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The works must be unpublished and refer to topics of education, crowdsourcing, operation of academics corps, regional development, fiscal, architecture, networks and other topics related to Social Sciences.

Presentation of the Content

In volume nine, issue sixteen, as the first article we present, *Academic performance in virtual learning environments post COVID-19 pandemic in higher education*, by HIGUERA-ZIMBRÓN, Alejandro & RIVERA-GUTIÉRREZ, Erika, with secondment in the Nova Southeastern University and Universidad Autónoma del Estado de México, as a second article we present, *History of a family business in San Juan del Rio, Qro.*, by CORTÉS-ÁLVAREZ, Yolanda, CORTÉS-ÁLVAREZ, Alfredo, GONZÁLEZ-NERI, Aarón Iván and QUEZADA-MORENO, Maribel, with an appointment at the Universidad Autónoma de Querétaro, as a third article we present, *The UAZ in the University Network of Arts, RUA (Red Universitaria de Artes): presence and development perspectives*, by JUAN-CARVAJAL, Mara Lioba & VDOVINA, María, with secondment at the Universidad Autónoma de Zacatecas, as fourth article we present, *User interface design and object segmentation applied to Autominy platform*, by LÓPEZ-PÉREZ, Manuel Aarón, SANDOVAL-GIO, Jesús, IX-ANDRADE, Freddy Antonio and MOLINA-CÉSPEDES, Julio, with secondment at the Instituto Tecnológico de Mérida.

Content

<div style="text-align: center">**Article**</div>   <div style="text-align: right">**Page**</div>

Academic performance in virtual learning environments post COVID-19 pandemic in higher education

Rendimiento académico en ambientes virtuales del aprendizaje en la pandemia COVID-19 en educación superior

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Abstract

The aim of this study is to analyze academic performance in virtual learning environments during the Covid 19 pandemic for Institutions Incorporated into the University located in the State of Mexico. For this, a review of scientific literature was carried out, which is based on current references in specialized databases. A quantitative design of this study based on an experimental study with a sample of 15 institutions, 1200 professors who taught at distance or virtually in the academic period, also 700 students were applied instruments during scholar period of year 2020- 2021, 2022. Data collection used different surveys. The information analysis is described narrative and presented by graphic, tables, and diagrams. The results of these surveys shown that, 80% learnt at distance, nevertheless 20% decided to quit the classes. The most used platform was Google classroom, the main communication plataforms used were Facebook, Zoom and WhatsApp. The 70% of the contents of the programs were completed. The 90% consider that academic performance is subjective. The 90% of theachers require developing digital competences 95% consider that access to technology is an oportunity to achieve learning.

Resumen

El propósito de este documento es analizar el rendimiento académico en ambientes virtuales de aprendizaje en la pandemia COVID-19 para las Instituciones Incorporadas a la Universidad ubicada en el Estado de México. Ello tuvo un sustento en la revisión de literatura científica que se apoya en autores vigentes. El diseño metodológico tiene un enfoque de corte cuantitativo con diseño experimental con una muestra de 15 instituciones de educación superior (IES), 1200 profesores que dictaron clase en el periodo académico, con 700 estudiantes a quienes se les aplicaron los instrumentos durante el año 2020-2021. En seguida, la recolección de datos se hizo a través de instrumentos denominados cuestionarios en la aplicación google forms. El análisis de la información se describe y muestra mediante tablas, gráficas y diagramas de frecuencia. Los resultados de las encuestas muestran que, en educación superior, el 80% realizó trabajo a distancia, y también se demuestra que hubo un alto índice de deserciones 20%. La plataforma más utilizada fue Google classroom, el principal medio de comunicación fue Facebook, Zoom y WhatsApp. Se cumplió con el 70% de los contenidos de los programas. El 70% de los encuestados consideró que el rendimiento académico es medio y el resto bajo. El 90% de los docentes requiere desarrollar competencias digitales. El 95% considera que el acceso a la tecnología es una oportunidad para lograr el aprendizaje.

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Introduction

Academic performance in virtual learning environments (VLE) is a construct that given the nature of the current dynamics called Pandemic COVID-19. This phenomenon requires its measurement in education, especially in higher education. It is a fact that virtual or distance learning raises many doubts about its efficiency or effectiveness. However, teaching and learning in virtual environments must be measured or evaluated to substantiate its performance with facts. Ross, Morrison and Lowther (2010) point out that there are theories that support Information and Communication Technologies (ICT), such as the connectivist theory of Simmens, who promotes their use as a trigger for new learning. This fact cannot be lost sight of in this new dynamic. Salinas (1996) suggests mixing technology, relying on synchronous and asynchronous media to achieve better communication as a starting point. It is recognised, as Bello (2005) rightly cites, that virtual education is entirely dependent on the functioning of the Internet. Consequently, virtual or distance education relies on electronic networks, and not necessarily on the construction of learning from a scaffolding of reality in the classroom. It is for this reason that it is necessary to see how academic performance in the COVID-19 pandemic was in VPAs.

To achieve the research objective, first, the background was described, based on scientific evidence to understand the emergence of the problem. Secondly, a comprehensive review of the current state of knowledge was made, supported by some current authors. Third, an experimental design was proposed to show the results of an instrument applied to the Institutions Incorporated to the Universidad Autónoma del Estado de México (UAEM) in Mexico.

To achieve this purpose, several databases such as EBSCO, Redalyc, ECORFAN, Web of Science, among others, were used to show evidence of the problem. Then, recent studies on VPA in higher education were identified to support the relevance of the study, and the gaps. In this research, with a quantitative experimental design approach, the quality criteria to be considered were certain elements shown to achieve reliability and validity. Reliability in this case is given by the degree of repeated application of the measurement instrument, as the same results were produced in different subjects. Whereas validity was indicated by the degree to which the instrument actually measured the variable academic performance (Hernández et al., 2010).

In this, internal validity detected the degree to which valid conclusions were drawn about the causal effects of the variables. While external validity generalised the results to the conditions or areas of interest (Ross, Morrison and Lowther, 2010). In this sense, we sought to replicate the study, but analysed from another context. To achieve this, instruments were used to provide reliability in the collection of information. Consequently, data obtained from the information is presented. Finally, some of the ideas were contrasted.

Background

Open distance learning (ODL), e-learning and e-learning on the Internet, has its historical antecedents in the last century, but it is only in the 1990s that it has taken off. It has evolved slowly in various parts of the world. Sometimes with uncertainty, sometimes without credibility. Nonetheless, some universities have developed the distance mode, or blended learning, as an alternative for educational coverage.

Nowadays, Distance Education and ICTs enable social spaces for human interaction in a virtual way. It is a fact that the environment gives rise to new teaching-learning processes. The transmission of knowledge through electronic communication networks must become a consistent reality. There is no going back, the search for a type of virtual education where the student is involved, participates and is the generator of his own knowledge is the challenge. They must also participate in multidisciplinary projects, learning to function in an environment of collaboration and cooperative development. In other words, paradigms must be broken. It is true that the Covid-19 global dynamics accelerated the process or positioned the method. It is necessary to understand that this phenomenon will not end in this century, the trend is different, and that it is better to be prepared for other adverse scenarios.

Evolutionary theorists confirm that more pandemics will come, all caused by overpopulation. For this reason, Higher Education Institutions (HEIs) are obliged to restructure their curricula not only to offer traditional face-to-face or blended classes, but also to make room for the introduction of virtual classes.

Theoretical Approach

This review of the literature notes the relevance of VPAs in various academic circles. Therefore, some of the gaps in the literature are shown to give rise to this study. It is noted that the discussions deal with studies developed for different contexts, systems or nations. For this reason, the research that has been done is validated, as it is designed in a context that has not yet been explored. Hence, the research presented has diverse approaches and characteristics, but none yet under this complex scenario.

Virtual Learning Environments

Authors such as Gonzáles and Flores (2000) define a VLE as a space where people converge who intend to learn a subject based on theory, technique and practice with the use of media or tools that contribute to their own generation of knowledge.

Meanwhile, a VLE, in the words of Herrera (2006) is an environment that is supported by technological means for learning in a synchronous or asynchronous manner. Cabero, et al (2000) consider that there are a series of characteristics that support the VLE: software and hardware, and even something that he calls orgware or structures that support systems that help the teaching-learning process.

Contreras-Colmenares and Garcés-Díaz (2019) in their research called Ambientes Virtuales de Aprendizaje: dificultades de uso en los estudiantes de cuarto grado de primaria, conclude that VLEs are training spaces that require a commitment from the teacher. In this case, still limited by the training and development of technological skills. Perhaps for these last reasons it can be inferred that, although the evolution of VLE has been moderate, the current dynamics demand its use in an accelerated manner, but supported by technology and media. It is recognised that other questions arise about its efficiency or effectiveness, but it must be understood that it is the only alternative available to counteract the issue of education in times of pandemic crisis.

Another paper by Suárez, Flores and Peláez (2019) on Teachers' digital competences and their importance in virtual learning environments, agrees that it is necessary to make the teaching community digitally literate. The researchers agree that virtual education is booming. Furthermore, they identify a number of opportunities to achieve the digital competences required.

For this reason, it can be argued that the efficiency of VLE also depends on the use of other technological tools in addition to the development of teaching competences. However, the article leaves a gap on academic performance.

Finally, Taborda and López (2020) comment in their article Critical thinking: an emergence in virtual learning environments that, although the strengths of the VLE modality are recognised, there are also implications that do not support the teaching-learning process. The latter refers to the possibility that one consequence is a lack of socialisation. This can be discussed in another study. The authors argue that the configuration of digital systems in synchronous and asynchronous processes are not dynamic, in the case of students and teachers, they feel intimidated, so they do not participate or do not turn on their digital cameras in the synchronous system, otherwise it is detected when they question themselves about learning or competences, given the world of information that exists. It is not clear whether there was a learning moment or whether the technology did not provide the expected dynamics. This is perhaps the main reason why academic performance is subjective in this type of VPA.

Academic Performance

Lucena, et al (2019), define academic performance (AR) as a student's maximum outcome from the learning process. It is understood that AR has different connotations. According to Martínez and Otero, in García (2019), they state that AR is the product obtained by students from learning centres and that it is regularly shown in academic grades. Pizarro (1985) in García (2019), incorporates the term ability measure that expresses an estimate of what a person has learned.

However, recent data show that AR depends on a number of factors. González and Guadalupe (2017) call them variables. Mostly determined by knowledge, subjects, learning ability, socio-cultural level, expectations, both of the teacher and parents. However, the discussion for this case focuses on the fact that there are other factors that are determinants of learning such as technology. In this context, VPAs are supported by ICT, yet there are learning methods that reinforce traditional models, although the discussion focuses on the fact that technology is a means to support learning. It is argued that everyone learns at their own pace and in their own way. In this case, it is up to HEIs to provide the necessary technological tools to equip this Virtual Learning Environment.

When we refer to equipping, we must consider equipment, media, Internet, applications and spaces or electronic classrooms. However, it is not only about equipping the "virtual classroom" but also about equipping the teacher and the student, through computer equipment, Internet cards and software. Everything is an investment, the most important one, in education.

