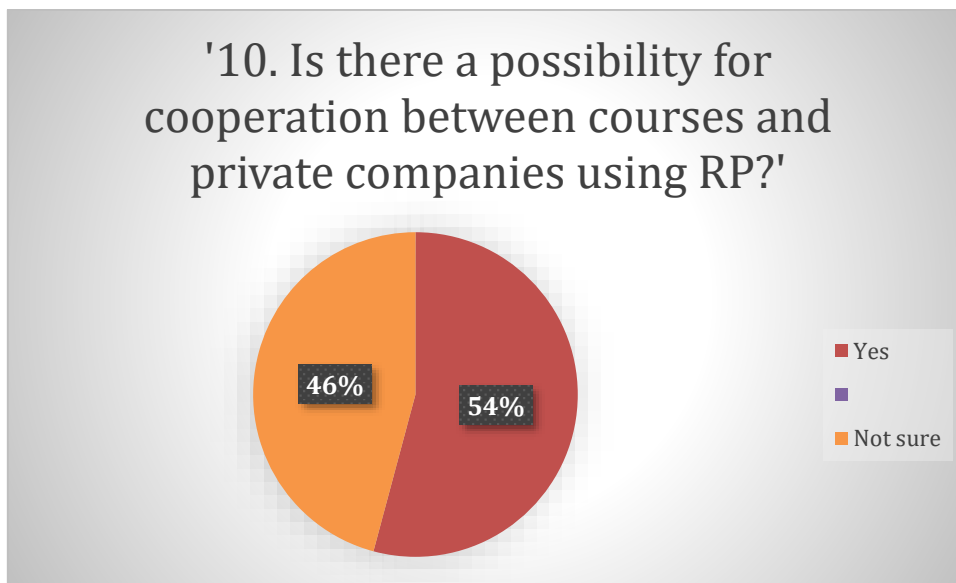
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2022-1-TR01-KA220-You-000089257
WP2 – Research Report on the Needs of Youth Regarding VR and RP

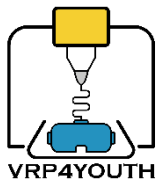


09. a) What equipment is available?	Count of 09. a) What equipment is available?
CNC e Impressora 3D	1
Não tenho essa informação.	1
(blank)	
Grand Total	2



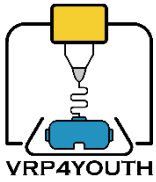
10. Is there a possibility for cooperation between courses and private companies using RP?	Count of 10. Is there a possibility for cooperation between courses and private companies using RP?
Not sure	11
No	0
Yes	12
Grand Total	24



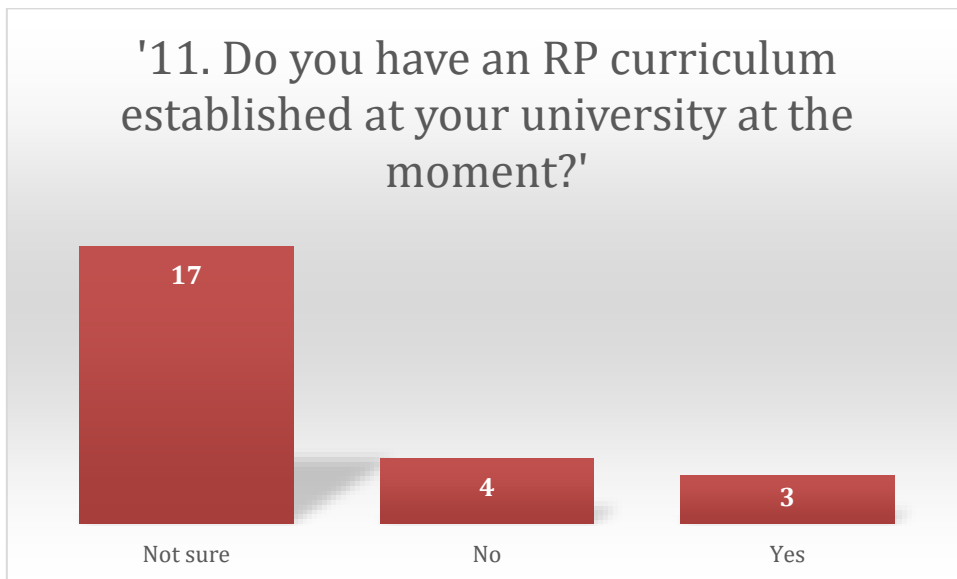
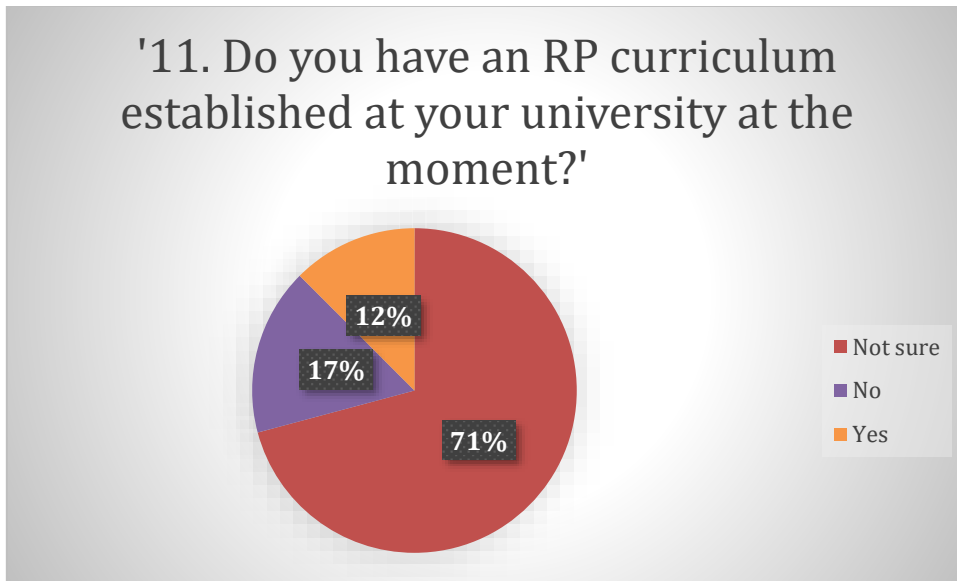


