Online Peer Learning by students and researchers at the Center for Research and Interdisciplinarity as strategy to face the Covid-19.

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Abstract

This past decade has seen the integration of digital technologies into everyday life, allowing people to acquire information faster and have access to extensive pools of information. During the Covid-19 pandemic, digitally mediated interactions have replaced physical interactions. For instance, classes are now instructed on online platforms, people are working from home, and many are finding social connections through online applications. Even though face-to-face contact at Center for Research and Interdisciplinarity (CRI) is limited, CRI community members (or CRI people) are still connecting to each other in order to achieve their learning goals using online tools. With this question in mind, we have conducted an inductive research project using a survey to study the relationships that exist in online peer learning connections within the CRI community. The results show how exchanging information, collaborative seminars led by students and cooperative learning are the most important online peer learning methods used through email, WhatsApp, video conferencing and LinkedIn. Additionally, there is evidence that the appropriate tools and online peer learning awareness could enhance the interactions between members in terms of facilities, methods and motivations.

Keywords: online peer learning / e-learning / peer-learning / communication / CRI / online tools / social media

1. Introduction

Online learning has become increasingly utilized and is rapidly changing classroom and learning dynamics. People frequently use mobile devices and online technological tools in their learning processes, and therefore having less “traditional” learning experiences. At the same time, peer learning is considered an effective method to enhance and improve student learning where students have an active role, learning with and from other students (Colbeck *et al.*, 2014). To summarise, the sudden shift to online work and school could have effects on the way of traditional face-to-face learning and interaction within the old working and learning settings. Plus, some online tools support interactive learning and increase opportunities for learners to connect to one another within boundless environments. The process of online peer-learning could result in collaborative questioning, assessment, peer facilitation and motivation without constraints of place and time (Sakulwichitsintu *et al.*, 2015)

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It is difficult for students and researchers to interact with peers during the learning process in the midst of the COVID-19 pandemic because of physical distancing. Higher education and research institutions are obliged to apply emergency protocols of e-learning which could lead to a problem in practice about self-regulating and sense of belongings when meaningful face-to-face learning and teacher support are very limited (Rashid, Shazia & Yadav, Sunishtha., 2020)

There is very little research to date on the effects of the COVID-19 pandemic in regards to peer learning. There is much to study on the effects of this abrupt transition to strictly online learning and how it has affected learners and the methods of learning and research. Understanding practices, motivations and tools used by students could enable them to have a more effective learning process.

Online peer-learning methods could fill the gap of online learning during this pandemic period and enhance the learning experience of learners in many settings, such as traditional online classrooms, seminars, while doing personal projects, while pursuing personal learning interests, and others.

This study has been conducted through inductive research and is an attempt to explore how online Peer Learning has been utilized during the Covid-19 pandemic in the learning community of the Center for Research and Interdisciplinarity (CRI) in Paris, France, during a period where most academic activities have been moved online. Assuming that within the CRI community there is an established presence of some peer-learning activity, it would be interesting to identify the details of this activity and exactly how people in this community connect to each other using digital tools to achieve their peer learning goals.

The primary objective here is to explore *online* peer learning used by students and researchers at CRI during the transition to predominantly online learning during the pandemic of Covid-19.

This study investigates the interaction patterns of students and researchers with their respective peers during their learning processes, as well as the differing patterns, the tools utilized, the motivations and difficulties involved and the types of Online Peer Learning used.

To address these questions, this study includes an online survey to collect information based on users' statements and a statistical analysis of the size of networks, tools, types of peer learning practices, perceptions, motivations and difficulties.

Understanding practices, motivations and tools that are used in the learning community at CRI could create a clearer picture of the current status of peer learning, which could lead to more effective strategies and initiatives aimed at enhancing the peer learning among students and researchers.

2 Methodology

2.1. Context

The COVID-19 pandemic has presented a unique opportunity for research in the context of online learning. In response to this rapid shift, research methods have had to shift in a more agile direction to collect data. Findings from such research have shown how online classes have achieved a positive effect and reduction of the pandemic's impact during COVID-19 at educational institutions (Zia, 2020). Other studies have shown that social networking influences overall learning performance (Wakefield and Frawley, 2020) and how peer learning in online environments necessitates the usage of different methods and tools than in-person classes (Sakulwichitsintu *et al.*, 2018).

2.2. Study design

This study is descriptive and explores online Peer Learning patterns, which have been undoubtedly shifted in the midst of the COVID-19 pandemic. To explore these patterns in this study, a survey was addressed to students and researchers at the learning community at CRI in Paris, France. The following categories were assessed in the survey: learning methods, tools used, difficulties associated with peer learning, and possible recommendations.

The participants of this survey were enrolled in different educational programs at CRI for the 2020-2021 academic year. The participant categories were Bachelors Frontiers In Life Science, Masters of Digital Sciences, Life Sciences and Learning Sciences, PhD students, as well as researchers. The invitation for the online survey was dispersed through a community-wide email at the CRI, as well as through informal channels utilized by students in each educational track. The description included the motivation for conducting this research and the it's relevance in the context of student online communities.

The research design was based on the survey and methods utilized in a study by Zia, which was conducted in 2020 during the pandemic (Zia, 2020). It was related to peer learning and social networking (Wakefield and Frawley, 2020) and guidance of online surveys. The research tools used were divided for collecting the data and analysing the data.

