Empirical analysis on the interaction of students and academic elements in a children's course during confinement

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ABSTRACT

The current problem about the global pandemic about Covid-19 has had a notorious impact on people's daily lives. It has allowed the growth of the use of digital platforms, where it is possible to create virtual educational programs, such as the case of the children's course promoted through Humanas y Social social networks and private invitations. The course was developed from two modules "Pequeños científicos" and "Pequeños artistas", made up of educational resources of the interest of children from 5 to 12 years of age. In addition, two synchronous classes were given with the author teacher. The objective of the research was to determine the interaction of users with the academic elements proposed in the vacation course. To do this, an analysis was carried out through sociograms, where the level of user activity was checked; in this regard it can be mentioned that the module with the greatest impact is "Pequeños científicos" and the interactivity in educational elements develops with greater percentage in the educational resources of the modules "Pequeños científicos" and "Pequeños artistas"   . The limitations that were found are related to the commitment to complete a virtual course, contribute interactively and the lack of knowledge in the use of academic platforms.

KEYWORDS: Digital platforms; virtual course; academic elements; sociograms; global pandemic.

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Análisis empírico sobre la interacción de los estudiantes y los elementos académicos en un curso para niños durante el encierro

RESUMEN

El problema actual sobre la pandemia mundial acerca del Covid-19 ha tenido un impacto notorio en la cotidianidad de las personas. Ha permitido el crecimiento del uso de plataformas digitales, donde es posible crear programas educativos virtuales, tal es el caso del curso infantil "Ciencia, experimentos y arte infantil"; el mismo que se promocionó a través de la cuenta oficial de Facebook del Departamento de Ciencias Humanas y Sociales de la Universidad de las Fuerzas Armadas ESPE y por redes sociales e invitaciones particulares. El curso se desarrolló a partir de dos módulos "Pequeños científicos" y "Pequeños artistas", conformados por recursos educativos como videos, infografías, tareas y evaluaciones del interés de niños de 5 a 12 años. Además, se brindó dos clases sincrónicas con la docente autora. El objetivo de la investigación fue determinar la interacción de los usuarios con los elementos académicos propuestos en el curso vacacional. Para ello, se realizó un análisis por medio de sociogramas, donde se comprobó el nivel de actividad de los usuarios; en cuanto a ello se puede mencionar que, el módulo con mayor impacto es "Pequeños científicos" y la interactividad en elementos educativos se desarrolla con mayor porcentaje en los recursos educativos de los módulos "Pequeños científicos y "Pequeños artistas". Las limitaciones que se encontraron se relacionan con el compromiso para culminar un curso virtual, aportar de forma interactiva y la falta de conocimiento en el uso de plataformas académicas.

PALABRAS CLAVE: Plataformas digitales; curso virtual; elementos académicos; sociogramas; pandemia.

INTRODUCTION

Actually, the teaching and learning processes are linked to the use of Information and Communication Technology, which allow achieving new educational realities, supporting the development of scientific knowledge, expanding the possibilities of development and understanding (Esguerra, 2019). ICTs have allowed the generation of learning spaces within the Learning Management System (LMS), platforms that manage learning systems and distribution of educational content, allow interaction between teachers and students. A virtual community can be created in which content on different topics of interest is placed, as well as activities, tasks, workshops, and these are structured by modules, topics and subtopics (Rajmil, 2015).

In the global context, the use of the Internet for education is described with interactive boards, videoconferences, virtual libraries, online classrooms, among others; in order to increase learning productivity; it is mentioned that since 2003 around 6.3 million of the world population had been connected to some service on the internet; By 2015, 7.2 million of the world population did so and by the end of 2020 it is projected to be approximately 7.6 million of the world population

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(Santoyo et al., 2018). In Europe, it is determined that the use of social networks can be given by 89% of the European population, 80% for the acquisition of goods and services in which they define virtual courses and 60% dedicate it to reading or searching online information (Suárez et al., 2016); in the local context there is limited information on virtual platforms in the educational field; however, it is mentioned that for educational innovation in the use of the internet and promoting educational knowledge it is important that teachers stimulate, accompany and promote different interconnection environments; to promote in students the human dimension for the development of research in the technological and innovative field (Cadena et al., 2017).

Carpentier (2012) mentions that the digital citizen develops activities and capacities inherent in their real and virtual environment; specially in online participation; in which it develops its own capacities for the use of technology, among them we can mention: set of knowledge, skills, attitudes, strategies and values for the use of digital media and the participation of tasks, communication, managing information, creating and sharing content in an autonomous and flexible way for technological empowerment (Torres-Gastelú et al., 2020). The use of digital platforms in early childhood is fostered by tolerance to the use of the internet with a time control and establishing routine activities and structured schedules; to propagate a correct use of it. (Castro et al., 2018). Based on them, the limited studies on the interaction of digital platforms for virtual courses for children are identified as the main problem.