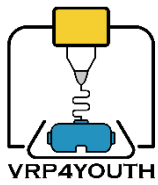
'10. Is there a possibility for cooperation between courses and private companies using RP?'





11. Do you have an RP curriculum established at your university at the moment?	Count of 11. Do you have an RP curriculum established at your university at the moment?
Not sure	12
No	11
Yes	10
Grand Total	33

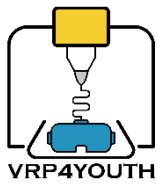




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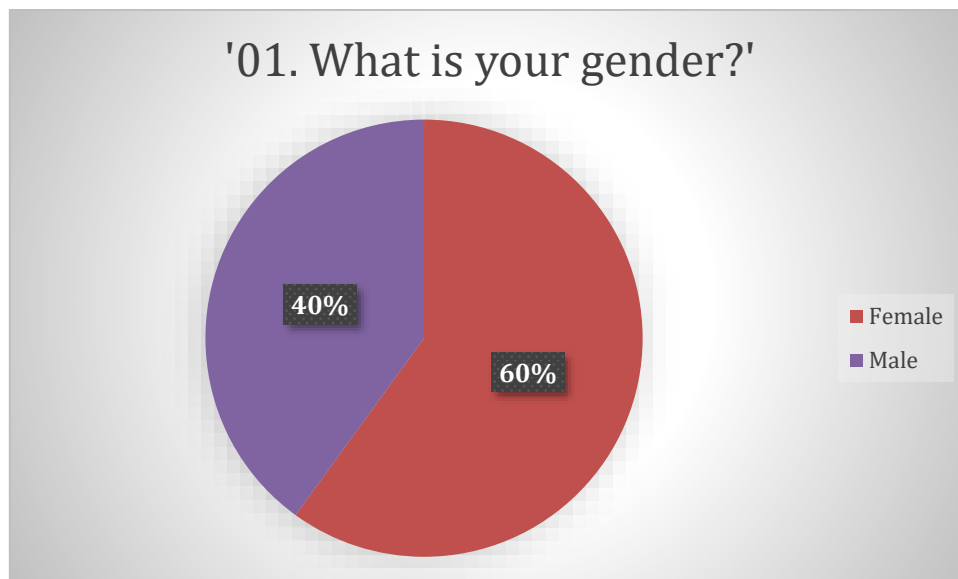
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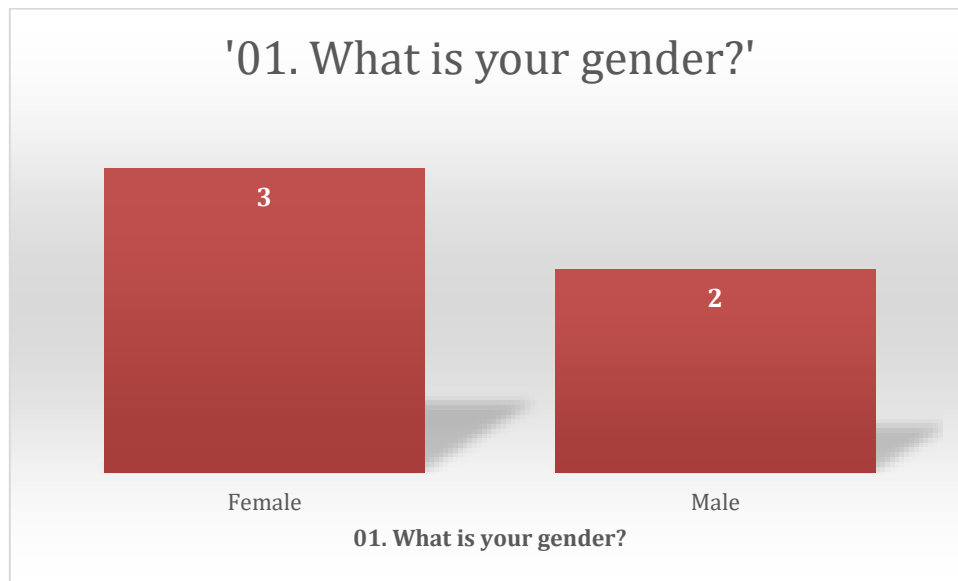
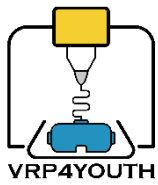
WP2 – Research Report on the Needs of Youth Regarding VR and RP