In Practice

In a study called Influencia del aula invertida en el rendimiento académico: Una revisión sistemática (Hinojo, et al., 2019) they show that this method (Flipped classroom) allowed to increase students' grades significantly, in a first period, and later it was demonstrated that there are conditioning factors that do not allow learning to be absolute. Although the results support that the flipped classroom method is more efficient versus the traditional method (Hinojo, et al, 2019), some data show that there are some issues or "factors" that influence AR to depend on other variables to achieve efficiency.

Suárez, Flores and Peláez (2019), in a paper on AR in VPA, state that the success of the tool depends largely on the support of ICT. The authors also recognise that teachers and students are required to have a series of digital competences (DC). However, while there are studies such as Rivera, et al (2021) that argue that the starting point towards virtualisation is the development of DCs to avoid improvisation in teaching, there are also studies such as Rivera, et al (2021) that argue that the starting point towards virtualisation is the development of DCs to avoid improvisation in teaching.

At the present time, many HEIs are declaring an end to virtualisation and a return to the traditional, which is incorrect. It must be acknowledged that the CDs add, to a large extent, to the AR of the students in this virtual modality. It is time to pass on good practices in order to replicate the studies.

For all of the above, Calvo, et al (2020), Prata, et al (2020), Ramírez-Hernández (2020), Peña (2020), Ospina, et al (2013), among others, agree that VPAs are supported by methods, models, infrastructure, competences, systems, for the achievement of the AR of students in HEIs. Under these circumstances, the following research question arises: What was the academic performance of higher-level students in virtual learning environments of the Institutions Incorporated to the UAEM in times of the COVID-19 pandemic?

Research Method

This study is based on a quantitative design with an experimental design, a case study with a single measurement, which will allow the application of instruments for data collection based on a series of items that guide the variables to be identified, therefore, as is well cited, this type of methodological design is the appropriate one for the research (Hernández, Fernández-Collado, and Baptista, 2008).

Method

Campbell and Stanley (1966) in Hernández et al (2008), argue that there are three types: pre-experiments, pure experiments and quasi-experiments. In this case, the pre-experiment was used. That is, a stimulus was administered to some groups, after applying the measurement of the academic performance variable to observe the level of the group. It is simply a matter of explaining some facts coming from the academic reality. This type of research aims to measure, collect group or individual information on variables according to the study (Hernández, Fernández-Collado, & Baptista, 2008).

In this case, the level of research, according to criteria and modality, requires explaining facts to measure the variable Academic Performance in Virtual Environments that have occurred in the context after the COVID-19 pandemic in the Institutions Incorporated to the UAEM. The data were collected electronically from the original scenario, without making inferences or manipulations (Creswell, 2009). It should be noted that the study had two points in time for measurement: it was carried out at the end of the 2020-2021 period, and the beginning of the 2021-2022 period, all to understand how the transition and use of technology was in VPA.

Participants

The sample used was approximately 700 students. All of them come from a higher education level, from different institutions, all of them incorporated to the UAEM.

The students were of both sexes and those who were interested participated. The ages ranged from 19 to 23 years old. Therefore, the sample represents an important value in this study. No exclusion criteria were established and anyone who wanted to participate and received the electronic link to fill out the form was allowed to do so.

Instrument

An instrument was designed to obtain the information using the google forms platform. The instrument was a questionnaire of approximately ten questions, some of which were open-ended, and others closed-ended, with the intention of obtaining truthful and reliable information. No value scales were established as the information obtained was quantitative.

Procedure

To achieve the purpose and answer the research question, the following activities were carried out in the order specified. The steps to obtain the information are as follows:

1. Questionnaire was designed in Google forms platform.

2. An email was sent to all the institutions to invite them to participate in filling out the survey.

3. A time frame of 15 days was given.

4. The platform was permanently monitored to see the degree of response from the participants.

5. Once the time period was over, the platform was closed, and the information was collected.

6. The results are presented in the form of discussion and graphic displays.

Results

This section collects the data on What was the academic performance of higher-level students in virtual learning environments of the Institutions Incorporated to the UAEM in times of the Covid-19 pandemic?

For this reason, the results are broken down in detail:

Question 1: Is there a plan of academic activities in your institution that includes objectives, activities, timelines, etc.?
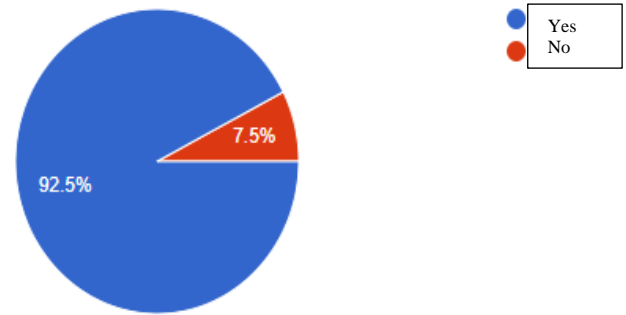
Figure 1 Results of the activity plan
Note. Directorate of Incorporated Institutions Admon. 2019-2021

In particular, the following results were generated:

	No High school education	Yes High school education	No Higher education	Yes Higher education
Total	42	507	14	180
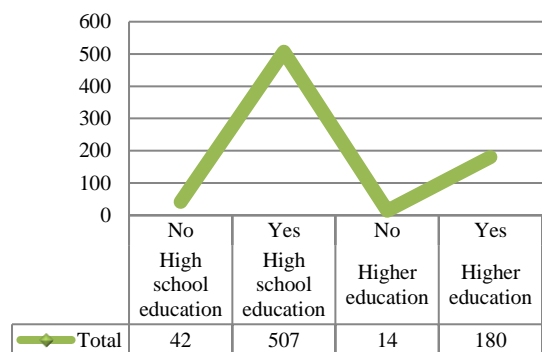
Table 1 Results of the activity plan
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 2: What platforms have been used in your institution? Online and distance learning.
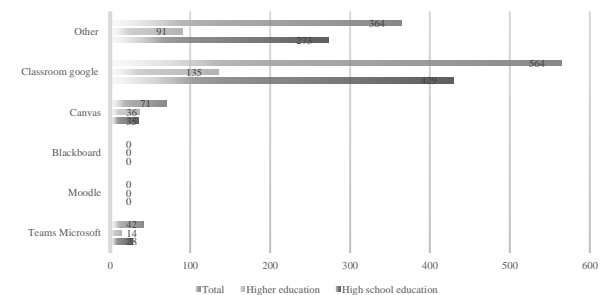
Figure 2 Most used platforms
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 3: What videoconferencing tools have been used in your institution?
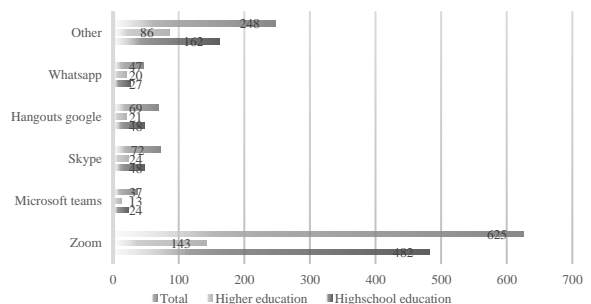
Figure 3 Videoconferencing tools
Note: Directorate of Incorporated Institutions Admon. 2019-2021

Question 4: What proctoring tools have been used in your institution?
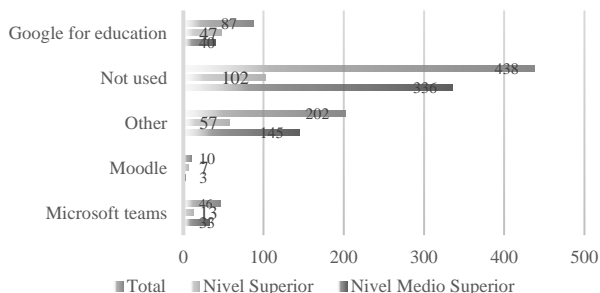
Figure 4 Proctoring tools
Note: Directorate of Incorporated Institutions Admon. 2019-2021

Question 5: What is your institution's primary means of communication during the COVID-19 health contingency?
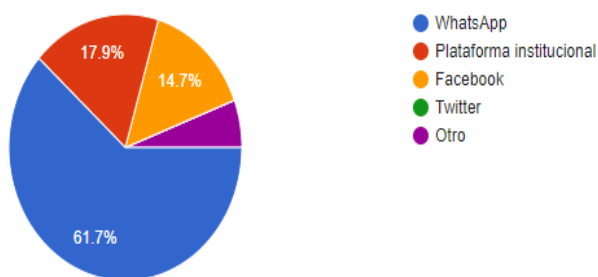
Figure 5 Proctoring tools
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 6: Please assign a percentage to the challenges your institution has faced during the COVID-19 health contingency?
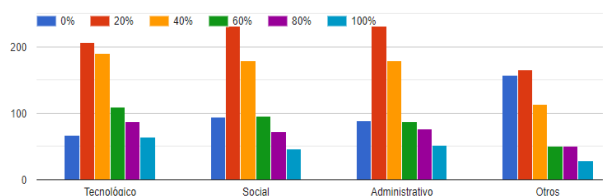
Figure 6 Proctoring tools
Note: Directorate of Incorporated Institutions Admon. 2019-2021

Question 7: Which staff has been most involved during the contingency? (where 1 is minor and 5 is major).
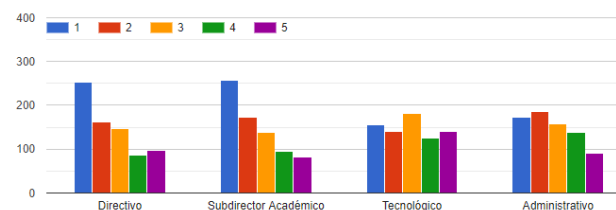
Figure 7 Proctoring tools
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 8: How do you consider your academic performance was during this COVID 19 pandemic?

	No Low	Yes Medium	Yes High	Yes Higher
TOTAL	180	507	42	14
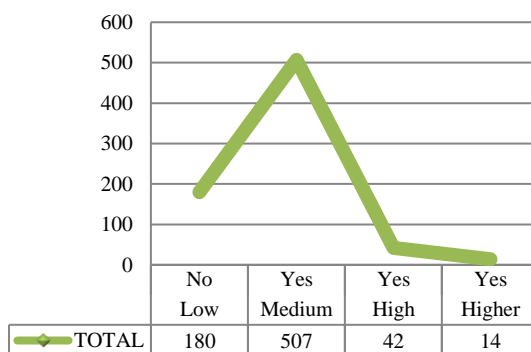
Table 2 Academic performance in the COVID-19 pandemic
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 9. Do you consider that academic performance in virtual education depends on the technological tools provided by your HEI?

	high High	high Medium	high Low	high Not answer
Total	450	50	50	0
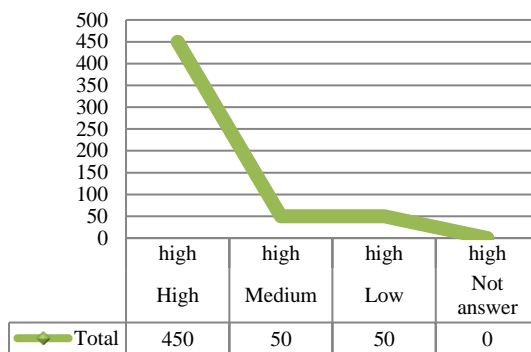
Table 3 Academic performance versus technology
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Question 10. Would you be willing to take classes in virtual learning environments regardless of the pandemic?