Thereby, the question appear of how much participation exists by students in a virtual vacation course during confinement; Based on this, it is intended to determine the interaction of users with the academic elements proposed in the Science, Experiments and Children's Art holiday course.

ICT and educational platforms

The era of technology allows interaction with the web how to search for information, buy, fill out forms, (Zajicek, 2007) and even take online courses. On the other hand, according to De Kool & Van Wamelen (2008) in recent years, virtual evolution goes hand to hand with the evolution of the physical world; in society the influence of technology is developed through the ease of obtaining services through the web; this is where groups with common interests can develop. For Cummings et al., (2009) it is a revolutionary advance that includes many interaction methods, development styles and content sources. Web 2.0 is seen as an opportunity to develop content that can be globally spread, where a network is formed that encompasses a series of connected devices and a community of collective intelligence of users is developed (De Kool & Van Wamelen. 2008).

ICTs have allowed the development of educational platforms; Among these is Moodle that allows to create a virtual educational environment, dynamic learning, where each student has importance within the teaching-learning process (Di Cerbo et al., 2008). This is an open source learning management

system, which supports the creation of online communications, encourages learning and forms teaching links; potentiates the flipped classroom strategy, where collaborative learning can be developed through a series of tools focused on student development and interaction with teachers (Acquila-Natale et al., 2019). The courses developed through platforms such as Moodle that allow to the instructor to make the configuration according to the student's needs, also interact with workshops, evaluation, and activities; and above this all; and above all the student receives the grades immediately (Torres & Caballero, 2015)

Virtual courses and student participation

Online courses are an opportunity to develop new knowledge, which includes an introduction to the subject to be developed and training modules. These allow teachers to develop information strategies based on synchronous and asynchronous activities, complementary bibliography, forums, organizational charts and evaluations; Furthermore, relevance is given to the material used to develop them; the courses must comply with computer development characteristics such as videos, audios and written material (Di Almeida, 2007).

Online courses must be characterized by interactivity, since the impact it will have on a group of people depends on this, which is why educational content designed and appropriate to respond to a need and above all to motivate students to respond is needed. To technological challenges (Chiappe, 2016). One of the most relevant aspects to take into account must be the context and in addition to that, make adaptive and flexible virtual didactic materials that allow educational practices in virtual teaching-learning spaces on electronic internet networks (Torres et al., 2019).

The interaction of children and technology is controversial, it is said that the impact on minors can affect cognitive development; However, pediatric society advises limiting the time spent in front of the screens, which is why a maximum of 2 hours a day is defined for preschool children (LeMay et al., 2014), even so, by limiting the time it is It must take into account that the means used are for communication between children and adults; with the interaction of parents who, in addition to taking care of the content observed by their children, are co-authors of learning and are committed to monitoring the activities of an online course.

Kebritchi et al. (2017) in their research in the Journal of Educational Technology about teaching in online courses, they pointed out that a compilation of 104 research articles was made, which includes topics such as "Online courses and problems", "Education and challenges online", "Web-based instruction", "Online teaching and problems", "Course redesign", "Instructional design and online learning", "Online curriculum and teacher design", "Distance learning", which made it possible to determine that

a) The problems related to the students can be summarized in the expectations, preparation, identity and participation of the students in virtual courses.

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b) Not all students can successfully participate in online courses, because the learning styles and skills necessary to participate in online courses must be identified and adopted; and

c) Recommended best practices for developing content in an online course are a combination of collaborative activities, clear assessment criteria, and technology integration.

At Harvard University, a study was conducted on the completion of online courses, for which a group of randomly chosen students was collected, thanks to the use of the digital platform, the course teacher could evidence data such as: Time to do activities, start and end date of the course and how many people accessed the certificate to complete; For this, the chosen population was divided into two groups; the first would receive a certain planning to follow the course, from which it was obtained that 29% of the registered population completed the course and that 40% paid for the certificate; while the group that took the course without prior planning showed that among students enrolled in HarvardX and MITx Courses, who declared in the inscription with the intention of finish your course , only 22% did (Yeomans & Reich, 2017).

At Indiana University, a study was conducted to verify the effectiveness of the use of digital platforms and to measure personal use of web 2.0, where data was collected through a survey, it was sent to more than 4,500 students who were chosen as a representative sample. Of the 4,500 surveys sent, a total of 2,200 (48.9%) were received from 259 subjects with 1,994 (44.3%) usable responses. The final sample consisted of 77% men and 23% women, which is representative of the company's employees. The age ranges of the subjects were 25 and less (8%), 26 to 30 (17%), 31 to 40 (29%), 41 to 50 (26%) and more than 50 (20%), given this It was determined that the proclivity of a user to use Web 2.0 technologies and provide positive results that demonstrate that before the experience (consume, contribute) influences Web 2.0. (Cummings et al., 2009).