2.1.1. Data collection. Survey. The tool used for collecting the data was an online survey[6] to conduct quantitative research while utilizing open questions according to the guidelines exhibited by Dillman, 2011 (Dillman, 2011). The duration of the survey, subject privacy and confidentiality were prioritized to guarantee the ethicality of the study and to encourage the engagement of the interviewees in responding to the survey. A pilot survey was administered to test whether the duration, questions, and comprehension were effective, based on the responses obtained. The pilot was completed by nine students. These responses were not included in the regression analysis because some improvements to the final survey included additional questions, in order to improve the quality of responses. The survey was conducted using a secure Google Form protocol.

2.1.2. Data Analysis. The data analysis was based on descriptive statistics of the peer learning practice variables, tools by Student Track and a correlation model of categorical features.

[6] Link of the Online Survey: https://tinyurl.com/surveypeers

The correlation is the measure of how two variables are correlated. The most used correlation is the Pearson's R in ordinal variables but this model is not defined when the data is categorical. The variables collected in this study are nominal variables. The nominal data currently lack a correlation coefficient, such the correlation coefficient for ordinal data. There are necessary and special regression models (Colignatus, 2007) and the Theil's U correlation is used for finding correlation between categorical variables.

2.1.3. Correlation model and measure. To explore respondents' peer learning, we ran a Theil's U correlation model. In order to use this regression technique, it is necessary to use dummy variables (Fabozzi *et al.*, 2014). The calculation of Theil's U statistic (Uncertainty coefficient) for categorical is based on the uncertainty of x given y, and the value is on the range between 0 to 1, where 0 means there is no correlation and doesn't give information about x and 1 means the correlation between the two nominal variables.

The asymmetric coefficient is U(x,y) != U(y,x)

2.1.4. Variables in the analysis. The variables used and the categories are in Annex 4. They are divided into 6 categories and are collected from closed and open questions:

- **Size of the Online Peer Learning Network.** The number of people that a person communicates with for the purpose of online peer learning.
- **Type of Peer Learning.** This variable is divided into 6 categories of Peer Learning: Cooperative Learning, Peer Collaboration, Peer Tutoring, Exchanging Information, CRI student seminars, Peer Assessment, Peer Discussion.
- **Tools for online Peer Learning.** The different tools used and the use of social media for peer learning.
- **Perceptions**: measure as Importance and Quality of Peer Learning in a category level from 1 to 5.
- **Online Peer learning Driven:** This variable shows what is driven by peer learning in the CRI community, self-motivation by students, imposed by teachers or a combination of both options.
- **Gender**: This variable shows how is the use of online tools and Peer Learning by gender

3. Results

The following results are for 35 participants, 54.3% female, 40% male and 5.7% people who preferred don't mention their gender (Table 1). From Master Science participants, the most common are women (83.3%). All the Researchers who participated in the survey are men. The survey got more responses for students in Master of Learning Sciences and Life Sciences. As noted in Table 1, there is only one PhD response for this reason; this response it's not included in the main analysis.

Most of the participants are in the age range of 18-25 years old (54%), followed by people in the age range of 26-35 years old (Table 2).

Table 1. Number of responses by Educational program and gender

Educational Program	Gender						Total
	Female	%	Male	%	Not defined	%	
Bachelor - FDV	4	100.0%	0	0.0%	0	0.0%	4
Master DiSc	5	83.3%	1	16.7%	0	0.0%	6
Master LeSc	6	66.7%	3	33.3%	0	0.0%	9
Master LiSc	4	50.0%	3	37.5%	1	12.5%	8
PhD	0	0.0%	1	100.0%	0	0.0%	1
Researcher	0	0.0%	6	85.7%	1	14.3%	7
Total	19	54.3%	14	40.0%	2	5.7%	35

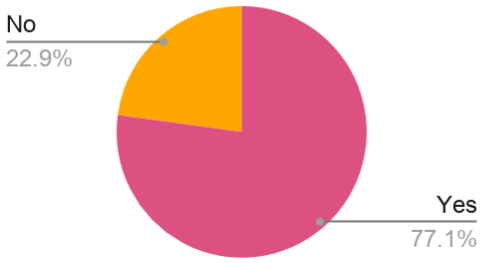
Table 2. Number of responses by Age group

AgeGroup	Nunber	%
18-25	19	54%
26-35	12	34%
36-45	3	9%
46-55	1	3%
Total	35	100%

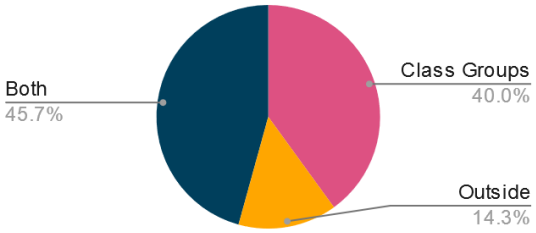
3.1. Use of Online Peer Learning at CRI.

From the responses, 77.1% of the community use peer learning in their learning process (Graph 1). 22.9% of respondents who state they don't engage in peer learning changed their minds gradually throughout the course of the survey, as they began to identify peer learning practices in their later responses. It is evident that many respondents were not familiar with the concept of Peer Learning until provided examples in the survey, causing them to presumably alter their view throughout the process of answering the questions. Students learn from other CRI community members, as well as from outsiders. Graph 2 shows that 45% of the people connected for online peer learning with peers from class groups and outside of the class groups. 40% engage in peer learning only with their classmates and only 14.3% have connection with people outside of the classroom.