	Medio Vitual	Medio Semipresencial	Alto Presencial	Bajo Deserción
TOTAL	150	230	200	100
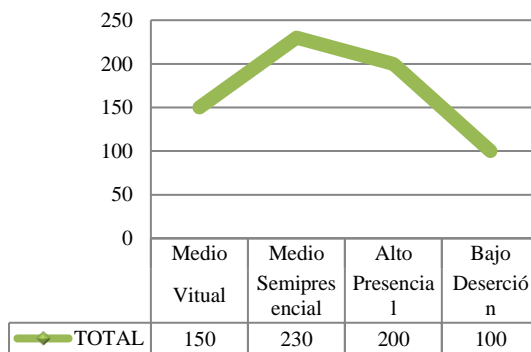
Table 4 Virtual versus face-to-face teaching
Note. Directorate of Incorporated Institutions Admon. 2019-2021

Discussion

In summary, analysing the academic performance (AR) in virtual learning environments (VLE) in the COVID-19 pandemic for the Institutions Incorporated to a University located in the State of Mexico, was achieved by means of a referential framework contemplating various sections: problem, literature review, methodology and results.

For all of the above, it was found that there is sufficient evidence to say that academic performance in virtual learning environments for the Incorporated Institutions (II) was maintained with a considerable standard of qualifications and without learning problems.

According to the results of question 1, the Incorporated Institutions (II) had a plan for the operation of online education. The IIs, immediately the pandemic situation was declared, worked on adapting the educational model using the technology at their disposal. This means that the student community detected that the institution made decisions based on a plan of action.

Regarding question 2, it was found that the Google classroom platform was the most used application for the instructional design of the learning units (LUs). The result shows that no major modifications had to be made to the contents of the AUs, but simply the transition from a face-to-face system to a virtual one. It is clarified that this does not mean that the transition was efficient, but quite the opposite: there is clear evidence that it is not an exemplary mechanism, but given the circumstances, it was what helped to solve the crisis at that time.

On question 3, the video tools that were used were those that were available and free of charge. However, it was clear that the IIs, with a few exceptions, have not made investments in educational technology, especially in what has to do with video conferencing in synchronous and asynchronous systems. It was found that the shares of platforms such as Zoom and WhatsApp increased by 70% of their stock price on the New York Stock Exchange (Forbes Staff, 2020). As a result, many educational institutions used less expensive and more efficient platforms.

On the issue of proctoring referred to in question 4, it was confirmed that there are platforms that have been used permanently, as many IIs have moved towards a virtual and distance education model. However, it is shown that many students in the IIs do not know how to operate such platforms and therefore it is urged to develop digital competence courses.

On the subject of communication, question 5, the results show that the most used medium is WhatsApp. This represents an advantage for the community, however, it is also a serious problem, as most HEIs have invested in using institutional e-mails, which are official means of communication, but most HEIs use WhatsApp groups as a communication mechanism. Many questions arise in this regard, which the HEIs themselves will have to address and resolve as soon as possible.

Now, on question 6, regarding challenges, the data show that there are two issues of concern: technology and socialisation. The issue of technology is likely to be a challenge for students as certain skills are required for the operation of systems. However, today's generations are adept at handling different equipment, so operating a platform should not be a problem. Perhaps the most complex issue is that of socialisation. This may be an issue that has an impact on learning, but studies are underway to identify what the consequences of a lack of socialisation are for students.

Question 7, on the level of involvement of the authorities, shows that it is still the top and middle management who make the most important decisions in this new dynamic. However, the graphs show that the decision must be agreed with the different sectors of an institution, i.e., administrative staff, technologists, academics and mainly the student community must be involved.

On the issue of academic performance, which is framed in question 8, the results show that 70% of the respondents considered their academic performance to be average. A quarter of the respondents did not learn, the rest of the respondents considered their learning to be optimal.

In question 9, it is observed that academic performance in virtual learning environments depends on the technological tools provided by their HEI. 80% of the respondents fully agree that it is the institution that is responsible for providing the necessary tools to take advantage of virtual learning environments. If investment in such technology is simply not possible, then there is another factor that conditions the success of the tools and that is access to the Internet.

In the last question 10, would you be willing to take classes in virtual learning environments regardless of the COVID-19 pandemic, the results are divided; however, perhaps what is worrying is the dropout rate, which would be another variable to measure in another study, in this case it is presented as a possibility that 20% would drop out. In addition, 40% of those surveyed considered that they would continue to take virtual classes, as long as there is equipment, means and technology. There is another segment, 40%, who do not consider it, preferring blended or face-to-face classes.

Conclusions

Finally, it is emphasised that this health emergency generated by COVID-19 has had a series of implications for the whole of humanity. One of them, in education; there is no doubt that learning models modernise in accordance with social circumstances. The connectivist model, based on virtuality, is a modality that must continue to be developed in all academic institutions.

Therefore, remembering that the objective was to analyse academic performance in virtual teaching environments, a case study of the Institutions Incorporated to the Autonomous University of the State of Mexico. It could be seen from the results that the academic performance was perhaps the expected, not the ideal.

The research problem was shown in an adequate context to develop the research. It was possible to validate that the academic performance of higher-level students in the institutions incorporated to the UAEM was more or less adequate, it was considered that there are other factors that influence this AR. Some stated that it was due to access to technology, media, Internet and equipment. It is noted that the question of this research was resolved from the application of the instruments in a transparent and adequate manner without tendencies.

In relation to the literature review, the studies presented have a currency, so that the state of the art of the topic is relevant in its study. In addition, it was achieved by the dynamics of the information obtained, always under the magnifying glass of investigating primary sources and references that supported the problem in other contexts, but perhaps with similar characteristics, so that the scientific rigour of the publications is verified.

As for the quantitative methodological design, pre-experiment: case study with a single measurement, it can be determined that it was useful because the group control was minimal and helped to have a first approach to the phenomenon. However, it can be suggested for other research that the result is generalisable, i.e., the research could be carried out at other levels such as primary, secondary or upper secondary.

The results, although they show that academic performance in the Institutions Incorporated to the Autonomous University of the State of Mexico did not have a negative impact on learning, it probably did cause other personal, social, communication and technological problems. The following particular results were found: 80% did distance work, and there was a high rate of dropouts 20%. The most used platform was Google classroom. The main means of communication was Facebook, Zoom and WhatsApp. 70% of the respondents considered academic performance to be average and the rest low. 90% of the teachers need to develop digital competences. 95% see access to technology as an opportunity to achieve learning.

The originality of this study does not remain unsaid because to date, not much has been published on the subject. Therefore, it is a research with an innovative contribution, it followed criteria of objectivity, it tried to be rigorous at the empirical level, it respected methodological procedures and it followed the steps of the scientific method. Also, one quality is that, on the basis of the method used, the results obtained are considered to have a degree of validity and reliability.

A recommendation that emerges from this study is that, although there are many issues that need to be studied further, two are identified at the moment: on the one hand, the digital skills gap between teachers at different levels of education. On the other, the effect of socialisation in virtual learning environments.

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History of a family business in San Juan del Rio, Qro.

Historia de un negocio familiar en San Juan del Rio, Qro.

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Abstract

The objective of this project was to know the history of a family business as well as if it was a process, considering it as a case study. With this investigation completed, an administrative process was developed that can satisfy family businesses nationwide.

Administrative process, Family business, Work

Resumen

El objetivo de este proyecto fue conocer la historia de un negocio familiar, así como si fuera un proceso, considerándose como un estudio de caso. Con esta investigación terminada se elaboró un proceso administrativo que podrá satisfacer a los negocios familiares a nivel nacional.

Negocio Familiar, Proceso administrativo, Trabajo

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Introduction

The municipality of San Juan del Río, Qro. has had a very significant growth since the 80's and up to the present year. This has led to the survival of family businesses with their owners during the period.

For this reason, the objective was to learn about the history of a family business as if it were a process, since it is not easy to continue with a small family business for more than 40 years and for it to be the support of children and grandchildren. Therefore, this research is considered a case study. And because this process has been carried out, they have had to face very significant changes that even in this year, they had to grow and improve the construction of the family business.

Literature Review

Administrative process:

An administrative process is the set of stages, - planning, organising, directing and controlling - with the aim of achieving the objectives of a business which will be the family business to be {disclosed in the most efficient way possible. It is in the management stage that the business owner can intervene in any conflict that may arise. López (2021) https://economipedia.com/definiciones/proceso-administrativo.html

According to the author Luna (2015:118) for a business to operate within the framework of rules set by the internal and external environment it is necessary to have or carry out control within the microenterprise and/or business. Classification (2020) because in this way the administrative process defined in the first paragraph of this part 2 is consolidated.

A business can be called a microenterprise, as mentioned by the author Calleja (2021:19) and the author Luna (2015:126) indicates that in the management phase would be for a small business the owner who must perform this phase of management applying efficiently and effectively leadership, since the owner must be a leader who supervises, communicates, motivates, and makes decisions.

The author Luna (2015:12) mentions that businesses can be considered micro businesses, as they belong to the service sector which according to the author Luna (2015:12) this category of business can have up to a maximum of 20 employees.

Blandez (2016:7) indicates that entrepreneurs and/or business owners have similar characteristics to have a successful business. These are mentioned below:

- They create a business in order to grow it.

- They focus on satisfying consumers' needs as well as their own.

- They establish plans and strategies such as innovation of new products and/or services.

- They come up with new ways of managing the business and/or company.

- They anticipate the demands of their consumers.

Zavala (2022:16) mentions that knowledge of people and events is important. That for a job a portion of money is earned and is destined to various actions.

If within the company it is the owner and/or leader who makes the decisions, actions are taken that lead to a change in the business over time.

For the author Jeffcut (1994:241), decision making is the process of narrative analysis, interpreting actions and identifying meanings for the business to function better.

Decision making, for author Monllor (1994:96) indicates that the use of the information obtained by the business to select actions that produce fruitful results for the growth of the business. This process of converting information into action is referred to as decision making.

In addition to the business owner making decisions, he or she also ensures that the organisation does so in the best possible way.

Simon (1982). Sfez (1984). Ivancevich, *et al*., (1997). Frank Harrisson (1999). Robbins (2004). Drucker (2006). Hammond, Keeney and Raiffa (2006). Etzioni (2006). Aviño and Maella (2010) the previous authors indicate that in order to continue in a market, it is necessary that the owners of microenterprises must carry out a decision-making process composed of phases, premises, steps, elements, rules, stages or principles.

Author Mapcal (1995:8) classifies important decisions depending on the hierarchical level at which they are made and points out the following:

General decisions: affect the whole business or company.