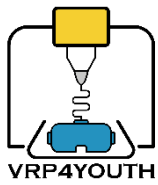


Unemployed Youth

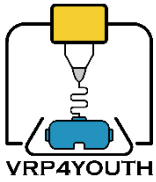
01. What is your gender?	Count of 01. What is your gender?
Female	3
Male	2
N/A	0
Grand Total	5



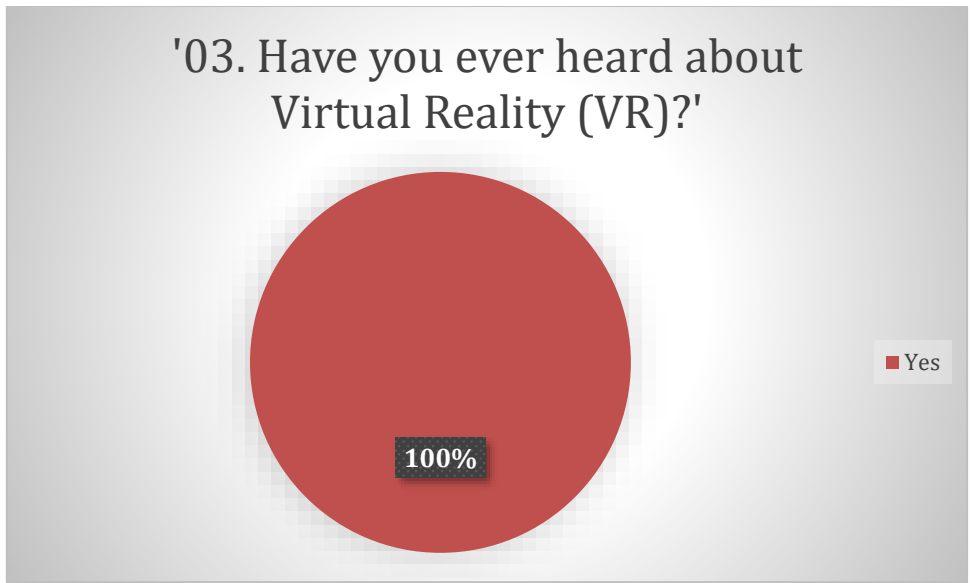


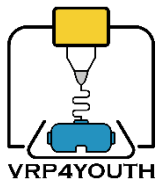


02. Which department did you graduate from?	Count of 02. Which department did you graduate from?
Comércio Internacional	1
Línguas	1
Tradução e Interpretação	1
Contabilidade e administração	1
Engenharia	1
Grand Total	5



03. Have you ever heard about Virtual Reality (VR)?	Count of 03. Have you ever heard about Virtual Reality (VR)?
Yes	5
Not sure	0
No	0
Grand Total	5

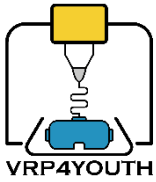




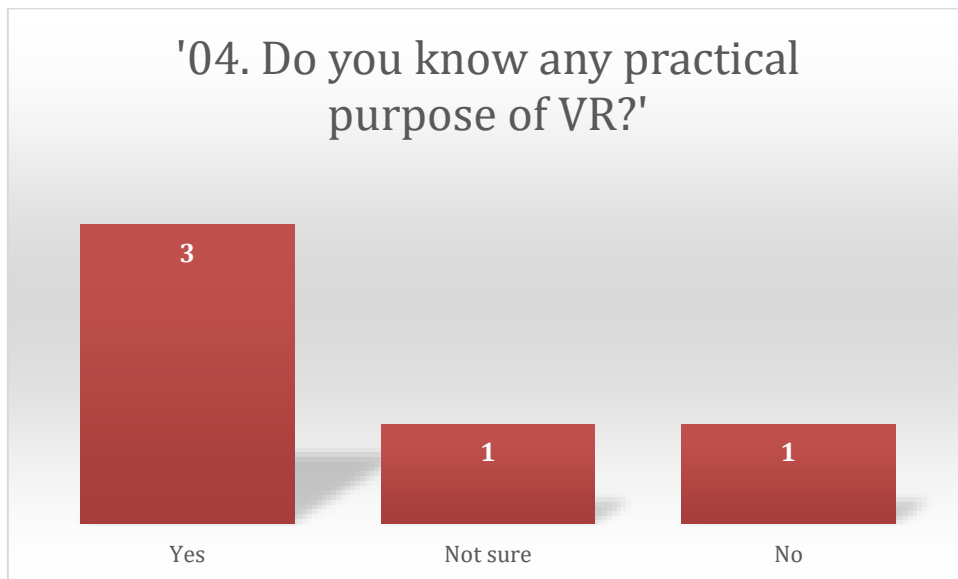
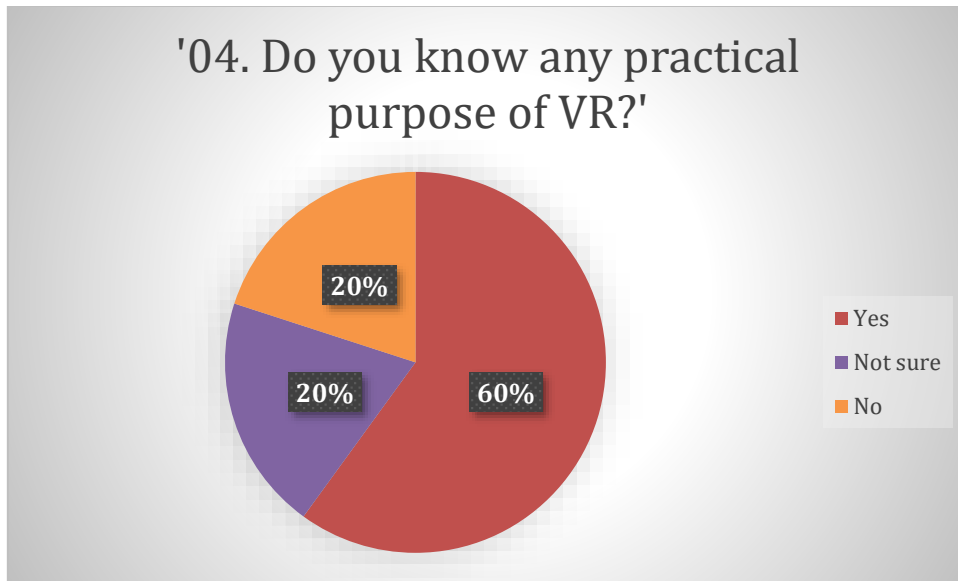
Innovative Integration Between Virtual Reality and Rapid Prototyping for Youth (VRP4Youth)