Graph 1. The use of Online Peer Learning at CRI



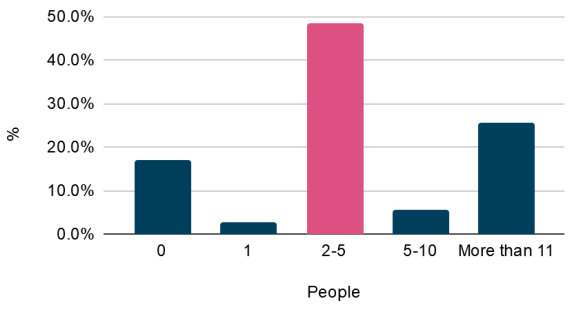
Graph 2. People doing Online Peer learning with class groups and outside of class groups



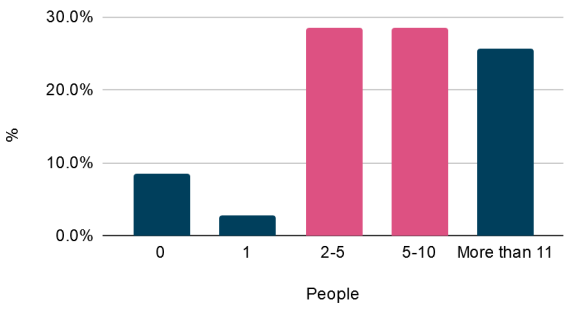
3.2. Size of the Online Peer learning Network

The size of the network for students and researchers for Online Peer Learning is larger within the CRI than outside of it. The Graph 3 shows that 48% of people are connected with 2 to 5 peers outside of the CRI community for peer learning. There are also people without any connections outside of CRI. Graph 4 shows the size of the online peer learning network Inside the CRI community, where 30% of the people are connected with 2-5 people, 30% with 5-12 people and 27% of people have a network of more than 11 individuals in their peer learning network.

Graph 3. Size of Online Peer Learning Network outside of CRI

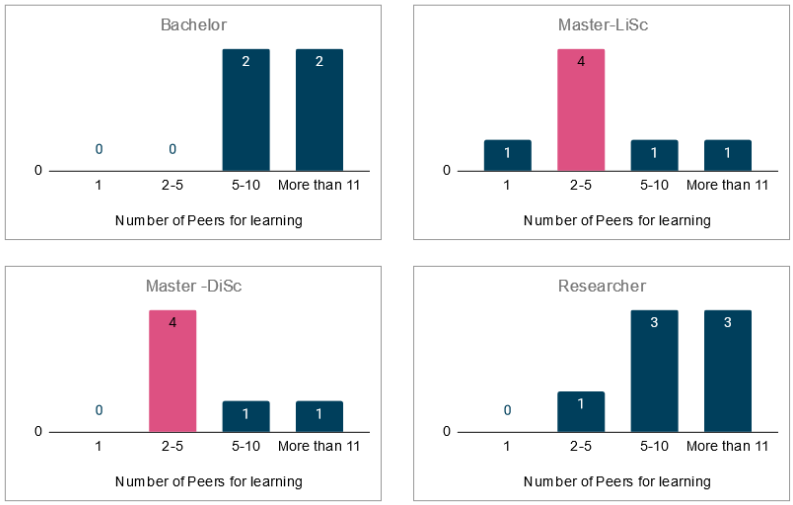


Graph 4. Size of Online Peer Learning Network Inside of CRI 2020-2021



There is a difference in the size of the network for peer learning between the study tracks. The bachelor students typically have a network of about 5-10 peers and more than 11 peers. The students from Master in LifeScience have a network of 2-5 peers. Few people have more than 11 peers in their network. Students in the Master of Learning sciences use a network of 2-5 people and 5 -20 people. Also, there are people with no connection at all. Among the students in the Master of Digital Sciences, respondents most commonly have a network of 2-5 people. The majority of researchers have a network of more than 5 peers, also there are people with more than 11 peers for learning performance, specially researchers and bachelor students (Figure 1).

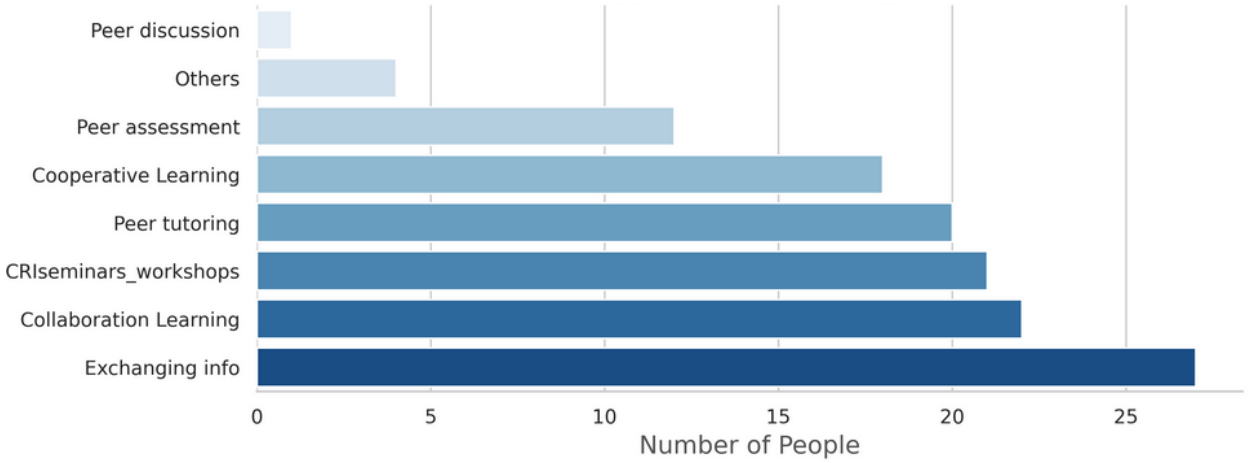
Figure 1. Size of Online Peer Learning Network by Study Track at CRI (Academic Year 2020-2021)



3.3. Types of Peer Learning.

The learning community at CRI uses a combination of different types of learning. Exchanging information is the type of peer learning most common, followed by Collaborative Learning and CRI seminars and workshops where students present their work, topics or projects (Graph 5).