Functional decisions: these are the ones into which the company is divided, the sales function, the purchasing function, the production function, the merger of production, accounting, customer service, etc.

Departmental decisions: those related to the activities of the various departments, such as the activities of accounting records, quality control, supervisors, etc.

Operational Decisions: are those that have a direct relationship with the activities that the operational levels of the business or company carry out on a daily basis, such as messengers, receptionists, workers, external salespeople, drivers, administrative staff, etc.

Computer science or information technology studies the techniques and automated processes that act on data and information (Suarez, R. 2007).

Work

For the author Rieznik, P. (2009:19) work is the driving force of human evolution. The author Cañigueral (2020:82) mentions that all changes in jobs, families and workers have occurred with absolute normality, tolerance and development of their own social, ideological and moral environment. For the majority of the population, going to work meant leaving the house, arriving at the same place, staying there for at least eight hours a day for twenty, thirty or forty years. Additionally. Teamwork is an investment. A complex structure of coordinated actions, carried out by a group of people and a fundamental pillar of social progress and human development. Ballenato, P. (2009: 120).

Authors Lara & García (2022:3) point out that the work carried out in a business can be considered a process of adaptation, where the members obtain recognition from their clients for the service they receive and can continue in this way for several generations. González (2022:128-133) indicates that the historical reconstruction aims to present 3 aspects: the origins and motivations, the presence of leaders and the changes and continuities present.

Methodology

In relation to the authors (Hernández, et al. 2018), the following hypothesis was established for this project: the business owner's decision-making is carried out according to the work that he/she carries out within the business.

With which the following variables were set dependent. Decision-making by the owner: independent. Work he does within the business.

With a focus on reality, laws and interconnections, it was deduced that there is a relationship between:

- Decision-making.

- Work he performs within the business.

- Food business.

- Administrative process.

By going through the municipal, national and food business contexts, it was possible to determine the dimensions, known as variables, which intervened in this project, and which were indicated at the beginning of this aspect, with the following characteristics:

Dependent variable: owner's decision making.

This variable mentions that for the case study considered in this research it is a business and/or microenterprise, indicating that it has an owner. A second characteristic is: the owner makes decisions in the business to get ahead in any circumstance. Even dealing with family businesses, where according to the authors Benitez, Benitez & Botero (2021:45) the values that were managed to strengthen are solidarity, respect and communication.

Independent variable: Work that he performs within the business.

A case study of a family food business was carried out in this project, an action plan was drawn up in the field with the purpose of collecting information by devising a strategy for approaching the business (observation or immersion in the field). The approach strategies to understand the phenomenon in the food sector environment in San Juan del Río were executed in the following way:

CORTÉS-ÁLVAREZ, Yolanda, CORTÉS-ÁLVAREZ, Alfredo, GONZÁLEZ-NERI, Aarón Iván and QUEZADA-MORENO, Maribel. History of a family business in San Juan del Rio, Qro. ECORFAN Journal-Spain. 2022

To describe and understand how the business owner has made decisions and to know how his basic structure of experience has been created. We attended the place where the business is located, which is a family home, to taste the tacos and stews they offer, for approximately one year, we tried to continue being a customer, to get to know the owner and the business in order to provide them with the following results.

Results

Description of the business

The business started approximately 50 years ago. It offers food for lunch and even lunchtime. It is not set up as a business, but one arrives at a family home, rings the doorbell and a man or woman comes out to ask for the amount of food to be taken in tacos. Then you close the door again and wait a short time for them to come out to deliver the $40.00, $60.00 or the amount you ordered. What was ordered is delivered wrapped in paper and a plastic bag, at which point the delivery person will collect what was ordered and if change is needed, they will tell you to wait a minute, close the door again and wait for them to return with the change and you can leave with your order.

By becoming a customer, you can arrive, ring the doorbell and they allow you to go inside so that you can have lunch inside the business in the place where they make the stews and tortillas. They offer tacos, stews, sopes, coffee, soft drinks and they have a molcajete with salsa.

Figure 1
Source: Taken in June 2021

Figure 2
Source: Taken in June 2021

In the previous photo, the owner of the business can be seen still working, she makes the tortillas that are used to provide the service, and she even keeps the firewood cooker lit to make them.

Figure 3
Source: Taken in June 2021

The owner, at times, because of her age, is helped by two daughters, one makes the stews and the other helps her make the tortillas. The owner of the business divided the work between the children she has in solidarity and their shared goal was to continue with the source of employment and this led the owner to make decisions regarding the change in her process of how the business is going and has to change with actions for a better functioning, this led the owner to share her experiences and situations she had and this as mentioned by the author Nava Murcia. (2022:25) because when she started it personally, she considered that it was very important to stay at home, without having to go out, and the family would stay together most of the time.

Therefore, she agrees with the author Jeffcut (1994). And with radical changes that have affected the modus vivendi this is mentioned by the authors Rico and De la Torre (2021).

The decisions that have been taken in the family business were not programmed, because for more than 40 years, there was an accumulation of adverse circumstances to the operation, they were not structured because there was no clear procedure on how to handle each situation. Simon (1982).

In business at the time, there had to be a course of action or a composite process of decisions made by phases, steps, premises, elements, stages, rules or principles. With adherence to the authors Simon (1982). Sfez (1984). Ivancevich, et al. (1997). Frank Harrisson (1999). Robbins (2004). Drucker (2006). Hammond, Keeney and Raiffa (2006). Etzioni (2006). Aviño and Maella (2010).

The following is the administrative process made up of decisions that the owner needed to make in order to move forward, not to close and to face the various situations that have arisen in the business during its trajectory in the municipality of San Juan del Río.

Decision-making process.

- The owner made the decision to sell takeaway tacos from her home, with the help of a sister.

- The owner made the decision to have her children help her with the business. Once they were old enough to do so.

- The owner made the division of labour for her children, depending on their age and experience.

- The owner made the decision to provide her sister and children with a weekly amount as payment for their support work in the business - as payment for their work done on a weekly basis.

- One of the daughters had a daughter who became the owner's granddaughter and who also became part of the employees of the business and supported him as a worker, when she has time available, as she is still studying.

- Thus, more than 40 years have passed in which the family has a home-based business and they do not need to incur any additional expenses to move to a job outside the house. They only have to carry out their assigned activities.

- The number of customers continues to increase as the tortillas and stews have a very familiar, special flavour, and as many years have passed, it is necessary to make an arrangement to the place in the house that has been established for the business. The owner decided to fix the construction of the place and so another place in the house is being occupied so that they can fix the one that is designated for this activity. Here is a photo of how the service continues to be provided temporarily, even outdoors.

Figure 3
Source: Taken in May 2021

As can be seen, the tortillas are no longer being made on a firewood cooker but are now being made with gas. The two sisters continue to support the owner of the business, but the owner of the business, even if it is on gas, makes tortillas to continue providing the service they offer.

One of the brothers has the job of going and opening the door of the house when the doorbell is rung, so that he can be told what is required, or you tell him that you want to come in for lunch and he tells you whether you can come in or not. And you must also enter with all the sanitary measures.

Description of the owner:

The owner in an interview, commented that since she was a child, her mum sold tacos and so she taught her from a young age to make tortillas on the cooker. The owner's daughters in another interview reported that their mother is approximately one hundred and two years old. But she is even in very good health, even though the cooker has been burning wood for the business for such a long time. The only thing is that she no longer leaves the family home alone, as she suddenly forgets who she is and could get lost. She even used to take a truck every Sunday to go to the parish church in the municipality for mass.

Discussion

According to the authors Simon (1982). Sfez (1984). Ivancevich, et al. (1997). Frank Harrisson (1999). Robbins (2004). Drucker (2006). Hammond, Keeney and Raiffa (2006). Etzioni (2006). Aviño and Maella (2010) whether they are called phases, premises, steps, elements, rules, stages or principles, the owner of the family food business has had to make a series of decisions that led her to form a process of them to continue selling in her home. what is relevant is that this family business or microenterprise has had a very positive impact of growth throughout the time that has meant income for a family in the municipality of San Juan del Río.

Conclusions

This research showed that the owner of a family food business has taken a decision-making process to continue in the market for more than forty years.

Every business, even a small one, can automatically establish an administrative process that includes decision making according to its needs.

Businesses, even if there are family members within them, are a source of income.

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The UAZ in the University Network of Arts, RUA (Red Universitaria de Artes): presence and development perspectives

La UAZ en la Red Universitaria de Artes, RUA: presencia y perspectivas de desarrollo

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Abstract

The University Network of Arts was created in Havana, (2014) to promote cooperation among university arts instructors and to improve artistic quality and its academic specificity (University Network of Arts [RUA], 2014). Since its inception, the network has been formed by university students and arts professionals who have represented dozens of institutions in America, Africa and Europe. The UAZ, based on the Academic Collaboration Framework Agreement (Convenio Marco de Colaboración Académica) signed with the Higher Institute of Arts of the Republic of Cuba (Instituto Superior de Artes de la República de Cuba) (2011), became a founding member, through various Academic Groups. The UAZ-CA 219 "Music and interdisciplinarity", formed by the authors of this article, has actively taken part in meetings of the RUA, contributing proposals for its expansion and consolidation. Despite this, the results are rarely communicated. In this sense, this work has as its main objective to spread the importance of the University Network of Arts, RUA and disclose some ideas about its possible development perspectives, increasing the participation of the UAZ, from its institutional Academic Groups focused on art, culture and sustainable development, and its capacity for social and inter-institutional bonding.

Resumen

La Red Universitaria de Artes se creó en La Habana (2014) para promover la cooperación entre los formadores universitarios de las artes y para el mejoramiento de la calidad artística y su especificidad académica (Red Universitaria de Artes [RUA], 2014) Desde sus inicios, se integró por universitarios y profesionales del arte que han representado a decenas de instituciones de América, África y Europa. La UAZ, teniendo como base el Convenio Marco de Colaboración Académica firmado con el Instituto Superior de Arte de la República de Cuba (2011), se integró como miembro fundador, a través de varios Cuerpos Académicos. El UAZ-CA 219 "Música e interdisciplina", que integran las autoras, ha participado activamente en las reuniones de la RUA aportando propuestas para su ampliación y consolidación. Pese a ello, poco se divulgan los resultados. En este sentido, este trabajo tiene como objetivo principal difundir la importancia de la Red Universitaria de Artes, RUA y exponer algunas ideas sobre sus posibles perspectivas de desarrollo, incrementando la participación de la UAZ, desde los Cuerpos Académicos institucionales enfocados en el arte, la cultura y el desarrollo sostenible, y su capacidad de vinculación social e interinstitucional.

Art, University, Networks

Arte, Universidad, Redes

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Introduction

This article presents the experiences and contributions made by the Consolidated Academic Body UAZ-CA 219 "Music and interdiscipline" of the Autonomous University of Zacatecas "Francisco García Salinas" (Mexico), as a member of the University Network of Arts. It is worth noting the importance of remaining a member of this network, which provides advantages for research, artistic development, and teaching quality.