In a study carried out at the University of Oxford Brookes in the United Kingdom, the impact that Web 2.0 has on physical accessibility and user acceptability was determined, where it was determined: (a) the interest and inclination of users means that the web can be used by everyone, but it must also mean that the work should not be laborious; (b) Accessibility should not mean that the user will be able to use some software if he spends two days struggling with it and learning how to make it work; and (c) if the user is excluded from a service, then it is not accessible for said place and neither the place for the user (Zajicek, 2007).

DEVELOPMENT

During the Covid-19 pandemic, face-to-face activities in different areas were converted to activities in virtual spaces. In the area of education, the Universidad de las Fuerzas Armadas ESPE, in the Departamento de Ciencia Humanas y Sociales planned, designed and implemented virtual vacation courses, among which is "Ciencia, experimentos y arte infantil" for children between the ages of

5 At 12 years, the course consists of two modules: "Pequeños científicos" and "Pequeños artistas".

The dissemination of the course was carried out through the official social network; Facebook, from the Departamento de Ciencias Humans y Sociales. Registration was through a form, which remained enabled from August 15 to 18, 2020, with the closing of registrations, 348 children from different provinces of Ecuador were obtained.

The course was published on the Moodle Platform from August 19 to 31, the research is carried out from a non-experimental design, with a non-probabilistic sampling type and for convenience. The research was carried out from the analysis of the activities proposed in the two modules, tasks that were named as scientific challenges and experimental challenges, evaluations at the end of two topics and two synchronous classes at the end of each module.

Through this course, data referring to the activity of each student enrolled in the virtual course was collected, through navigation and behavior records; to define from this the interaction of participation of each individual under study.

The study is analyzed from two coding perspectives; the first addresses the educational elements of the "Pequeños cientificos" module, to determine the interaction that exists between the participants in the "Ciencia, experimentos y arte infantil" course; from the extraction of data that are related to the educational resources used prior to carrying out the activity, the proposed tasks that were named as scientific challenges and the evaluations. The results are analyzed through sociograms, since it is intended to identify the interaction with the relationship of the nodes and the categories; since when mentioning the nodes, it refers to the participants who observed, carried out and learned with 21 exposed resources; after this, the interaction in the tasks given by the participants is determined, , an analysis is made of which of the tasks was delivered in the highest proportion, and finally the number of udders who participated in the evaluations by receiving a grade in the planned attempts.

The second perspective is defined from the module "Pequeños artistas", in which, as in the previous perspective, interaction is evaluated from sociograms that allow defining the participation of users in resources, tasks and evaluations carried out by the users. Students of the virtual course for this, the categories were used to classify the interaction of the children against the academic elements, which are presented in Table 1.

Table 1: Categories and codes of the course "Ciencia, experimentos y arte infantil".

Code	Category	Meaning
R	Educational resource	Interactive material with relevant information for student learning
T	Task	Activities that the student performs
E	Evaluation	Questionnaire to modify the knowledge acquired

Note: Own elaboration

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For the coding of the data, the information downloaded from the Academy platform (MOODLE) was collected, later the users who participated in the virtual course were anonymized with the letter N and their number according to the alphabetical order of their name, being so that for the first The user observes the code N1, and so gradually, after this a code was given to each category that is analyzed in the research, as it is an educational resource, it is given the letter R and the number is given from the subject in the one found, being that within each module is R1 and successively until reaching R_21, it can be seen in more detail in Table 2 and Table 5; for the tasks the T code and the activity number T1-T5 were entered, and finally the E1 and E2 evaluations; in order to continue with the process, a dynamic table was made where each code and category is placed in order, finally the sociograms are made the Gephy program, the process is detailed in Figure 1.
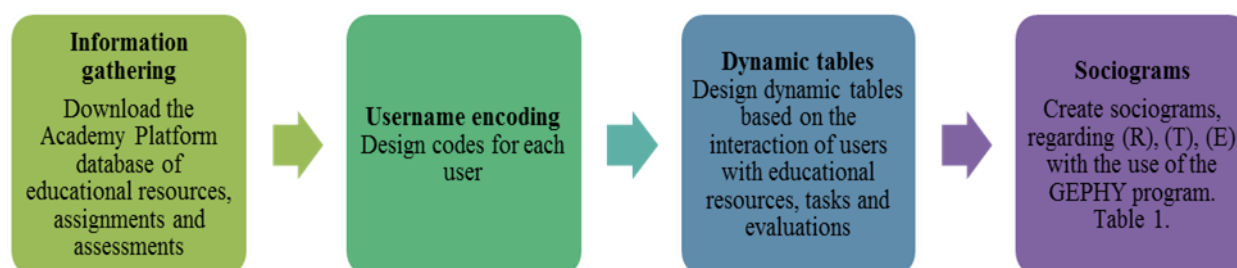

Figure 1: Data analysis process.