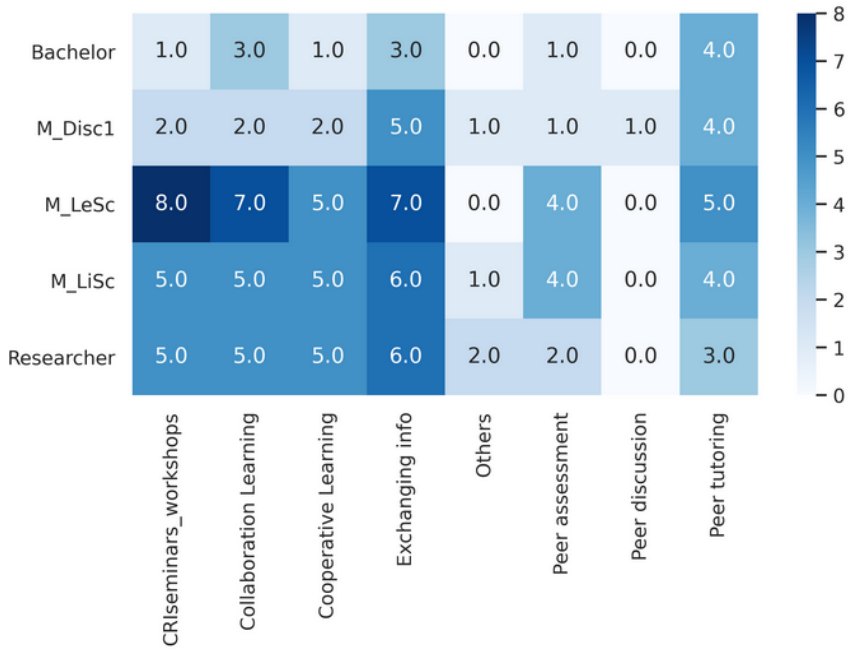
Graph 5. Type of Peer Learning most used at learning community at CRI (Academic Year 2020-2021)



The results show the type of learning used most frequently by each study track. Graph 6 shows the quantity of people using all types of Peer Learning in each educational program, confirming in one general graph that CRI seminars, Collaboration Learning, Cooperative and Exchanging information are the most used Peer Learning method among students and researchers surveyed at CRI.

Also, Graph 6 shows which study tracks use a particular type of learning. Collaboration Learning is most used by Master students in Learning Sciences, Cooperative Learning and Exchanging information is used more by Master students in Life Sciences, Learning Sciences, as well as researchers. The lack of Peer assessment by the students in Life Sciences and Learning Sciences Master track is noted, as well as the general low rate of peer learning in the Digital Sciences and Bachelor tracks. Peer discussions were mentioned by one Digital Sciences Master student. Almost all the students on the tracks are using Peer Tutoring.

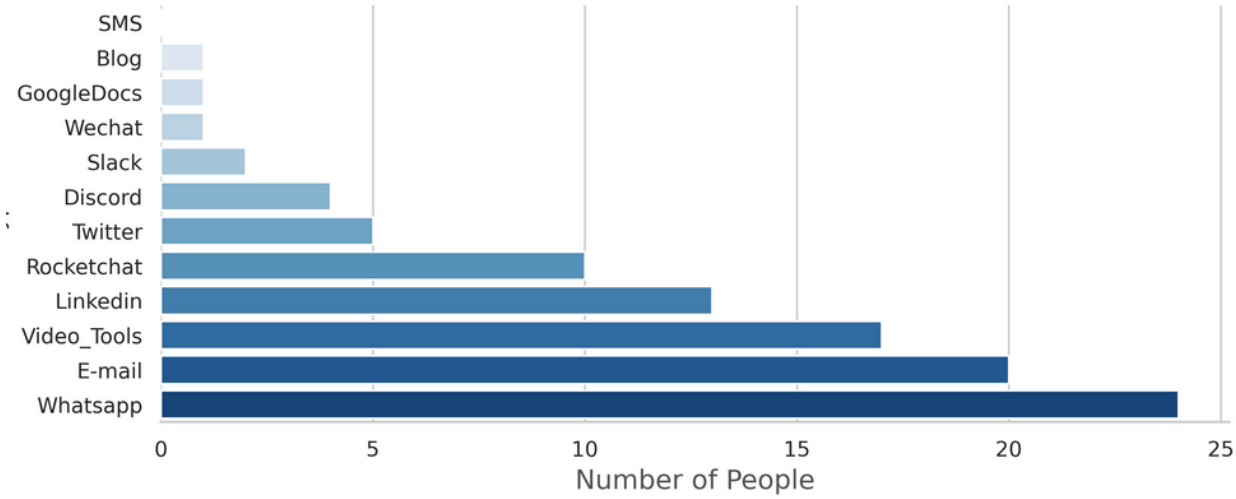
Graph 6. Number of People using types of Peer Learning by each education program at CRI (Academic Year 2020-2021)