This academic group arose during the first five years of the present century through the initiative and will of teachers and researchers in the area of the arts and humanities with the social purpose of "...attracting young people and children from the State of Zacatecas to classical music, a public that could become a future quarry in the study of the degree in Music at the UAZ" (Sánchez, Carvajal, Vdovina, and Navarro; 2014, p.12). To this end, its members have carried out a collegiate activity of exploration, compilation of information, ordering of works by composers from different periods and nations, as well as others of a scientific, teaching and extensionist nature, which contribute to personal and collective academic-research development, and which favours the delivery of validated results through publications to the University Network of Arts (RUA).

The network was created within the framework of the IX Higher Education Congress "University 2014", taking advantage of the possibility of bringing together teachers and researchers whose specialisation was in or related to art (figure 1). From its genesis, RUA's challenge was "... to build development paradigms that recognise and value the specificity of artistic creation, its articulation in university professional training in the arts and its fundamental role in the production of knowledge" (RUA, 2014, p.1). Its legal domicile is at the University of the Arts (ISA), the university that has presided over it since its beginnings.

Figure 1 Foundation of the University Network for the Arts (RUA)
Source: Authors' personal archive

The creation of this network aimed to "promote and strengthen cooperation between university arts education institutions in any region of the world, for the improvement of artistic quality and their academic specificity (education, research and extension), as well as their participation in the sustainable development of the respective institutions and societies" (RUA, 2014a, p.1) and involved the participation of rectors, vice-rectors, teachers and researchers from more than thirty countries. Among its founding members were representatives of the following institutions:

- Alanus University for arts and social sciences (Germany).

- Universidad Nacional de Río Negro, Universidad Nacional del Nordeste, Universidad Nacional de Córdova, Universidad Nacional Tierra de Fuego, Instituto Nacional Universitario del Arte (Argentina).

- University of Sao Paulo (Brazil).

- Universidad del Atlántico, Universidad de Caldas, Universidad Pedagógica Nacional, Pontificia Universidad Javeriana de Cali, Universidad Antonio Nariño, Institución Universitaria Antonio José Camacho, Instituto Departamental de Bellas Artes, Cali, (Colombia).

- Instituto Superior de Diseño, Universidad de las Artes (Cuba).

- Universidad Autónoma de Nuevo León, Universidad Autónoma de Zacatecas; Centro Nacional de Investigación, Documentación e Información de la Danza José Limón (CENIDID); Universidad Autónoma de México, Universidad de Veracruz, Universidad Autónoma de Guerrero (Mexico).

- Instituto Superior de Investigación y Cultura (Mozambique).

- University of Alabama (United States).

- Universidad Nacional Experimental de las Artes (Venezuela).

- Universidad Espíritu Santo, Pontificia Universidad Católica de Ecuador, Universidad de las Artes (Ecuador).

- University of Seville (Spain).

In the course of time, new institutions have been incorporated or others have been disassociated for a variety of reasons, among them, changes in university management or transformations in their structures. Nevertheless, and despite the weaknesses that have appeared in the network's activities, the exchange of experiences, good practices and management for publications, participation in events, among other activities that strengthen cooperative work and the quality of university teaching, continues. In this sense, the main objective of this work is to disseminate the importance of the University Arts Network, RUA, and to present some ideas about its possible perspectives of development, increasing the participation of the UAZ, from the institutional Academic Groups focused on art, culture and sustainable development, and its capacity for social and inter-institutional linkage.

Development

The University Arts Network

The technological development achieved by society in the last decade has favoured the growth of university networks that provide greater exchange between teachers and researchers in higher education worldwide. Although the recent COVID-19 pandemic led to the deterioration of face-to-face co-operative work, the possibility of using computer and communication technologies made it possible to maintain relations of co-ordination and co-operation through hybrid and distance modalities, which allowed the continuity of collaborative work in many of these networks.

When one hears of university associations and networks, it is needless to say that there are a number of related organisations at the base of which are higher education institutions; these may be regional, national or international. Their aims, although stated in different ways, have in common the improvement of quality in university processes with the aim of generalising experiences, disseminating ideas, analyses or reflections of their members, from different areas of training processes and knowledge management.

There are innumerable universities or a part of their structure related through regional, inter-regional, sub-regional and intercontinental networks; there are even "umbrella" networks in which several of these are grouped together on the basis of their research and work themes. Such is the case of the Association and University Networks UDUAL, which brings together organisations and groups oriented towards linking higher education with social and public life. Its member organisations function as cooperation and study bodies, and their structures differ according to the context in which they operate (UDUAL, 2022) or the Coimbra Group, an association of historical European universities of a multidisciplinary nature, with members committed to establishing lasting academic and cultural links to promote internationalisation, academic collaboration and excellence in teaching and research (Vice-Rectorate for Internationalisation, 2022).

With similar aims, but in the area of the arts, the University Network for the Arts, RUA, was founded. To date, it brings together more than thirty universities or groups belonging to them, whose maxim is cooperation for the improvement of academic, research and extension quality. Its legal basis is endorsed in its statutes, approved by the founding members present at the meeting held in the Assembly Hall of the University of the Arts in February 2014 (Figure 2), and its structure includes the Assembly (composed of the competent authorities of each institution), the Board of Directors (which brings together up to nine members) and the coordinating institution (which is elected by the Assembly every two years) (RUA, 2014a).

Figure 2 First RUA meeting. Discussion of the legal documentation of the network.
Source: Authors' personal archive

RUA's areas of development include quality assessment and undergraduate accreditation in the arts; academic, artistic and cultural exchange; knowledge management and institutional, academic, artistic and economic-administrative management, as well as academic, research and artistic development; technological development of academic programmes, internationalisation, communication and development, and fundraising.

Its statutes regulate the RUA's operating regime, i.e., when the assembly meets and when the board of directors meets; however, in practice, its activities go beyond its limits, as the statutes themselves promote coordination relations that give rise to the organisation and development of scientific and academic events, the joint production of products such as books, the exchange of teachers, research stays, and so on. For example, related to the area of development of quality assessment, in 2020, taking advantage of the framework of the 12th Congress of Higher Education, and within this, the IV Symposium "Arts Education in Higher Education", an exchange took place with members of the Council for the Accreditation of Higher Education in the Arts (CAESA) of Mexico.

CAESA brings together higher education institutions that host arts degree programmes for the quality and continuous improvement of professional arts education. This organism is recognised by the Consejo para la Acreditación de la Educación Superior, A.C. (COPAES) and has the function of contributing to the quality assurance of higher education programmes, through the evaluation and accreditation of educational programmes in the different artistic disciplines, both at Bachelor's and Technical University level (CAESA, 2022).

At the IV Symposium mentioned above, the debate focused on the experiences of the evaluation body during the procedure for the evaluation and accreditation of arts degrees, where the need to identify the particular parameters of the arts for the evaluation process was highlighted, indicating the alignment of the activity with the areas of development of the network.

The transformations in the functioning of this network led the last meeting of the Board of Directors to propose the modification of its objective, adding "...a decolonising, emancipatory, intercultural approach that promotes the cultural identity of the peoples" (RUA, 2022), which makes explicit the respect for the tradition and culture of each member.

Among the university representations belonging to the RUA is the Consolidated Academic Group "Music and interdiscipline" UAZ-CA 219. This CAG was initially structured (2009) as Consolidated Academic Group UAZ-CA 129 "Research, Teaching and Musical Performance with emphasis on string instruments" (from which it was later separated due to the convenience of development for both CA's to form internal networks), and was recognised by the then Programme for the Improvement of Teaching Staff (PROMEP). AC 129 put its efforts "...in maintaining and reinforcing its consolidation, while tending towards the expansion, strengthening and achievement of greater results of the International Research Network "Art, Music and Culture", which is becoming increasingly extensive, solid and productive" (Sánchez, Carvajal, Vdovina and Navarro, 2014, p.12).

Some Academic Group members of this network, which emerged before the RUA was formed, also joined it when it was created, however, the CA 219 "Music and interdiscipline" has been a permanent link of the RUA with other members of the "Art, Music and Culture" Network, which has expanded the possibility of exchange with various universities such as, for example, the University of Oviedo and the Complutense University of Madrid, Spain, among others.

The dynamics of teaching and the Mexican education system, as well as the development of the members of the CAG, have led to transformations that have led to the continuity of this group, now with more clearly defined objectives and lines of research. Its members have an extensive artistic and academic production, including articles and books published under strict arbitration systems and editorial processes, the production of compact discs, as well as the signing of inter-institutional agreements.

Among the lines of research of the CA 219 are, as usual: The Integrality and transversality of music in research and professional practice; in which interdisciplinarity is highlighted in musical research in such a way that it transcends any other discipline and area of knowledge. In the body of knowledge that constitutes its study, musical performance and interpretation, as well as the exhibition of results, are the final objectives of both its research and its teaching and praxis.

In the individual development of the researchers are:

- Thought, music and culture. Musical art from the point of view of aesthetics, sociology, history and education. Musical art education and its methodological principles, composers and performers, mainly in Russia and Latin America. A leader in artistic and academic research and production; this line promotes the organisation of conferences, forums, festivals, academic exchanges, concerts and social links.

- Musical performance, chamber music, teaching, repertoire, teaching methodology and history of string instruments, oriented towards teaching activities, concerts, curricular programmes and student preparation.

- Medieval universal and Spanish history. Philosophy, literature and history: multidisciplinary studies. Music and multidisciplinary: History, Thought and Culture. In this line, the theoretical foundation, mainly of a philosophical and historical nature, of the activities and research carried out by the AC stands out.

66.6% of the members of the academic body are members of the National System of Researchers (SNI) evaluated at level I and 100% have renewed their PRODEP profile (Programme for the Professional Development of Teachers), which endorses the collegiate work of its members and the results obtained in the composition of the AC.

As already mentioned, this CA 219 "Music and interdiscipline" has been a member of the RUA since its foundation (figure 3); throughout this time it has developed different initiatives and activities whose tangible results have increased the cultural and scientific heritage of the network.

It has also contributed to its improvement by identifying weaknesses in the functioning of the network and proposing alternative solutions, such as the need to create and update its own web page[1], the definition of the members of the membership in order to ensure the permanence of the institution's representation regardless of the renewal of university positions, an aspect contemplated in the minutes of the last meeting (April 2022), or the carrying out of exchanges in a multilateral manner, since up to now they have been carried out mainly through the coordinating institution.

In the latter case, the potential of the network's website can be used to disseminate events, promote activities, generalise experiences or encourage exchanges with or without the intervention of the coordinating institution.

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[1] At present, its website contains archives with legal documentation on the network, promotions of cultural, scientific and educational events, projects and exchanges, and information on member institutions, although there are still aspects that need to be updated and the dissemination of activities and the website itself needs to be increased. Its e-mail address is https://reduniversitariadeartes.wordpress.com/.

Figure 3 Representative of CA 219 signing the RUA constitution act
Source: Authors' personal archive

It would also be useful to consider the possibility of directly integrating not only institutional representatives, but also teachers, researchers, students and artists belonging to the art universities themselves who are interested in participating in the network. This would allow a greater flow of events, exchanges of information, and, in short, would contribute to the academic strengthening of the universities that are members of the network, and to the development of projects and programmes that contribute to the training of artists and have a social impact.