Note: Own elaboration

To determine the interactions of the users with the academic elements in the "Ciencia, experimentos y arte infantil" course, according to the modules, the results obtained in the sociograms are presented below.

Perspective from educational resources of the "Pequeños científicos" module

Educational resources are those that allow the child to acquire knowledge, since they transmit information to carry out a task; that is why Table 2 presents the results obtained from this category, where you can see the resources, the interaction of the participants and the percentage it represents in relation to the total group.

Table 2: Percentage of interaction in the educational resources of the "Pequeños científicos" module.

Educational resource	Coding	Interaction	Percentage
Origin of ink	R_1	145	41.67
Invisible Ink	R_2	139	39.94
I experience secret messages	R_3	136	39.08
Tutorial: Invisible Ink	R_4	134	38.51
Volcanic eruption	R_5	107	30.75
Volcanoes in Ecuador	R_6	96	27.59
Foam Volcano Experiment	R_7	102	29.31
Tutorial: Foam Volcano	R_8	96	27.59
Tongue twister	R_9	75	21.55
What is a jumping egg?	R_10	42	12.07
Experiment: Bouncing Egg	R_11	82	23.56
Tutorial: Jumping Egg	R_12	81	23.28
Story: Hen that Lays Golden Eggs	R_13	80	22.99
Origin of plasticine	R_14	78	22.41
Experiment: homemade modeling clay	R_15	39	11.21
Tutorial: Homemade modeling clay	R_16	75	21.55
Curiosities	R_17	77	22.13
What are the states of matter?	R_18	71	20.40
Experiment: Liquid or Solid	R_19	52	14.94
Tutorial: Liquid or Solid	R_20	40	11.49
Non-Newtonian liquid	R_21	62	17.82

Note: Own elaboration

In table 2 you can see the column that belongs to educational resource, followed by it the code of each activity is represented from R1-R21, in the next column is the interaction where it represents the number of children who accessed the material and in the fourth column are the interactivity percentages, thus being that the interaction in the educational resources category R-1 belonging to the topic "Origin of the ink" represents the highest amount of interaction, belonging to 41.67%, on the other R-2 side corresponds to 39.94% with the topic "Invisible ink", followed by R-3 corresponds to 39.08% with "Secret messages experiment", and finally "Tutorial: Invisible ink" R-4 represents 38.50%.
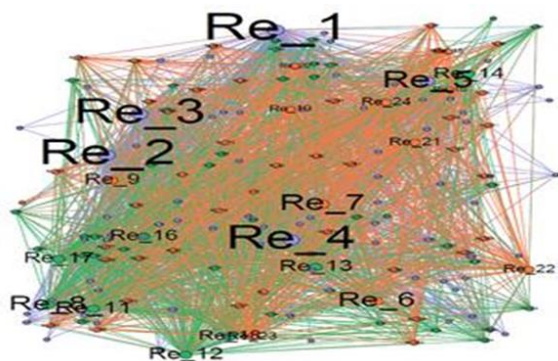

Figure 2: Sociogram based on the interaction with educational resources in the "Pequeños científicos" module. Note: Own elaboration

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The analysis is carried out from the most notorious interaction nodes, which are represented in Figure 2.

In the analysis of sociograms it is evident that within the 21 educational resources used for the Pequeños científicos" module, the most representative nodes belong to R1 41.67%, R2 39.94%, R3 39.08%, R4 38.51% and R5 30.75%. The second category analyzed belongs to the tasks that were carried out in the "Pequeños científicos" module, this is a space where user present evidence according to the issues raised: Invisible ink, foam volcano, jumping egg, homemade plasticine and non-Newtonian liquid; this is described below in Table 3.

Table 3: Percentage of interaction of fulfillment of tasks of the "Pequeños cientificos" module.

Theme	Coding	Interaction	Percentages
Invisible Ink	T_1	71	20,40%
Foam volcano	T_2	60	17,24%
Jumping egg	T_3	48	13,79%
Homemade modeling clay	T_4	50	14,37%
Liquid or solid	T_5	40	11,49%