3.4. Tools for online Peer Learning

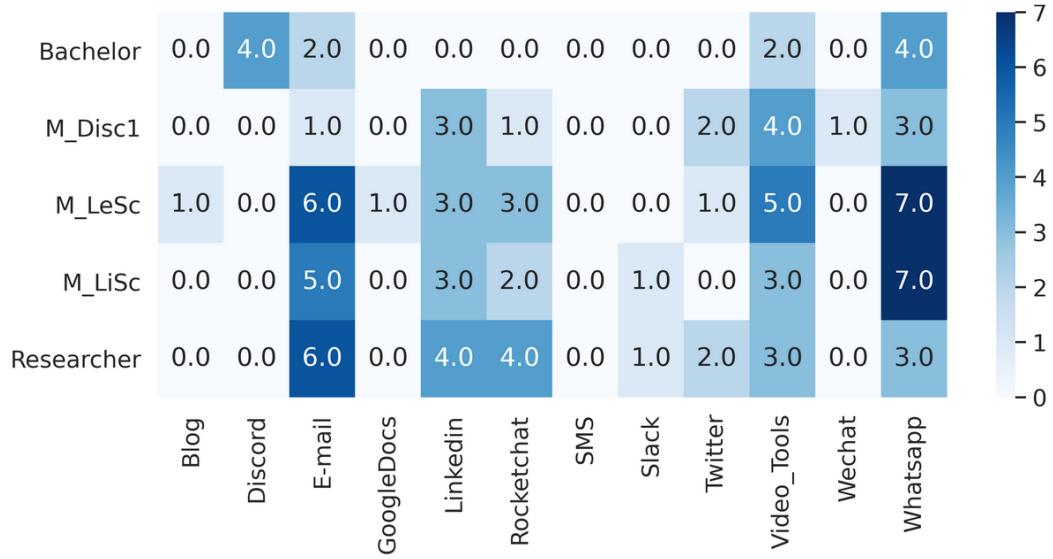
The results show which are the tools used by each educational program for online peer learning. The tool most used is WhatsApp, followed by the use of emails and video tools (Google Meet and Zoom). Even though Rocketchat is the official channel for Master students to communicate amongst themselves, it is used less than more informal tools such as WhatsApp (Graph 7)

Graph 7. The most Used Online Tools in the Learning community at CRI for Peer Learning (Academic Year 2020-2021)



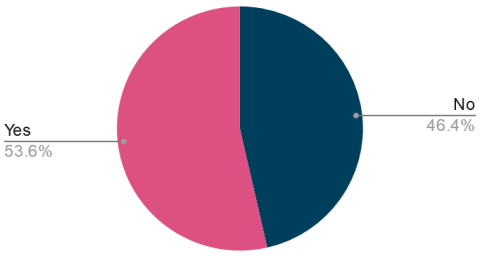
From Graph 8, about the analysis of each online tool, it is possible to highlight the following aspects: WhatsApp is used more by Master Students in Learning and Life Sciences. Email is used more frequently by researchers, Learning Sciences and Life Science Master students. Digital Sciences Master students and Bachelor students do not recognize email as a tool for peer learning. LinkedIn is used mostly by researchers, mostly due to its usefulness in the professional world. The use of Rocketchat is most frequent in Researchers at CRI. The tool Discord is used most frequently by Bachelor students. Video conferencing tools are used by all respondents, but Learning Sciences Master students use it the most frequently. Blog websites are not commonly used in this learning community, as only one person mentioned it from the Learning Sciences Master track. Twitter is a tool used mostly by Digital Sciences students and Researchers, and it is typically used to follow other researchers, professors in the scientific community. Google Docs and Blogs were mentioned by just one person in the Master of Learning Science, and Slack and SMS were mentioned as a tool used by one researcher and one PhD Student.

Graph 8. Online Tools used by educational program at CRI for Peer Learning
(Academic Year 2020-2021)



3.4.1. The use of social media. Inside of the tools used by online peer learning, were mentioned social media tools. Around 53% of the people interviewed recognized social media as a tool for peer learning (Graph 9). The reasons mentioned for that are to follow researchers, professors and scientists, connect with other researchers and scientists and update on career pathways. For those who are not using social media, the reason explained was the use of social media for other purposes and do not consider social media as a tool for Learning, also some people feel distracted when they use social media.

Graph 9. Use of Social media for Peer Learning in the Learning Community at CRI
(Academic Year 2020-2021)



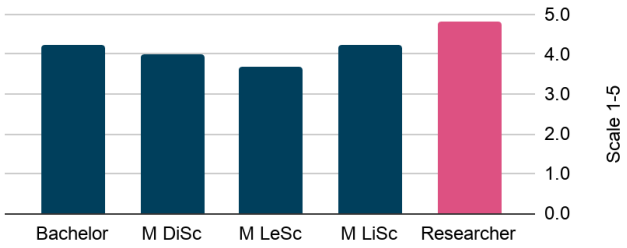
3.5. *Perceptions of use of Peer Learning*

The learning community at CRI has the perception of Peer Learning is important for their learning process, especially for Researchers. There are notable differences between Students from Masters Tracks (Table 3 and Graph 10) . The perception of the quality of online Peer Learning is higher for Researchers and Digital Sciences Master students than the others people (Graph 11).