Development of the University Arts Network. Possible contributions of the academic groups

The incorporation of non-managerial staff into the RUA favours the use of the potential of the academic bodies for research, teaching and extension, given the expertise and experience that its members have in these areas, which undoubtedly has an impact on the development of the network, as it would offer the possibility of multiplying artistic, academic and scientific exchanges, the organisation of festivals, the creation of new support groups or networks, the signing of agreements between higher level institutions, the giving of master or specialised conferences, the participation of its members in different events given the ease of dissemination, all of which, in turn, would have repercussions on the results of the evaluations, both of the teachers and researchers, as well as of the body itself.

These collectives "the authors refer to the academic bodies (CA's)" would integrate professors committed to their institutions, qualified for professional practice, efficient and competent in their disciplines, with adequate accreditation and research sufficiency, which would allow for the generation and innovative application of knowledge, with defined and stable profiles in terms of their lines of research and with ample social skills and demonstrated willingness to work as a team, establishing internal and external cooperation networks starting from their HEIs (Sánchez and Juan, 2017).

The members of the consolidated CA's, Drs. María José Sánchez Usón, María Vdovina and Mara Lioba Juan-Carvajal, -both in 129 and currently in 219-, since their incorporation to the RUA, have been able to offer artistic, academic and scientific results related to the research lines of the CA and the RUA's areas of development, which, in turn, has had a positive balance in our evaluation as a consolidated body. This demonstrates the importance of the existence of a network that favours exchange and communication between lecturers from member universities. These results are tangible mainly in the publication of books, artistic-academic production and the organisation of events; activities commonly shared by more than one member of the RUA.

If one were to describe the variety of activities that teaching and research artists, or the artistic personalities linked to the university network that can contribute to it, either individually or in their composition as Academic Groups, these would exceed the limits of the work.

One of the variables of the development potential of the network and its members, as has been expressed, is the publication of books or book chapters in which the members of the RUA participate jointly, so that the logo or centre of the organisation can be distinguished; for example, our CAG 219 has had the possibility of publishing some results, many of them with institutional support from the Prodep, among which we can mention:

- 2015. Proposals for a contextualisation of music. ISBN 978-607-96709-7-9. Book coordinated by Dr. María José Sánchez Usón and Dr. María Vdovina, whose thematic axis deals with the art of learning and teaching music. In this way, the wealth of knowledge, the diversity of criteria and the spiritual richness of the collective of authors, including members of the network from Cuba and Mexico, meant that their articles described theory, experience or good practices on the university pedagogical process, particularly related to the formation of the personality, modes of action and the development of disciplines, which favours the systematisation of knowledge.

- 2015. Proposals for a contextualisation of the arts. ISBN 978-607-96709-6-2. Book coordinated by Dr. Mara Lioba Juan-Carvajal and Dr. Laura Gemma Flores García; where there is a double participation of members of the CA of the Network "Art, music and culture" and some members of the RUA. The research deals with multidisciplinarity and the exchange between the arts and socio-cultural constructs.

- 2016. Music and identities: an interdisciplinary reading. ISBN 978-607 402-894-2. Book coordinated by doctors María José Sánchez Usón, Mara Lioba Juan-Carvajal and Gonzalo de Jesús Castillo Ponce, which presents the debate on the need of human beings to define and affirm themselves, and on the influence of music in the shaping of identities - individual or collective-. Music is disseminated in theories, thoughts, fictions, methods, instruments, roots, traditions, composers, and creations, among others, to describe identity. It contains articles written by members of the RUA and various universities in Mexico.

- 2016. Alia Musica. ISBN 978-607-8028-92-4. Book coordinated by Dr. María José Sánchez Usón and Mara Lioba Juan-Carvajal. It contains articles by authors from Cuba, Spain and Mexico who are members of the networks. In a network of diverse articles, the authors promote the epistemic debate on music, the recognition of cultural roots, the confirmation of the scope of music in personal development or the diversity of forms and relationships between the different artistic disciplines.

- 2018. Metamusica. ISBN 978-607-8368-95-2 (UAZ), 978-607-8692-29-4 (Plaza y Valdés). This book, coordinated by Dr. María José Sánchez Usón and Dr. Mara Lioba Juan-Carvajal, contains articles written by members of the RUA of the Universidad Autónoma de Zacatecas, Mexico. Its thematic axis visualises the need to shorten distances between philosophy, philosophies and music, for which the relationship between disciplines that favour a complete and meaningful image of the human being is presented.

- 2019. IniciARTE. An approach to scientific research. Ediciones IMD, Spain. ISBN 978-1-79476-144-5. Book by the authors Dr. Dargen Tania Tania Juan Carvajal, ISA, Cuba, and Mara Lioba Juan-Carvajal, UAZ, Mexico. It is an invitation to enter the paths of science in an entertaining and simple way, but with the rigour it demands. It presents contradictory positions and examples that favour decision-making during the first steps of the research process.

Publications include articles in Open Access indexed journals that favour the visibility, generalisation and systematisation of topics related to the arts, teaching, the quality of training processes, general and specific scientific methods of research in, on and for the arts, and the arbitration of journals. The exchanges produced in the network have enabled CA 219 to increase and diversify its publications, as well as the joint participation of other members of the Cuban and Mexican networks. Among its titles are, for example:

- Women in three different operatic versions of Bluebeard (December 2017). Journal of Social Research, 3 (10). ISSN 2414-4835.

- Scientific methods in art: their benefits for music teaching (January-March 2017). Journal of Philosophy and Everyday Life, 3(6). ISSN 2414-8857.

- The arts and scientific research (September-December 2018). Article by members of CA 219, published in the journal Educación (155). ISSN 0138-8029.

- International Forums/Festival of Academic Research in the Arts: cultural mediation initiative of a collaborative network" (December-2018). ECORFAN Journal Republic of Peru, 4(7). ISSN: 2414-4819.

- Alternatives for harnessing the research process in music education (September 2019). Journal of Philosophy and Everyday Life, 5(16). ISSN: 2414-8857.

- Brahms, romanticism and the potential development of the viola (December, 2020). Journal of Philosophy and Everyday Life, 6(19). ISSN 2414-8857.

- Evaluating the quality of educational programmes in an arts university. Some contradictions (2020). Didasc@lia: Didactics and Education, XI (2). ISSN 2224-2643.

- Motivation in music as the axis of professional training (December 2020). University Management Journal, 4(11). ISSN: 2523-2495.

- La música de salón en el Zacatecas decimonónico (December 2020). Revista Teoría Educativa, 4(12). ISSN 2523-2509.

- The impact of research results on art education (December 2021). Journal Practical Didactics, 5(14). ISSN: 2523-2444.

- From the art-science universe. Unity and divergences in the university environment (January-March 2022) ISSN. Mendive, 20(1) ISSN 1815-7696.

An important area for the development of the network is artistic production, which is enhanced by the exchange between teachers, researchers and artists, to which students who learn from their teachers and receive feedback from other poits of view are added that are generalised on the basis of reciprocal interaction between the members of the RUA. The favourable enrichment of the cultural heritage of the members of the CAG 219 is distinguished in the hybrid production of art, academia and science, an example of which can be seen in:

- Diálogos musicales latinoamericanos, a CD of music with some works composed by Cuban composers, teachers and artists from the Universidad de las Artes (ISA) and performers from the UAZ, Mexico, sponsored by the CA 219. In this CD were premiered works by Cuban composers Juan Piñera, "El Bolero de Ravel según Juan Piñera" (for string sextet and piano), and by Guido López Gavilán, "Diálogo entre violas con final feliz" (for two solo violas and string orchestra). This is a sample of the joint work between the members of the RUA with teachers and students of the Academic Unit of Arts of the UAZ, which contributed to the increase of the cultural heritage of the latter, and also to their professional training. This CD received the International Prize awarded by the Cuban Institute of Music, the XX CUBADISCO International Fair and the Cuban Academy of the Recording Arts, in 2016.

- Contemporary music for viola (2017). These are two compact discs that motivated the participation of members of the network and teaching composers from the University of the Arts, and performers from the UAZ. This work includes works that have been world premieres such as "Preludio y tumbao para dos violas, homenaje a Bela Bartok", by the composer, musicologist and ISA pedagogue José Loyola, premiered at the XXV Havana Festival of Contemporary Music (2012) by the violists María Vdovina and Mara Lioba Juan Carvajal; "La danza implacable" trio for violas by the composer, conductor and pedagogue Jorge López Marín (ISA), premiered in Zacatecas in 2007, the idea for the recording of the disc was born as a result of the academic artistic exchange of the RUA members.

Another remarkable point is, without a doubt, the organisation, participation and realisation of events of a scientific, academic and cultural nature. In this sense, the implementation of the International Forums/Festivals of academic research in the arts, of which this year will be its 10th edition, deserves a section, since they have always had the presence of teachers from the University of the Arts, as well as other invited artists from Europe, collaborators from other networks, and representatives of the CA and the Academic Unit of Art of the UAZ.

Its realisation has contributed to the professional development of the students, who have participated in courses, conferences, concerts, didactic talks, workshops, competitions of musical interpretation and research essays in the areas of arts and humanities, among others.

The realisation of these forums/festivals favoured the participation of pedagogues and/or personalities of Cuban music, among them the composers José E. Loyola Fernández and Juan M. Piñera Infante, the Doctor in Philosophical Sciences Norma Gálvez Periut, the violinist Alfredo Muñoz and the pianist María Victoria del Collado, the musicologist Grizel Hernández Baguer, and the composers and orchestra conductors Jorge López Marín and Guido López Gavilán linked to the ISA, University of the Arts, who collaborated in the aforementioned activities and promoted the premiere of works and the presentation of a Cuban repertoire in Mexico.

As part of the aforementioned lines of research, it is worth mentioning the active participation in concert events held in different university spaces, museums, theatres or cultural institutions where the performance of works for string instruments is emphasised, and the concert-lectures, such as the one given by Dr. María Vdovina "The suites of J. S. Bach and their performance on the viola". In addition to the academic connotation, this type of event has an important social and cultural impulse that projects all the activities beyond the academic spaces.

In November 2020, the VIII International Forum/Festival of Academic Research in the Arts was held in Zacatecas in mixed virtual mode (in real time and asynchronous). In this event, in which the State University of Gzhel" (GGU), Russia, had an important participation, various activities were developed such as: concerts, workshops with postgraduate students, book presentations, conferences with themes of art and humanities and exhibitions of various study options in foreign universities, with the integration of teachers, researchers and artists from various countries, such as Cuba, Russia and Spain, as well as Mexico. During the three days of the virtual event, there was a daily participation of around 100 people connected between teachers, students and the general public.

The presence of Gzhel State University included the screening of videos, the exchange of academic artistic experiences, and the artistic exhibition of a representative part of their work, particularly marked in ceramics. This collaboration was made possible thanks to the integration of Gzhel State University into the RUA University Network for the Arts, which took place in February 2020.