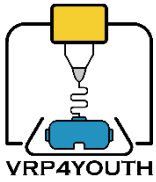
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WP2 – Research Report on the Needs of Youth Regarding VR and RP

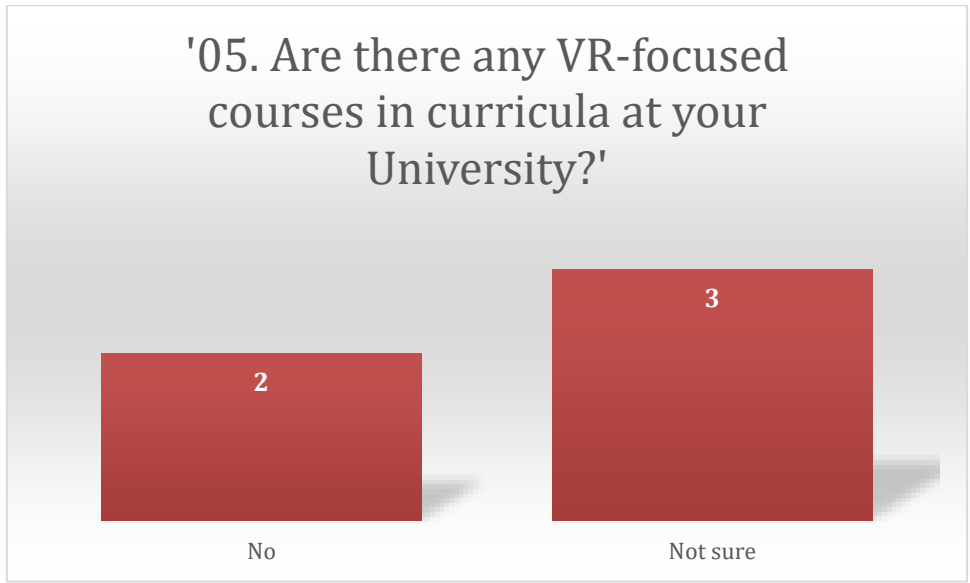
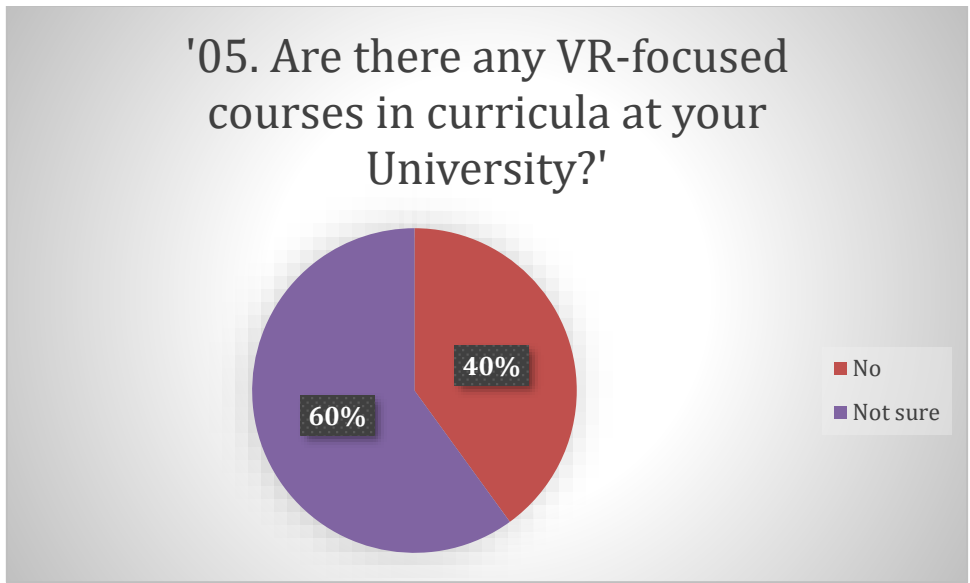