Note: Own elaboration

Table 3 shows that T_1, which belongs to the topic "Invisible ink", was made by 20.40%; T_2, which is about "Foam Volcano", was met by 17.24%; on the subject of "Jumping Egg", T_3 was delivered by 13.79% of users; T_4 that refers to the task of the topic "Homemade plasticine" was fulfilled by 14.37% of the participants and finally T_5 that was carried out "Liquid or solid" was delivered by 11.49%. For the analysis of greater interaction, the sociogram corresponding to Figure 3 is presented below.
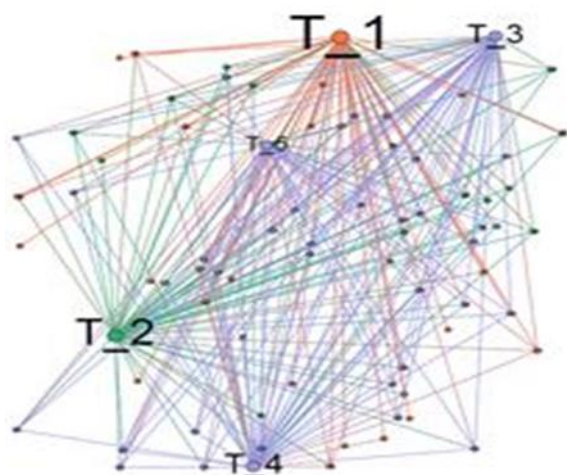

Figure 3: Sociogram of user interaction with the tasks of the "Pequeños científicos" module.

Note: Own elaboration

In the sociogram corresponding to the interaction of the users in relation to the tasks that were fulfilled in the "Pequeños científicos" module, it can be seen that node T_1 is more representative; since it belongs to 20.40% of user compliance and due to the interaction effect, while when observing node T_5 it is immersed in the sociogram, that is, it has a lower interaction representativeness, belonging to 11.49% of user participation.

In the first module "Pequeños científicos" the level of interaction in the evaluations is analyzed, at the end of the activity "Invisible ink" and "Volcanoes", the participants were evaluated with a questionnaire of three questions obtained from educational resources, the second evaluation was carried out from the activities proposed in the themes "Jumping egg", "Plasticine" and "States of matter"; The interaction percentages between users and evaluations are detailed below in Table 4.

Table 4: Assessment compliance interaction in the "Pequeños cientificos" module

Topics	Coding	Interaction	Percentage
Invisible ink and Volcanoes	E_1	78	22,41%
Jumping Egg, Plasticine and States of Matter	E_2	58	16,67%

Note: Own elaboration

In this table can be noted that E_1 was solved by 22.41% of the participants, later it can be seen that in E_2 the 16.67% has solved the test. Next, the sociogram in Figure 4 represents the interaction of the participants with the evaluations.
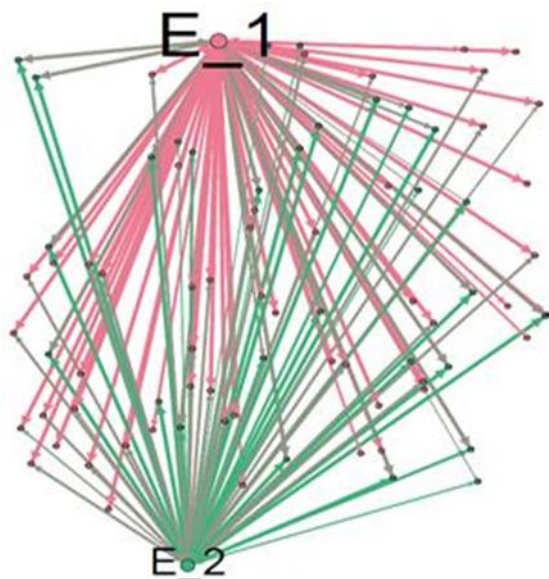

Figure 4: The interaction of users with evaluations of the Small Scientists module

Note: Own elaboration

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In the sociogram presented above, it can be shown that the most representative nodes belong to the E-1, corresponding to the themes of "Invisible Ink" and "Volcanoes"; which symbolizes the 22.41% of the total of the participants.

Perspective from educational resources of the "Pequeños artistas" module

The following is the analysis of the data obtained from the second module, called "Pequeños artistas" of which the interaction of 20 educational resources used for the acquisition of student knowledge is analyzed, later the tasks delivered by the participants are analyzed and finally the evaluations.

Regarding educational resources, it was implemented through information about the proposed topics; Puzzle games, coloring graphs were also used and those with a higher percentage of interaction between users and educational resources will be analyzed, then the interaction percentages are presented in Table 5.

Table 5: Percentages of interaction with the educational resources of the "Pequeños artistas" module.

