

DIFFERENCES IN PERSPECTIVES OF INTERDISCIPLINARITY BETWEEN THE STUDENTS AND THE TEACHERS AT THE CRI

Abstract

This paper aims to explore the contrast in the perspectives of interdisciplinarity between students and teachers at the Center for Research in Interdisciplinarity in Paris. Interdisciplinarity has been extensively studied in relation to its contributions to learning and the diversity of curriculum in any field. It is also considered to be a focal point of all three of CRI's AIRE master tracks. Our results highlight the difference between the perception of interdisciplinarity between both teachers and students in their master's curriculums. While both groups equally viewed it as vital to their field, teachers were more likely to consider the curriculum as interdisciplinary and were generally more satisfied with the degree of interdisciplinarity than their students.

Introduction

CRI (Center for Research in Interdisciplinarity)¹ is an institution built on interdisciplinarity and interdisciplinary research (*see Core Concepts on page 8 [here](#)*). The interdisciplinary approach in research has been defined by Executive Director of the Association for Integrated Studies William H. Newell and William Green (1982) as “inquiries which critically draw upon two or more disciplines and which lead to an integration of disciplinary insights” (Haynes, 2002, 17).

Klein (2010) explained interdisciplinarity in a taxonomy that classified the subject into three terms, according to the OECD typology, which are multidisciplinary, interdisciplinary, and transdisciplinary. Multidisciplinary is an approach that juxtaposes disciplines in an academic setting where the learners are taught more than one discipline in parallel to the other. They remain separate, retain their original identity, and their existing structure of knowledge is not questioned. Interdisciplinary happens when there's an integration and interaction between disciplines that become proactive and the lines between the multidisciplinary is crossed. It can also be defined as a more holistic understanding of a cross cutting question or problem. Whereas, transdisciplinary was defined as a common system of axioms that transcends the narrow scope of disciplinary worldview through an overarching synthesis. Finally, cross-disciplinarity according to Jones (2010) is achieved when one discipline is crossed with the subject matter of another. Interdisciplinary techniques go beyond the aforementioned techniques by allowing students to see different perspectives, work in groups, and make the synthesizing of disciplines the ultimate goal.

Beside the formal definition above, the difference between interdisciplinarity and multidisciplinary are stark enough to be studied in terms of their definition and their application at CRI. As opposed to the unique mission of the CRI, not many institutions have attempted to offer an interdisciplinary approach in all of their tracks courses in their master's programs. The mission of interdisciplinarity, while being an important cornerstone of research, may be viewed and experienced differently by everyone involved in the CRI.

Even though interdisciplinarity is a cornerstone of the CRI, depending on their background, students and researchers may have different perceptions of interdisciplinarity. The understanding of interdisciplinarity varies depending on the topics covered and research background of the individual. If there is a wide gap in perception between students and teaching staff, because what a teacher

¹ As per December 16th, 2021 CRI has changed its name to Learning Planet Institute.

might think is explicit in their curriculum design is not clear to students, then, the data we collected might be useful to improve the situation.

In this paper we will discuss the results of our study about the perception of interdisciplinarity at the CRI which involve the students and the teaching staff. We will look at how the two parties see the importance of interdisciplinarity, its implementation in the course, and their level of satisfaction. We would also like to understand the differences of perception between the academic staff and the students and understand what falls under interdisciplinarity and multidisciplinary.

Methods

To achieve our goal of knowing the perception of AIRE Master students and teaching staff upon interdisciplinarity at the CRI, we gathered quantitative and qualitative data from the actors mentioned above as well as an analysis of previous projects carried out in CRI. We utilized the survey model to collect the data from the two groups targeted; one for the students and one is for the teachers, in November 2021. The surveys contained 14 questions each and were made using Google Forms. We designed the questions to be balanced for both the teachers and the students in order to get the information needed and for them to be accurately compared and analyzed.