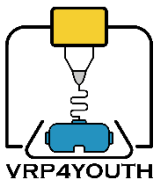
04. Do you know any practical purpose of VR?	Count of 04. Do you know any practical purpose of VR?
Yes	3
Not sure	1
No	1
Grand Total	5



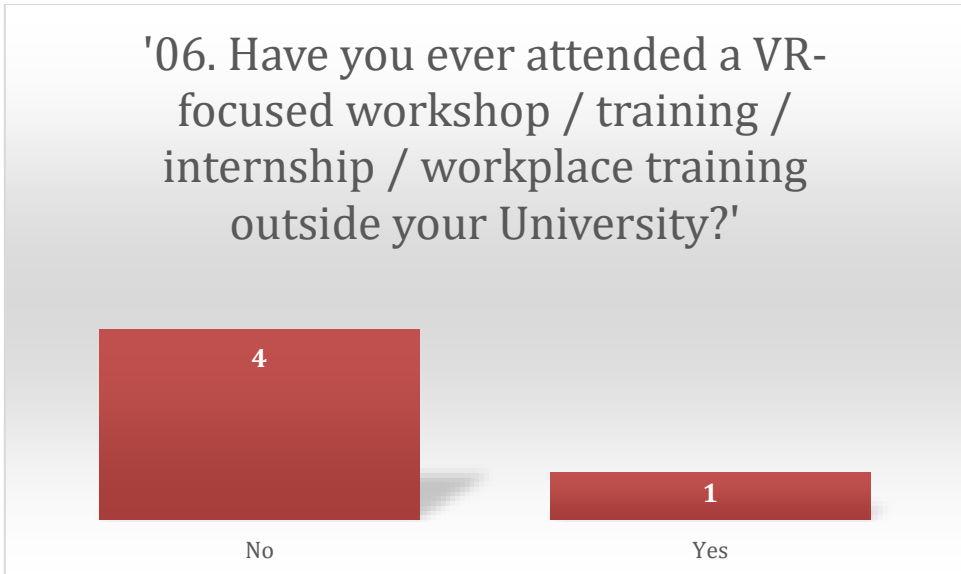
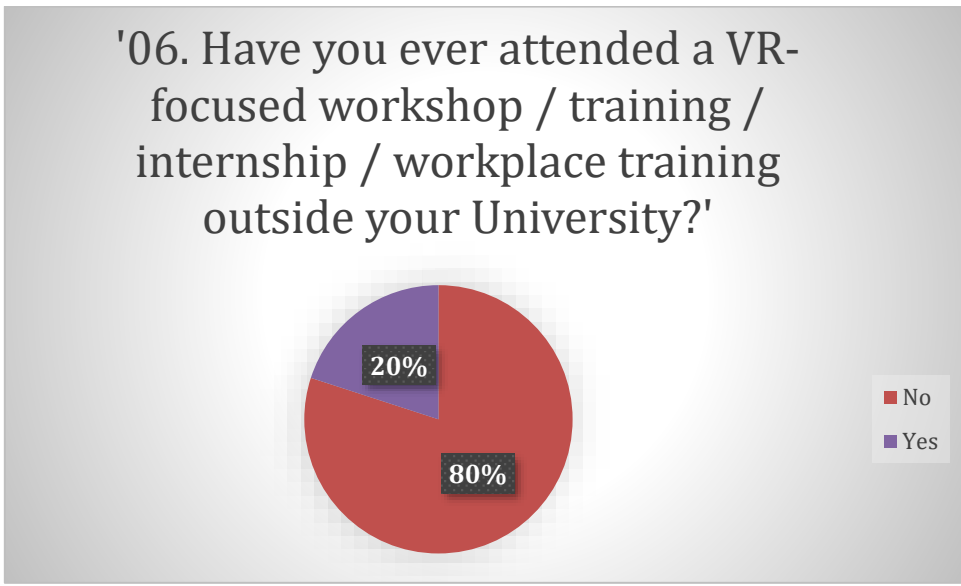


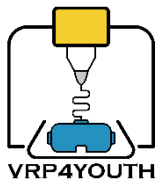
05. Are there any VR-focused courses in curricula at your University?	Count of 05. Are there any VR-focused courses in curricula at your University?
No	2
Not sure	3
Yes	0
Grand Total	5





06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?	Count of 06. Have you ever attended a VR-focused workshop / training / internship / workplace training outside your University?
No	4
Not sure	0
Yes	1
Grand Total	5