Finally, Dr. María José Sánchez Usón was invited to give a keynote lecture entitled "The social function of the arts: origin and destiny" during the 5th Symposium on Arts Education in Higher Education, held as part of the 13th Higher Education Congress "University 2022", an invitation that enabled an imaginative journey through history to the origins of art and its impact on the socio-cultural development of humanity.

Another aspect in which participation in the University Network of Arts contributes to the improvement of the quality of the training processes and the individual and collective development of the CA, is the possibility of carrying out research stays and interdisciplinary exchanges that go parallel to the scientific-educational progression and favours the updating of teachers, researchers, artists and students.

The RUA meetings, so far, have had the particularity of coinciding with the celebration of the Higher Education congresses held in Havana, Cuba (University 2014, 2016, 2018, 2020 and 2022), which has enabled the participation of network members and the increase of multilateral relations between university institutions, thus promoting exchanges, dissemination of calls for new events, invitations for stays or lectures, among others, knowledge that multiply and revert to the quality of the training process of the professional.

Conclusions

The University Network for the Arts, an organisation created in 2014, which brings together members from more than thirty university institutions with artistic training programmes in different countries, has contributed to the exchange of knowledge, the generalisation of experiences, and the increase in the academic, scientific and artistic production of its members through communication, dissemination and the promotion of participation in the different activities that it generates.

RUA's lines of development contribute to the improvement of the quality of training, research and extension processes, to the development of knowledge management and institutional, academic and cultural management, as well as to internationalisation, communication and the development and training of the staff of the institutions and of the various academic and research bodies that make up the network.

The Consolidated Academic Group "Music and Interdiscipline" CA-219, made up of teachers and researchers whose experience is endorsed by their scientific, artistic and academic production, has benefited from the exchange promoted by the network between its member institutions, which has made possible the organisation and contribution to academic, scientific and artistic events; the publication of articles and books with the participation of members of the network and the giving of specialised conferences or lectures in different scenarios, which has strengthened the development of this collective.

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User interface design and object segmentation applied to Autominy platform

Diseño de interfaz de usuario y segmentación de objetos implementado en la plataforma Autominy

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Abstract

This work proposes to design and implement a user interface to the Autominy platform, which is used for teaching robotics at the Universidad Politécnica de Yucatán. In addition, implementing an object segmentation algorithm improves the robot's environment perception. For the development of the user interface, a framework called KivyMD based on the Python language was used. As far as the segmentation code is concerned, The Point Cloud Library (PCL) is a library which facilitates the management of a large amount of point cloud processing. These are theoretically supported by OcTree sample reduction and by finding the nearest neighbor using K-d Trees. Both techniques are written to create a ROS (Robotic Operating System) Node to improve communication between the actuators of the Autominy robot. In addition to providing an application with which the mobile robot can be manually controlled, a different method for obstacle perception is proposed for autonomous or manual navigation.

Framework, Autonomous, Reduction, Segmentation, Perception, Processing, Actuators, Application

Resumen

Este trabajo propone diseñar e implementar una interfaz de usuario a la plataforma Autominy, la cual es usada para la enseñanza de robótica en la Universidad Politécnica de Yucatán. Así como implementar un algoritmo de segmentación de objetos para mejorar la percepción del entorno del robot. Para el desarrollo de la interfaz de usuario se utilizó un framework llamado KivyMD basado en el lenguaje Python. En cuanto al código de segmentación, se recurrió al apoyo de "The Point Cloud Library (PCL)", el cual es una librería que facilita el procesamiento de las nubes de puntos. Estas se sostienen teóricamente por la reducción de muestras por OcTree y por encontrar el punto más cercano mediante los K-d Trees. Ambas técnicas están escritas para que se cree un Nodo ROS que facilite la comunicación entre los actuadores del robot Autominy. Además de entregar un aplicativo con el cual se puede controlar de manera manual el robot móvil, se propone un método diferente para la percepción de obstáculos para una navegación autónoma o manual.

Framework, Autónomo, Reducción, Segmentación, Percepción, Procesamiento, Actuadores, Aplicación

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Introduction

The Autominy platform is an autonomous mobile device that uses an Intel camera and a 2D Lidar sensor for object detection. The main framework for controlling all sensors is ROS (Robot Operating System) which runs in Windows and Linux. ROS can handle the programming, control, and simulation using python and C++ languages. However due to the complexity of Autominy's control executing commands typed in a terminal, it is necessary to create a user interface to enhance the experience using this platform.

This work is transcendental because; the Universidad Politecnica de Yucatán did not previously have a practical way to control this mobile robot except for command lines, which could represent certain complications. In other words, the enhancement of this; serves as an optimization for teaching subjects like control or basic robotics.

In addition, within other problems to solve, perception represents an important challenge. (BORGES- MONSREAL et al., 2021.) used the Intel D435 Camera to apply artificial vision methods for achieving autonomous navigation without obstacles. Therefore, it is proposed a different process for identifying objects using the point cloud data from the Depth Camera; this idea is based on Euclidean cluster extraction theory which could facilitate object detection. The content of this paper is divided into theoretical foundation which explains the basics of the robot, as well as the software used to develop, and data architecture fundamentals for implementing the clustering algorithms. Then the methodology expounds how the codes work. Next the results section shows in a visual way, the clusters of the objects in the robot's peripheral perception. And finally, the conclusions and the future work of this line of research.

Theoretical Foundation

Autominy

Autominy is a research platform developed at Free University of Berlin, which emulates in a scale of 1:10 an autonomous car. (Alomari, K. et al. 2020.) It's equipped with sensors that provide information as to the angular position of the steering wheel, and an encoder to determine the position of the engine. In addition, it has a processing unit supplied by Intel, like the Realsense D435 Camera. For controlling the actuators, an Arduino Nano board is used. (Autominy, n.d.)

Figure 1 Autominy Platform
Source: (Alomari, K. et al. 2020.)

ROS

ROS is an operating system created for facing control problems, since there are many types of robots which have different hardware and functionalities.

Specifically, ROS is a set of software libraries that makes use of specific tools for the control, visualization and simulation. Making this using not only for academic purposes, but also in industry, since this is open source.

The fundamental concepts for implementing this software are **nodes, topics** and **services**. Nodes are the processes in which the computing is implemented. As ROS is designed to be modular; the system is composed of several nodes. These nodes are connected through the messages exchange. This message data structure is strictly written as an integer, float, or boolean.

A node sends a message by publishing through a specific topic, which could be a simple string as "Odometry" or "Map". There may be multiple publishers and subscribers for one single topic, and a single node could publish or subscribe to many topics. (Quigley et al., 2009)

Planar Segmentation Methods

Discrete point processing has always been represented as one of the most challenging tasks for the perception of the environment. The massive points acquired from a depth camera, make the process a high-memory and time consuming task. Down sampling allows processing algorithms to not have to analyze each point of the data, which means less resource consumption. Planar segmentation methods are examples which use only a few points of the total point cloud and maintain exactly the same result as if each point were analyzed.(Yamaguchi,et al. 1984)

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Octree Method consists in a 2n x 2n x 2n array, and it is formed by repeatedly dividing itself in octants and sub octants, until obtaining sections with only one constant value, otherwise another ramification is required. As it can be observed in Figure 2; this process is usually represented as a tree with eight ramifications, each node corresponds to an array, while the eight children node is related to the octants. Explained in other words, the implementation of this method is effective for saving time and processing power of the point cloud. (Wen et al., 2019).
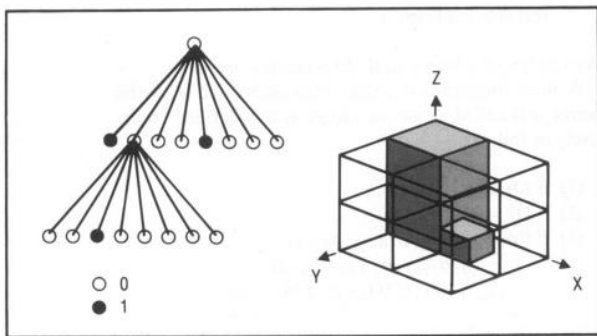
Figure 2 Octree-based region growing for point cloud segmentation
Source: (Yamaguchi, et al., 1984)

A KD-tree is defined as an algorithm to store a finite set of points from a space of k-dimensions. This structure separates the data space into multiple sub spaces and each node is divided into two subspaces; if the contained data is less than the lower limit, this node won't divide its data space again.(Kraus, Piotr et al. 2008) As shown in Figure 3. all divisions will be done in a specific dimension, using a hyper-plane which is perpendicular to the corresponding axis. At the root, all the secondary elements will divide in function of the first dimension, namely, if the first coordinate of the first dimension is less than the root, this will be in the left sub-tree, otherwise it'll be at the right sub-tree. Each level downside at the tree, splits into the next dimension until all the coordinates are used up.
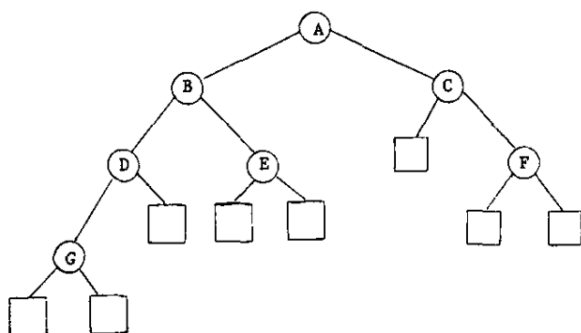
Figure 3 Nearest neighbor search by using Partial KD-tree method
Source: (Kraus, Piotr et al. 2008)

Methodology and development

Preparations

First, it is necessary to establish a link between the roscore form Autominy and the roscore from the main computer. To do this, the main computer environment should have the next variables *ROS_MASTER_URI* and *ROS_IP* with IP from Autominy as the master, and the computer as slave. This configuration is represented in Figure 4.
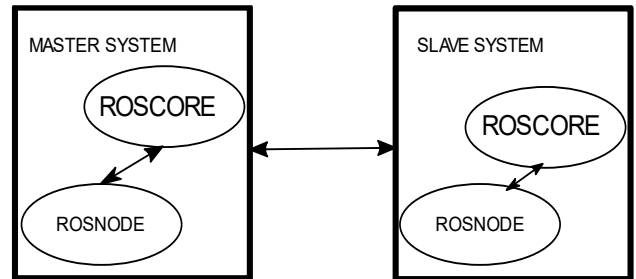
Figure 4 ROS System connection
Source: (Own Source)

User Interface Development

KivyMD is a framework for app development using Python, so the integration with ROS commands is an ideal option. There are two main files, the former is the python file which contains the ROS commands and the logic output when pressing buttons and setting dials. The latter is a ".kv" file with the design of digital buttons and sliders, also containing the properties of each component. Both files are linked through a main class in the python file, also this principal file has all the topics needed to control the Autominy. The figure 5 shows the libraries imported from Autominy's workspace and KivyMD. These libraries will be utilized later, but for now it is important to emphasize the design of the user interface.