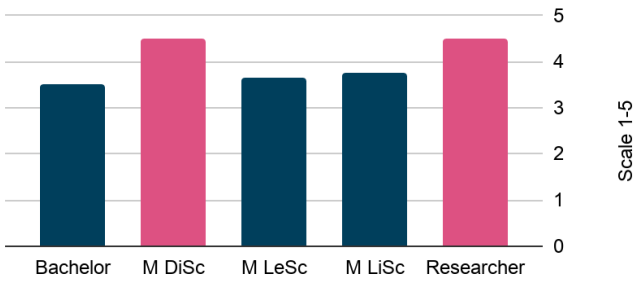
Table 3. Average of Importance and Quality perception of use of Peer Learning by CRI community (Academic Year 2020-2021)

Educational program	Importance	Quality
Bachelor	4.3	3.5
M DiSc	4.0	4.5
M LeSc	3.7	3.7
M LiSc	4.3	3.8
Researcher	4.8	4.5

Graph 10.. Perception of the Importance of Peer Learning by educational programs at CRI. (Academic Year 2020-2021)



Graph 11. Perception of the Quality of OnlinePeer Learning by educational programs at CRI. (Academic Year 2020-2021)



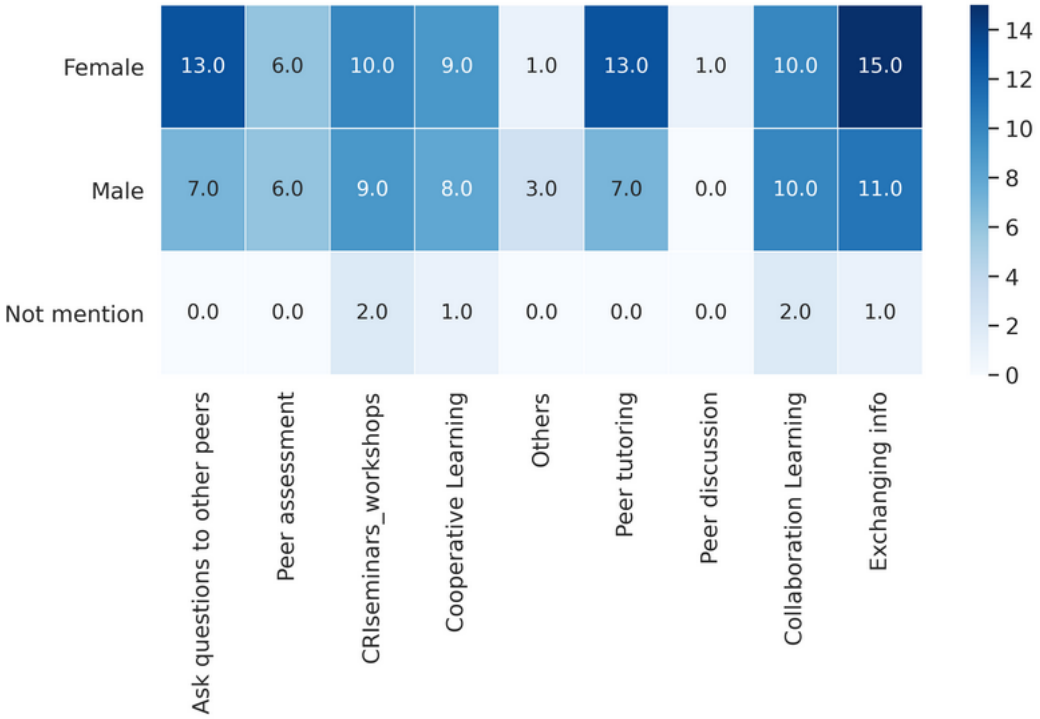
3.6. Online Peer Learning based on Gender

Females are using more video tools than men. Whatsapp is the most used tool for both genders, and there is no difference between them (Graph 12).

Graph 12. Number of females and male using Online Tools at CRI. (Academic Year 2020-2021)

Females are using more Exchanging information, Peer tutoring, Ask questions to others peers. Men are using Exchanging information, Peer tutoring, and CRI seminars workshops. Women are using asking questions to others and Peer tutoring more than men for their learning process. There is no difference for the other types of peer learning (Graph 13)