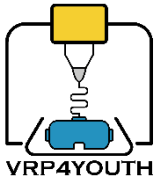




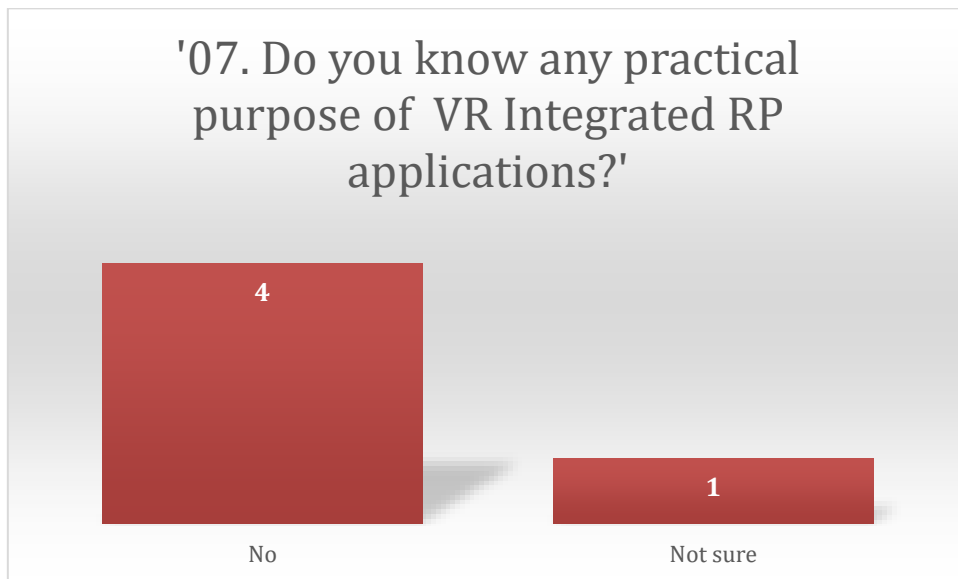
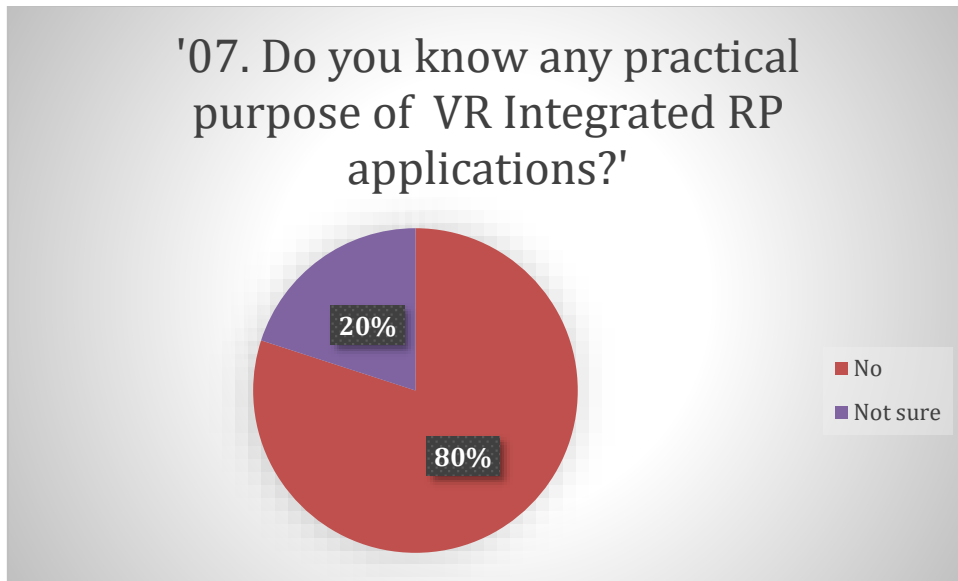
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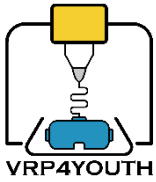
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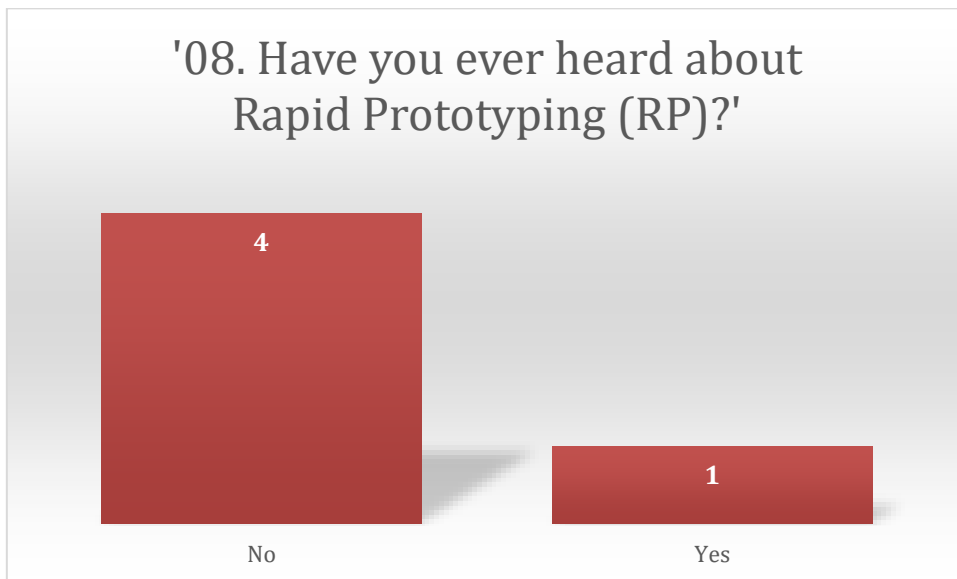
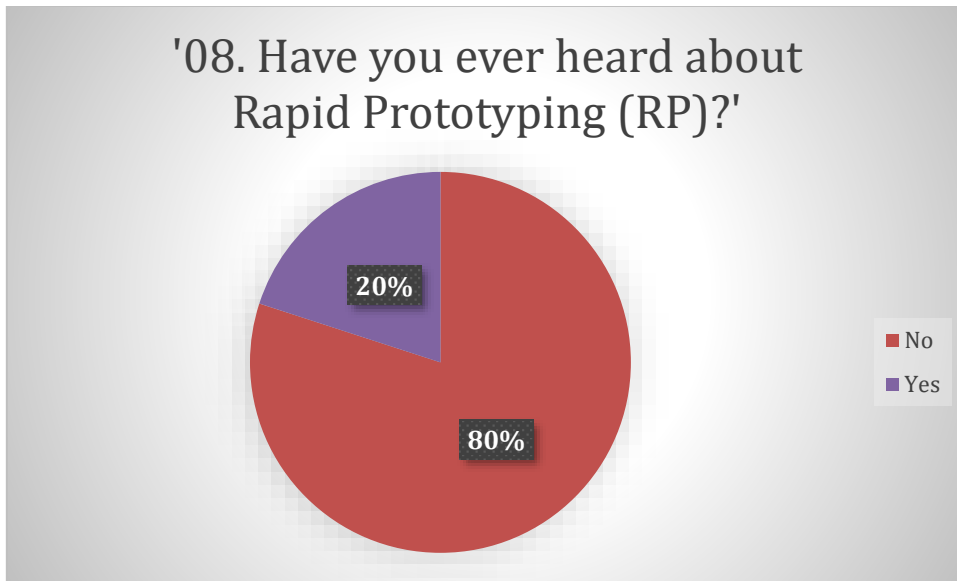