Educational resource	Coding	Interaction	Percentage
What's going on in your brain?	R_1	37	10.63
Silhouettes of hands	R_2	54	15.52
Tutorial: Silhouettes of hands	R_3	54	15.52
Shadows of hands	R_4	48	13.79
What is abstract art?	R_5	30	8.62
Blots	R_6	45	12.93
Tutorial: Blots	R_7	43	12.36
Puzzle	R_8	43	12.36
Creation of wool	R_9	40	11.49
Wool collage	R_10	39	11.21
Tutorial: Wool Collage	R_11	24	6.90
Story: Little sheep give me wool	R_12	35	10.06
What is the color wheel?	R_13	36	10.34
Chromatic drops	R_14	34	9.77
Tutorial: Chromatic drops	R_15	34	9.77
Rainbow	R_16	22	6.32
How do you make paper?	R_17	33	9.48
Crepe paper collage	R_18	32	9.20
Tutorial: Crepe Paper Collage	R_19	32	9.20
Puzzle	R_20	27	7.76

Note: Own elaboration

In the table the five highest percentages are extracted, among them is R_2 which is about the activity "Silhouettes of hands" which has a 15.52% interaction percentage, as well as R_3 which is "Tutorial: Silhouettes of hands", which also has 15.52 %, followed by R_4 where the resource of "Shadows of hands" is identified with 13.79% interactivity, in fourth place is R_6 which is on the activity named "Blots", which was carried out by 12.93% and finally R_7 about "Tutorial:

Blots ", which was found with 12.36% in relation to interaction between the user and their interactivity.

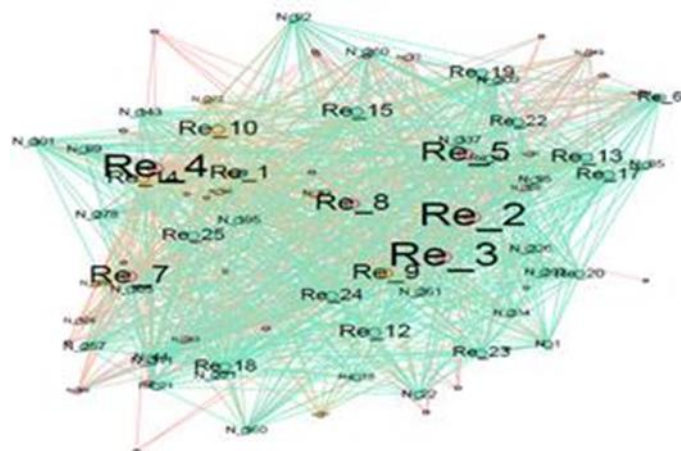Below is the sociogram that belongs to the educational resources of this module, Figure 5.

Figure 5: Interaction of users with the resources of the "Pequeños artistas" module.

Note: Own elaboration

In the analysis of sociograms, it is evident that within the 20 educational resources used for the Little Artists module, the most representative nodes belong to R_2 and R_3 with 15.52%; R_4 with 13.79%; R_6 which represents 12.93% and finally R_7 which is 12.36%.

Next, the data obtained with respect to the tasks of the "Little Artists" module is analyzed. In these activities, the participants had to upload evidence regarding the work proposed in the course on each topic; among them are: "Figures of hands", "Abstract art", "Wool", "Color circle" and "Paper". The following Table 6 shows the percentages of interaction in each task.

Table 6: Percentages of user interaction with the tasks of the "Pequeños artistas" module.

Theme	Coding	Interaction	Percentage
Silhouettes of hands	T_1	37	10.63
Blots	T_2	33	9.48
Wool collage	T_3	25	7.18
Chromatic drops	T_4	24	6.90
Crepe paper collage	T_5	23	6.61

Note: Own elaboration

In the table it can be seen that in T_1, belonging to the "Silhouettes of hands" activity, there is a percentage of 10.63% of interactivity; With respect to the T_2, which is about the topic "Blots", 9.48% of activity is determined; Regarding T_3,

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it is represented by 7.18% in the theme of "Wool collage", later 6.90% is described for T_4 in which the theme "Chromatic drops" is developed and finally the corresponding T_5 to the task of "Crepe paper collage" in which 6.61% of users participated; It is then presented through a sociogram to determine the level of interaction, Figure 6.
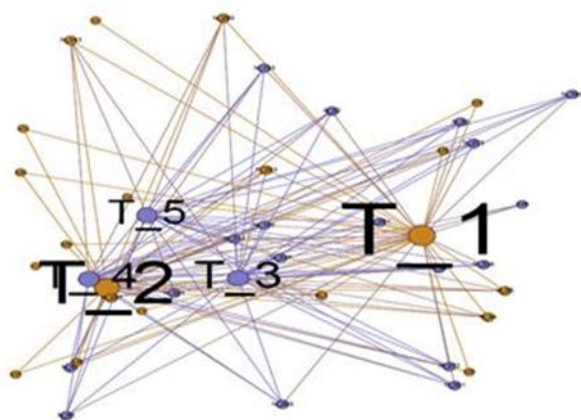

Figure 6: Sociogram of student interaction with the tasks of the "Pequeños artistas" module.

Note: Own elaboration

In the sociogram that corresponds to the interactivity of the users with the tasks of the "Pequeños artistas" module, it is determined that the node with the highest representativeness belongs to T_1 with 10.63% interactivity, while when observing the least protruding node, it is defined at T_5 with 6.61%.