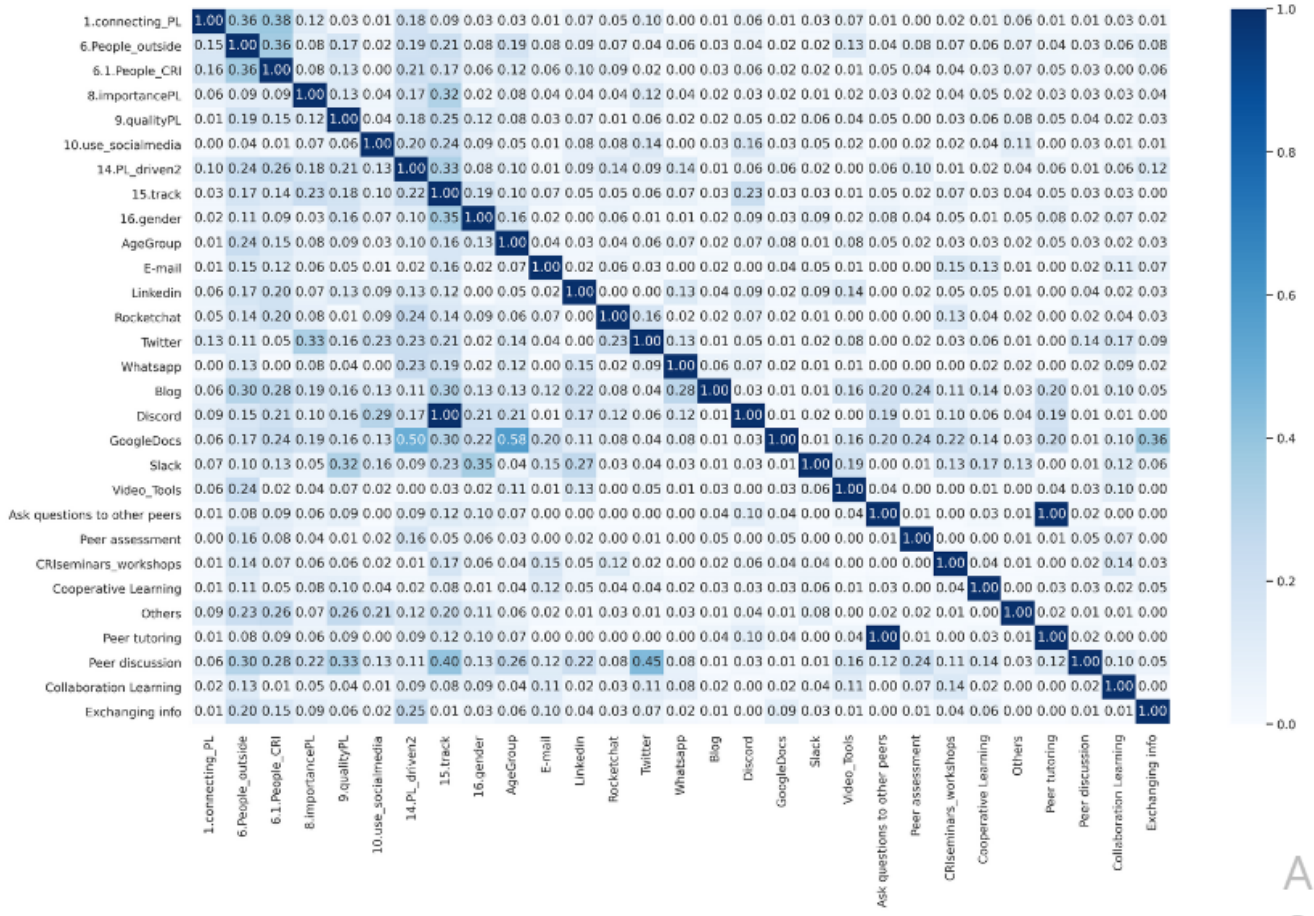
Graph 13. Number of females and male using Online Peer Learning at CRI. (Academic Year 2020-2021)



3.6. Correlation of variables (Theil's U)

There was a positive correlation between: the educational programs and the online tool Discord (1.0), the educational program with Peer Discussion (0.40). The correlation between the peer learning driven by teachers and the use of tool GoogleDocs (0.50). The correlation between Age group and the use of a tool Google Docs. And the positive correlation between people asking questions to other peers as a peer learning with peer discussions as part of their learning process. Finally, there was no correlation between the variables categorical of gender categories, the importance and quality of peer learning or the size of the network for peer learning inside or outside of the CRI community (Graph 14).

Graph 14. Online Peer Learning at CRI Community (Academic Year 2020-2021). Correlation Theil's U Heatmap



4.Conclusions

Considering shortcomings in this study, it is apparent that some participants did not have a complete understanding of peer learning before completing the survey. Explaining the concepts of peer learning by using examples throughout the survey facilitates recognising the different types of Online Peer Learning.

The CRI community used a mix of online peer learning and tools. The exchanging of information, collaborative learning, Seminars led by students and cooperative learning are the most online peer learning methods used through email, WhatsApp, video conferencing and Linkedin. However, female students are using more exchanging information and asking other peers in their learning process.

The correlation demonstrates four things, how educational programs and the peer learning drive-by teachers influence the use of an online tool for the learning process. Another finding is the correlation between asking questions with peer discussions as part of the peer learning process. Twitter was the only social media tool that has moderately correlated with peer discussions. Students' peer learning methodology is correlated more with the educational program leading the use of tools and online peer learning methodologies.

Another result is that researchers at CRI use online peer learning, and their curiosity and field of interest drive the purpose of doing so. Meanwhile, students in Bachelor and Master programmes tend to have peer learning connections that are usually encouraged by their instructors and course work. There is no correlation between the importance and quality of peer learning with peer learning types. The perception of Peer Learning's importance and quality is higher in researchers than Master students; they expressed reasons about their scientific careers and the development of their projects.

The institution (CRI) holds an essential role in establishing the foundation for a learning and scientific community that allows its members to thrive. To fill in the educational and research gaps caused by the COVID-19 pandemic, it must look into peer learning methods as a possible remedy to decreased linear, in-person instruction. Therefore, CRI should encourage more meaningful and self-driven peer learning strategies within its community while providing resources about useful online learning collaboration tools and give students free access to these tools. Educating students about the usefulness of online peer learning tools would only produce beneficial results for their community members in developing their scientific and professional careers while at CRI and beyond.

To increase the use of online peer learning could be built upon by streamlining applications and online workshops for CRI people to use these applications to their fullest potential. Therefore, the type of online peer learning use depends on the tools.

5. Speculations

Peer Learning's unawareness could also show the lack of identification of being part of a learning group when students are taking online educational programs. At least several respondents do not see their learning process as a collective effort that can be aided and strengthened by communicating with others.

Online peer-learning approaches within the CRI community are bound to an individual's preferences, learning styles, such as learning on an individual scale versus within a group context and the use of tools.

6. Future work

The results could be amplified to more students in all the educational programs of CRI and focus on building strategies for people to become more involved in online learning. Moreover, it would be interesting to learn more about how online peer learning approaches are adopted within other academic institutions and communities and how much support is given to connect with other communities for learning purposes?