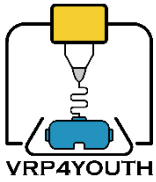
07. Do you know any practical purpose of VR Integrated RP applications?	Count of 07. Do you know any practical purpose of VR Integrated RP applications?
No	4
Yes	0
Not sure	1
Grand Total	5



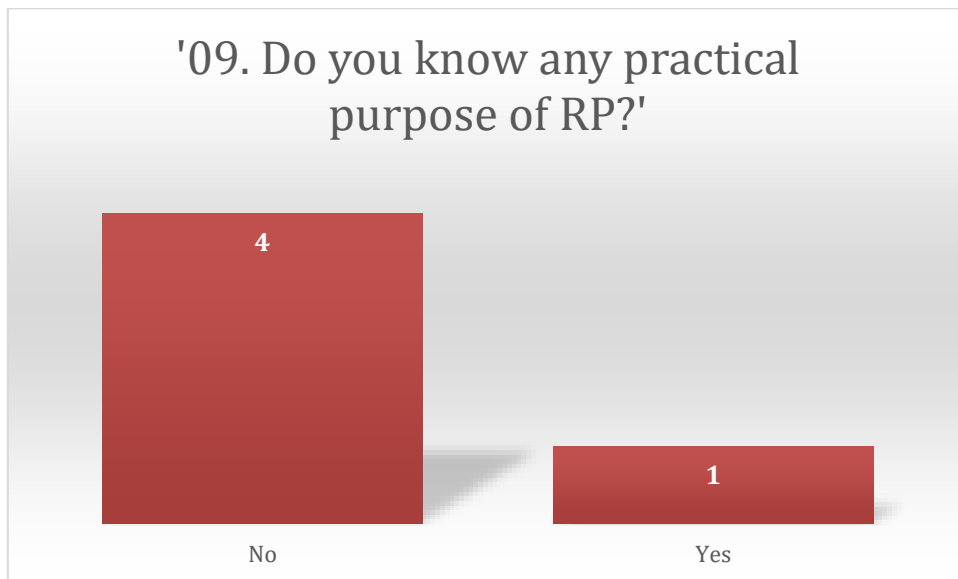
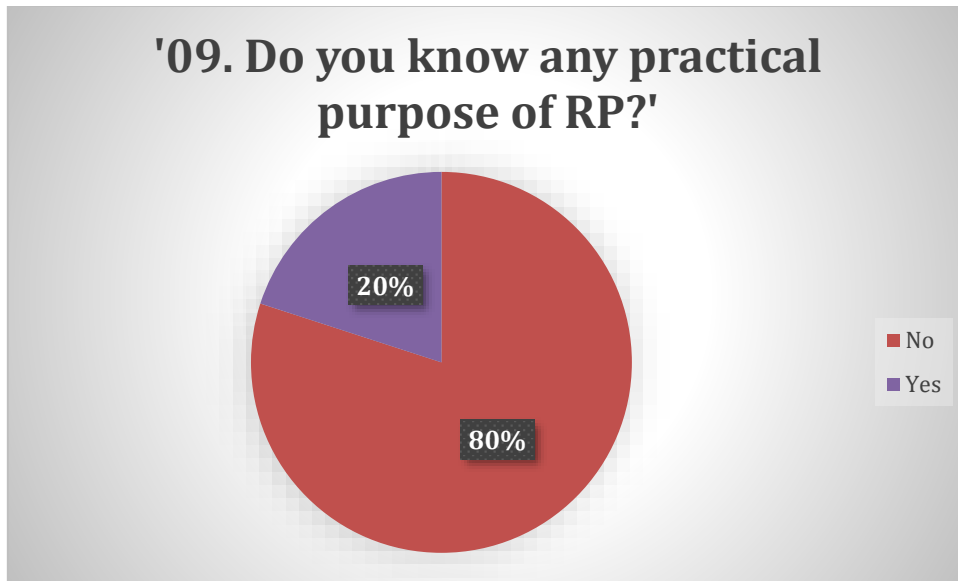