Finally, the data obtained in the evaluations is analyzed, the same that were developed in two parts; the first was made from the educational resources of the topics of "Figures of hands" and "Abstract art", evaluating the students with three questions to add a total of 10 points, with respect to the second evaluation, this was carried out based on the themes of "The wool", "Color circle" and "The paper"; Like the previous one, it was evaluated with three questions for a total of ten points; Below are the interactivity percentages based on the evaluations of the Little Artists module, Table 7.

Table 7: Percentage of student interaction with the Little Artists module assessments.

Theme	Coding	Interaction	Percentage
Figures of hands and abstract art	E_1	32	9,20%
Wool, Color Wheel and Paper	E_2	28	8,05%

Note: Own elaboration

The table shows that E_1 receives an interactivity percentage of 9.20% of student participation; that is, the users carried out the evaluation and received a rating; Regarding E_2, it had an interactivity of 8.05% regarding the students who carried out the evaluation. Next, the sociogram is analyzed, Figure 7.
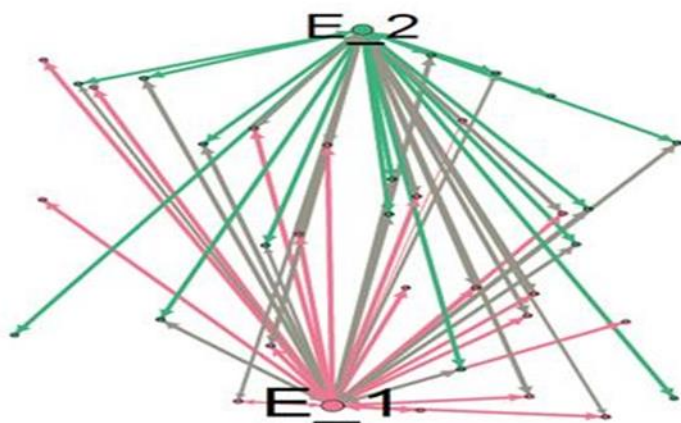
Figure 7: Sociogram of student interaction with the Little Artists module assessments.

Note: Own elaboration

In the sociogram, it is evident that the node of E_1 has a higher representation with 9.20%, which belongs to the first evaluation with the themes of "Silhouettes of hands" and "Abstract art".

The objective of the research was to determine the interaction of users with the academic elements proposed in the holiday course of "Ciencia, experimentos y arte infantil", based on the registration of activities in educational resources, tasks and evaluations; respectively of the two modules "Pequeños cientificos" and "Pequeños artistas", the results were coded and represented in sociograms to allow to analyze the interaction in the aspects mentioned above; the interaction percentages of each user were observed. After the launch of the virtual course and the participation of children between the ages of 5 and 12, it can be said that the evolution of the internet, in addition to facilitating the acquisition of resources for users, also is a space which groups with the same interests and also virtual courses and educational platforms can be crated (De Kool & Van Wamelen, 2008).

That is why, through the analysis of the results obtained from the Academy platform, the interaction is determined; In the first place, there is the module "Pequeños científicos", where a higher interaction in the resources is evidenced, this refers to the first educational resource that is about the "Origin of the ink", coded as R_1 (Table 2), the interaction of 145 users was registered; on the other hand, the tasks registered, in T_1 71 participants were registered who fulfilled the proposed activity about the "Invisible ink, finally the evaluations, where the first evaluation E_1 records an interaction of 78 participants and E_2 was carried out by 58 participants, that is, less 20 participants than the previous one; regarding the "Pequeños artistas" module, in R_2 and R_3 equal amounts of users participated; that is, 54 students of the total number of participants; to continue with the analysis, the T_1 that deals with the topic "Silhouettes of hands" which was fulfilled by 37 users, finally the (E) of this module indicated an

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interaction in the E_1 of 32 users and the E_2 denotes that was fulfilled by 28 participants.

It is important to analyze the sociograms, to determine the interaction of the users in the virtual course based on educational resources, task, and assessments. The "Pequeños científicos" module had a greater interaction than the "Pequeños artistas" module, with the above it can be said that the Academy platform allowed the development of a course and the creation of a virtual educational environment, (Di Cerbo et al. , 2008), however this online study community showed a notorious decrease in interaction percentages, it is necessary to include an extrinsic motivation and generate activities that allow the children's interactions to be increased, for this it is necessary to carry out prior planning, the same it must be validated to avoid errors (Yeomans & Reich, 2017).