Figure 5 Libraries imported from KivyMD
Source: (Own Source)

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The control interface is simple; it has two sliders which set the speed and steering nodes values and publish information to actuators of the robot. Arrows are implemented as buttons of direction that change the values automatically, as well as a stop button that kills all processes and messages that are running in that moment. Equally important, visualization in real time is necessary, so that the Realsense Camera topics are streamed via web, for this an external package was installed, which essentially sets up a webserver on the robot that allows to select and view image streams from a web browser. Because of the web based nature anyone on the same network will have the ability to monitor cameras.

Clustering algorithm Development

The code starts creating a ROS package using C++ as a principal language, when compiling this package, a ROS node is created which will induce a process using three-dimensional planar segmentation methods, in this way, Point Cloud Library (PCL) makes the data processing implementation easier. (Rusu and Cousins, 2011).

Once the node is running, a subscriber and publisher is described, the former for establishing the input data, the latter for printing processed data. The algorithm waits to read the input data from the depth camera and once it's done, immediately makes the conversion from ROS to PCL data type, due to the PCL libraries being specifically made to work with certain types of data. Now that the data are homogeneous, p (x,y,z) point cloud coordinates are subjected to a downsampling process to enhance time processing and memory consumption.

Then, a Kd-tree object is created to search the nearest point from a reference and cluster it. It is important to mention that for this process, an index vector was created, containing information of the current index. Each index of every detected cluster is conserved. (e.g., cluster *index [0]* is composed of all the indexes from the first cluster in the point cloud). Furthermore, a clustering tolerance was set by empirical syntonization; this is because there is not a standard perception hardware and the precision of sensing 3d coordinates of each sensor may be diverse. Let's say if the tolerance is overly lowercase, a single object could be segmented in many clusters; on the other hand, if it's too meaningful many objects could belong to a single cluster. Now the clusters are stored in the index vector, and through an iteration, new clusters are invoked and added to the main point cloud.

Finally, after all the clusters are processed from the main point cloud, every single segmentation is converted back from PCL to ROS data type and published via ROS protocol for visualization or even setting a trajectory avoiding those blobs.
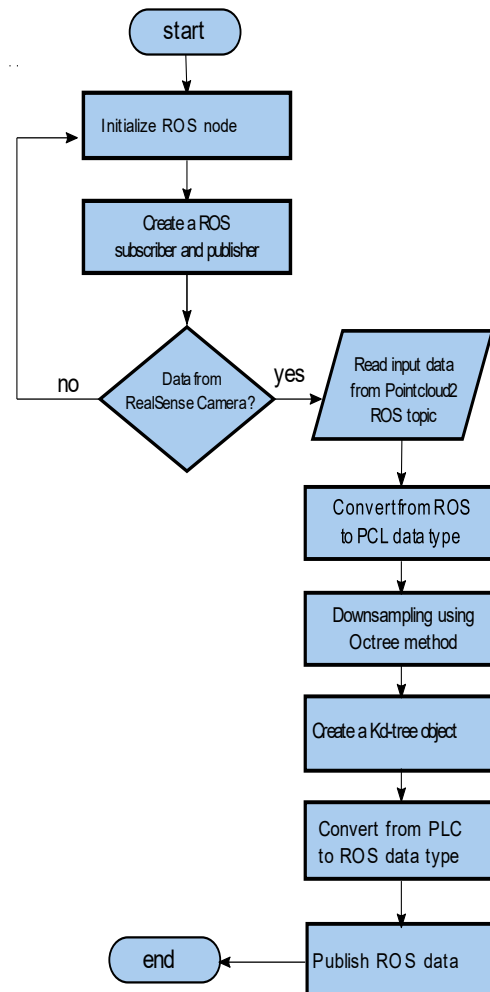

Figure 6 Clustering Pseudocode *(Own Source)*

Results

The User Interface designed is capable of sending ROS commands via ROS topics initialized in the master's roscore. This implies a bidirectional communication between the two computers. Consequently, Autominy's data image can be streamed and supervised by the user. Figure 7 highlights the GUI and the information from the camera.
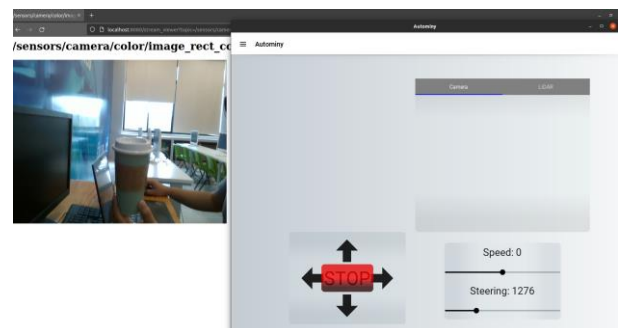

Figure 7 User Interface
Source: (Own Source)

A slider of speed and steering were created, and until the user releases up the dial the data string command is stored in the memory, then when the user presses the forward button the command string is sent.

Likewise, a condition is implemented, this is to prevent a malfunction or decontrol. Only the data string can be sent by pressing the forward button if the speed of the slider is greater than zero. Conversely if the speed value is less than zero, the command will only be sent by pressing the backwards button.

In regards to the steering commands, the center of the slider represents a zero degree direction. and the same speed logic is applied.

In any event, if the stop button is pressed, it will kill all the processes that are running. This application is running from a python file in a computer, but easily can be converted into a portable device.

Equally Important, the clustering algorithm results are also interesting. As mentioned before, information from the depth camera was read and processed; passing through a downsampling method and finally a clusterization technique. An experiment with different parameters took place, changing the leaf size of the voxel grid downsampling filter.

The first test was set by a leaf size of 1 cm in relation to the depth camera measurement. The cluster tolerance was set at approximately 1 cm. As shown in Figure 8 the clustered point clouds are overlapped in the ROS camera topic, this is because of better visualization of the results. Clearly, a perceptive delay is present, which is due to the latency of sending the point cloud to the computer and sending back to the Autominy's processor. When the program was compiled in the Autominy's CPU, the struggle was significantly decreased.

It is important to mention the fact of setting the cluster tolerance approximately at 1 cm, almost the objects are perfectly separated into important clusters. But if this element changes, the resolution of wrapping objects can considerably enhance. It is important to mention the cluster colors were set randomly and do not have any relation to the distance of the elements.
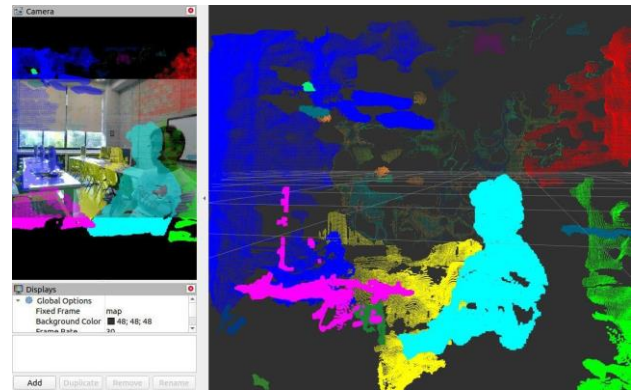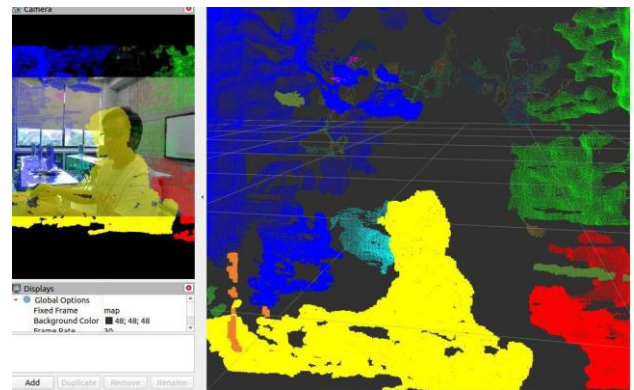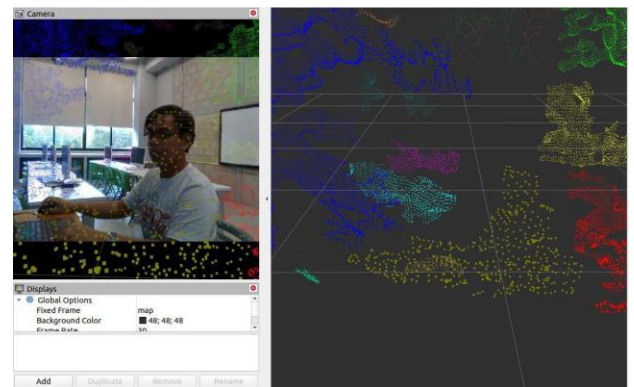

Figure 8 Segmented point cloud
Source: Own elaboration

In the next Figure 9 a better representation of the downsampling can be shown. In this experiment a leaf size of 0.06 cm and 1 cm was applied.

(a) Segmented point cloud with a 1 cm of leaf size

(b) Segmented point cloud with a 0.06 cm of leaf size

Figure 9 Segmented point cloud
Source: Own elaboration

Acknowledgments

Conclusions

To summarize, a graphical user interface was created using a framework called KivyMD, in which one ROS command is sent via ROS nodes. The user can watch in real time what the Autominy's camera is streamed via web server.

In addition, a clustering algorithm was implemented to enhance the perception of the robot, and to implement a different method instead of the camera. The Point Cloud Library was used for this work and implemented to ROS. Techniques of Downsampling and Kd-Tree were executed.

Future Directions

For future work, this clustering method can concur in spatial recognition of these clusters, and complete diverse challenges such as the parking or navigation with objects in movement. Also a certain intelligence can be provided to the Autominy, this if the point clouds segmented are also passing through a neural network which can be identified and classified, for example pedestrians.

Funding by

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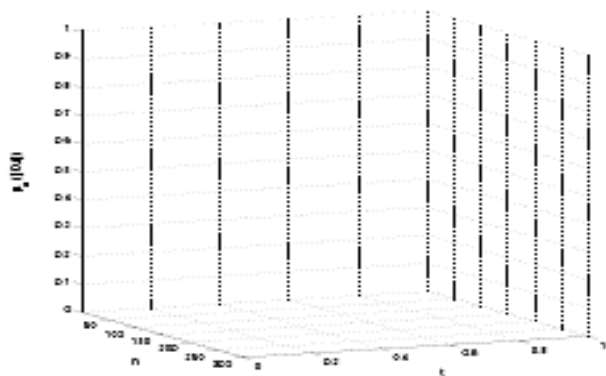
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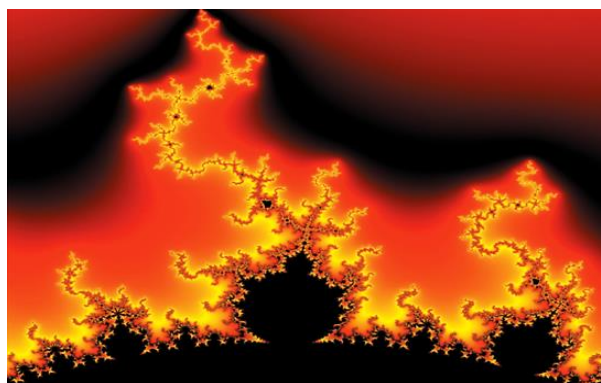
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