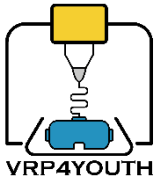
08. Have you ever heard about Rapid Prototyping (RP)?	Count of 08. Have you ever heard about Rapid Prototyping (RP)?
No	4
Not sure	0
Yes	1
Grand Total	5



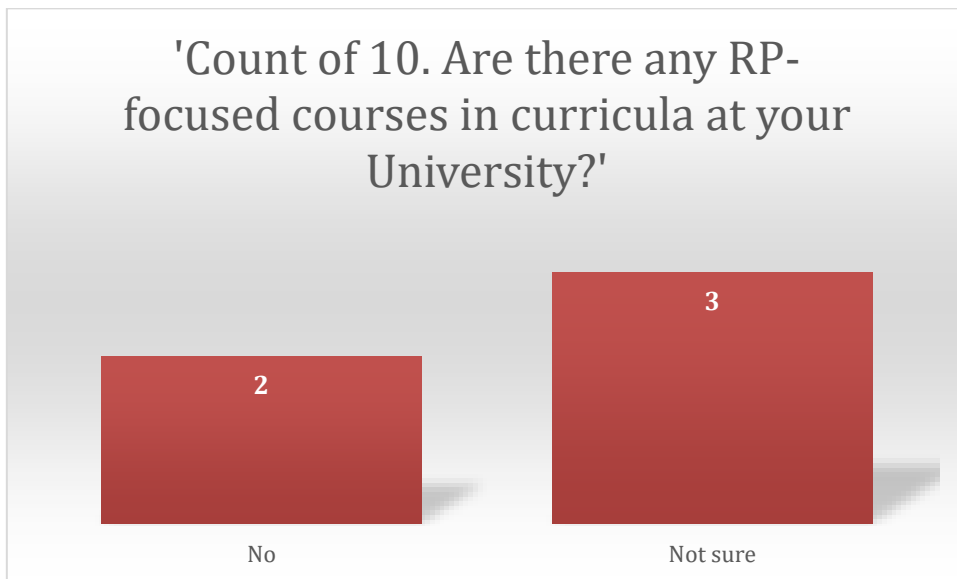
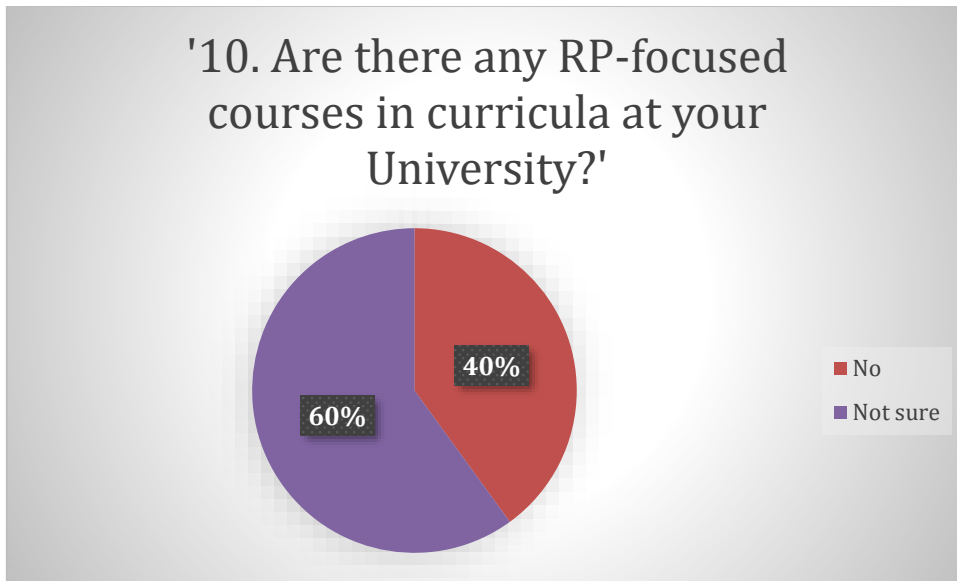


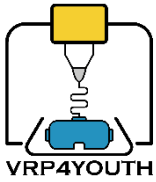
09. Do you know any practical purpose of RP?	Count of 09. Do you know any practical purpose of RP?
No	4
Not sure	0
Yes	1
Grand Total	5





10. Are there any RP-focused courses in curricula at your University?	Count of 10. Are there any RP-focused courses in curricula at your University?
No	2
Yes	0
Not sure	3
Grand Total	5





11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?	Count of 11. Have you ever attended an RP-focused workshop / training / internship / workplace training outside your University?
No	4
Not sure	0
Yes	1
Grand Total	5