In the "Pequeños científicos" module, the greater interactivity of the virtual course was generally registered, however, more impact was observed in R_1 with a percentage of 41.67% of the total participants, followed by R_2 with 39, 94% interactivity, R_3 and R_4 with a percentage of 39.08% and 38.51% respectively; However, when analyzing R_ 21 there is a decrease of almost half in references to the first educational resource, this being 17.82% of interactivity; the noticeable decrease in student interaction can be summarized in expectations about the course, prior preparation to access resources and even the study plan (Kebritchi et al., 2017), since it is complex to adapt the daily study system to an online mode, even more so when the accompaniment is asynchronous. Regarding the tasks, it is recorded that T_1 has a 20.40% interactivity, while T_5 has 11.49% participation; a decrease of 8.91% can be mentioned; because the delivery dates were not defined and that is why users did not have a planning to follow the ordered process; planning due dates in an online course can increase interaction (Yeomans & Reich, 2017). The E_1 and E_2 had a difference of 5.74% of interactivity by the users.

When analyzing the results in a general way, it can be said that among the three categories the one that had the least interaction was that of tasks (T). Because the delivery dates were not defined and that is why users did not have a planning to follow the ordered process; planning due dates in an online course can increase interaction (Yeomans & Reich, 2017). The E_1 and E_2 had a difference of 5.74% of interactivity by the users. When analyzing the results in a general way, it can be said that among the three categories the one that had the least interaction was that of tasks (T). Because the delivery dates were not defined and that is why users did not have a planning to follow the ordered process; planning due dates in an online course can increase interaction (Yeomans & Reich, 2017). The E_1 and E_2 had a difference of 5.74% of interactivity by the users. When analyzing the results in a general way, it can be said that among the three categories the one that had the least interaction was that of tasks (T).

In the "Pequeños artistas" module it can be seen that in the (R) there is less interaction than the educational resources of the "Pequeños científicos" module;

because the one with the highest percentage of interactivity is R_2 and R_3 with 15.52%, which is even lower than R_ 21 of the "Pequeños científicos" module; regarding the last educational resource of this module R_ 20, there is an interactivity of 7.76%; interactivity with digital platforms and accessibility to information depends on the interest and acceptability of the user, which arises from the level of knowledge to use it (Cummings et al., 2009).

On the other hand, the recommended time for the use of technology for children plays an essential role, since it should be a maximum of two hours a day and under the supervision of an adult, which leads to a commitment of adults in the accompaniment of a virtual course (LeMay et al., 2014), regarding the fulfillment of the tasks it is evidenced that T_1 had a greater interaction with 10.63% while T_5 with 6.61%, that is why the essential thing for the fulfillment of tasks is the time that is granted to do the proposed activities (Yeomans & Reich, 2017) and that it is also recommended to teach children structured activities or routines (Castro-Rodríguez & Lara-Verástegui, 2018), without this order it cannot be achieved with the fulfillment of the presented block. Finally, the evaluations were developed by a minimum percentage of participants; E_1 was prepared by 9.20% and E_2 by 8.05%, although the difference between these two is not very significant. It can be said that in contrast to the evaluations of the first module and those of this module there is a significant difference of approximately 10%; the digital citizen manages to develop capacities in their real environment and merges it with their virtual environment; however, this is worked from a technological culture (Carpentier, 2011).

CONCLUSION

This research allows us to analyze that the data obtained from the "Ciencia, experimentos y arte infantil" course, shows that at the beginning of the course the interaction that the participants had with the educational elements was high, however at the end of the course the same behavior was not demonstrated; based on this, it can be said that virtual platforms allow users to access virtual courses for free in some cases and mostly in a paid way, even so the virtual course developed for the research was aimed at children between the age of 5 at 12 years, due to this the interaction in virtual courses in children is a commitment for parents; therefore, it is concluded that there is no independence in minors to freely enter the Academy platform and that in this way they interact in the course, it also requires the accompaniment of parents and teachers, who commit to support the learning of the children; it can also be mentioned that there is a gap in the use of platforms and even a lack of knowledge due to the use of technological resources, that is why by not being able to enter and use the platform correctly, the levels of interaction decrease as the contents in the modules of the virtual course.

Among the limitations that were presented throughout the investigation, it is mentioned that at first the Academy platform requires the confirmation of users, so many of them, not being able to enter, lose interest in continuing with a

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course; on the other hand, the registered interaction decreased as the activities of each module progressed, which is due to the lack of commitment to continue with a virtual course; another factor that had an impact was the opening time of the course; since the activities must be done daily and no deadline for the preparation of tasks and evaluations was specified, so many users did not comply with it; finally, the delivery of tasks can be a challenge for people who do not master technology, because it influences their fulfillment.

Interaction in academic platforms allows users to participate in online courses, however, it is recommended to create prior plans for the organized development of activities and determine the interaction in a virtual course based on meeting dates; in addition, previous instruction is required, in order to achieve higher interaction percentages in all categories of the proposed course; and a program that generates greater motivation when participating in online courses should be promoted, that fosters interest and commitment on the part of users and their representatives.

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