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Annexes

Annexe 1. Access to the Database

https://github.com/merlynjocol/Online_Peer_Learning_Analysis/blob/main/responses_PL2.csv

Annexe 2. Closed Questions and the categories

Variable in analysis	Questions	Information get it	Category
1.PL_connecting	1. Do you connect with people online to increase your knowledge and skills in your field(s) of study? (Not including official online classes)	People connected with others for Peer learning	Yes No
3. PL_driven	3. Are those people you are online connected different from your class groups made by teachers ?	Using Peer learning different from class group	Yes No Both
4.online_tools	3. Are those people you are online connected different from your class groups made by teachers ?	Peers are outside or inside of CRI	Yes No Both
4.1.others_tools	4. What are the online tools you use to connect with your community to improve your learning and career ?	Online tools use for Peer Learning	Twitter Whatsapp Linkedin Rocketchat Remo Video meeting E-mail Others tool

5.why_use_PL	5. Why do you connect with others online in your learning process ? ● Forming a group/club to study about something together = Cooperative Learning ● Working together in study groups = Peer collaboration ● Ask questions to other peers, unofficial tutoring class with peers = Peer tutoring ● Exchanging information ● CRI activities (projects, workshops, seminars ● Asking or giving assessment for others students work	Peer Learning used by Students	Cooperative Learning Peer collaboration Peer tutoring Exchanging information CRI seminars Peer assessment Others
6.People_outside	6. How many people OUTSIDE of CRI are you connected to online for your personal learning process?	Ratio of peers for Peer learning Outside of CRI community	0 1 2-5 5-10 More than 11
6.1.People_CRI	6.1 How many peers AT CRI are you connected to online for your personal learning process ?	Ratio of peers for Peer learning Inside of CRI community	0 1 2-5 5-10 More than 11
8.importancePL	8. On a scale of 1- 5, how important is the interaction with others in your learning process ?	Importance Perception of Peer Learning	1 2 3 4 5
9.qualityPL	9. On a scale of 1- 5, how do you rate the quality of the peer online interactions for your learning improvement ?	Quality perception of Peer Learning	1 2 3 4 5
10.use_socialmedia	10. Do you use social media tools such as twitter, linkedin, facebook , to gain knowledge or skills in your field(s) of study?	Use of Social Media for Peer Learning	Yes No
14.PL_driven2'	14. Is your online interaction with peers for learning self driven or teacher directed ?	Peer e-learning is self motivated or boosth by teachers	Self-driven Teacher Both

15.track '	15. Which program are you participating in at CRI ?	CRI Programs participating in the research	Bachelor - M LeSc M LiSc M DiSc PhD Researcher
16.gender	16. What gender do you identify yourself ?	Gender Participation	Female Male Prefer not to say
17.age	17. What is your age? (number only)	Age participation	Graph frequency

Annexe 3. Open Questions

Variable in analysis	**Questions**	**Information get it**
2.Why?'	2. Why? Please, tell us more about it	Reasons to connect for PL
4.1.others_tools	4.1. Please, if you check Other tools in the last question, could you name which are the other tools you use?	Other tools mentioned for peer learning
5.1.Others_reason	5.1.Others_reason of Peer learning	Others Peer learning process use by students
11.why_use_socialmedia	11. We love to hear why you are using them and why not?	Use/ non-use of the online tools
12.difficulties_PL	12. What would you consider to be the difficulties in connecting with others in an online setting for advancing your learning and career ?	Difficulties for peer e-learning
13.willdo_PL'	13. What do you think could be done to improve the connection between students for online learning ?	Recommendations for improve the peer e-learning
18.info_add'		?¿

Annexe 4. Variables Nominals used in the correlation analysis in Python

Variabel Nominal	Number of Values	Categories
1.connecting_PL	2 distinct values	['No' 'Yes']
6.People_outside	5 distinct values	['0' '1' '2-5' '5-10' 'More than 11']
6.1.People_CRI	5 distinct values	['0' '1' '2-5' '5-10' 'More than 11']
8.importancePL	4 distinct values	[2 3 4 5]
9.qualityPL	4 distinct values	[2 3 4 5]
10.use_socialmedia	2 distinct values	['No' 'Yes']
14.PL_driven2	4 distinct values	['Both' 'Peer learning driven by teachers' 'Self-driven' 'Teachers']
15.track	6 distinct values	['Bachelor' 'M_Disc1' 'M_LeSc' 'M_LiSc' 'PhD' 'Researcher']
16.gender	3 distinct values	['Female' 'Male' 'Prefer not to say']
E-mail	2 distinct values	[0 1]
Linkedin	2 distinct values	[0 1]
Rocketchat	2 distinct values	[0 1]
Twitter	2 distinct values	[0 1]
Whatsapp	2 distinct values	[0 1]
OtherTool	2 distinct values	[0 1]
Blog	2 distinct values	[0 1]
Discord	2 distinct values	[0 1]
GoogleDocs:	2 distinct values	[0 1]
SMS	2 distinct values	[0 1]
Slack	2 distinct values	[0 1]
Video_Tools	2 distinct values	[0 1]
Ask questions to other peers	2 distinct values	[0 1]
Peer assessment:	2 distinct values	[0 1]
CRIseminars_workshops	2 distinct values	[0 1]
Cooperative Learning	2 distinct values	[0 1]
Others	2 distinct values	[0 1]
Peer tutoring	2 distinct values	[0 1]
Collaboration Learning	2 distinct values	[0 1]
Exchanging info	2 distinct values	[0 1]