The two surveys were sent through whatsapp groups and emails to both students and teachers at CRI. The life science, learning science, and digital science tracks were targeted equally in order to get an accurate sample of the population targeted. After a series of questions pertaining to the respondent's age, gender and track, the student or teacher had the choice to complete an open-ended question asking to describe what interdisciplinarity means to them. Furthermore, the survey asked questions on the respondent's view of the importance of interdisciplinarity in their field, to society as a whole and for their curriculum at the AIRE master they are currently involved in. The questions were in likert-scale format ranging from 1 to 10, with a final optional open-ended question asking the respondents to suggest any improvement on the current status of interdisciplinary activities at the CRI.

The completed Google forms were then analyzed and compared in order to study both students and teachers' perception of interdisciplinarity at CRI. The data from the 3 most notable questions in the surveys was presented in Histograms, and a KDE curve was added to accurately represent the distribution in our results.

Results

You can find the raw data and code [here](#).

We had a total of 31 answers from students from 2 levels of study (M1 and M2) and from 3 tracks (Digital Sciences, Learning Sciences, Life Sciences), and 15 answers from teachers teaching students from those levels and tracks. You can see on the pie chart below the repartition of answers based on students' tracks (figure 1) and the repartition of answers based on teachers' tracks (figure 2). We can see that a majority of students answers come from M1 digital sciences student, followed by M1 learning sciences students and M1 life sciences students. M2 students of each track compose around 30% of answers in total, compared to 70% for M1 students

For the teachers, we observe another pattern. A majority of answers come from teachers teaching at M1 life sciences students, followed closely by teachers teaching at M1 digital sciences students, followed equally by teachers from M2 life sciences and M2 digital sciences. Each teacher can teach at multiple tracks (either digital, life, or learning track) and level of study (either M1 or M2). If a teacher teaches at multiple tracks and levels, it will appear once per category.

Repartition of students answers based on their tracks

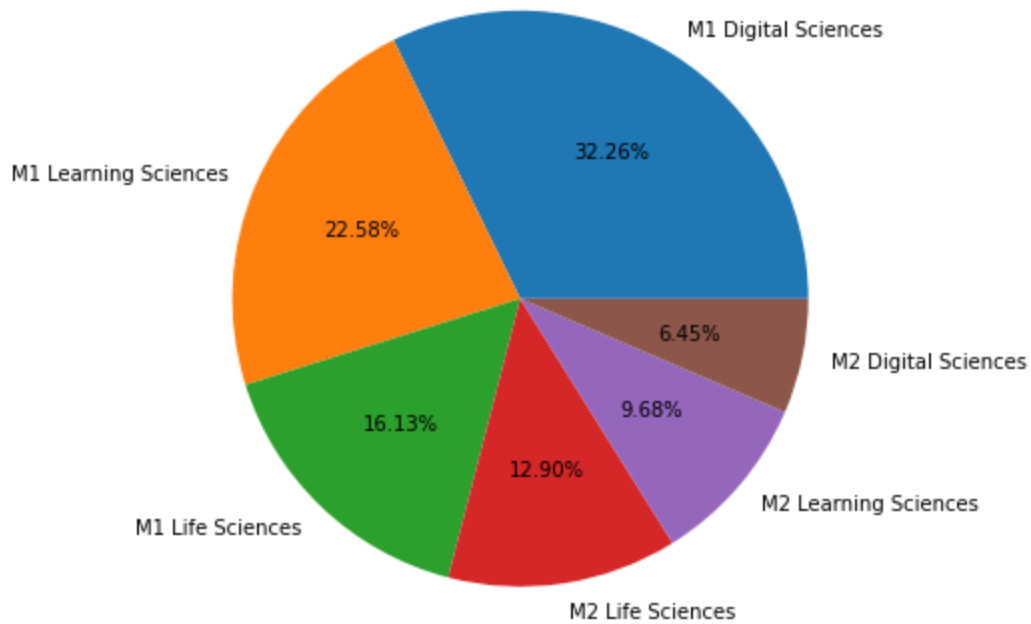


Figure 1: Pie chart showing the repartition of answers based on students' tracks.

Repartition of teachers answers based on each track they teach in

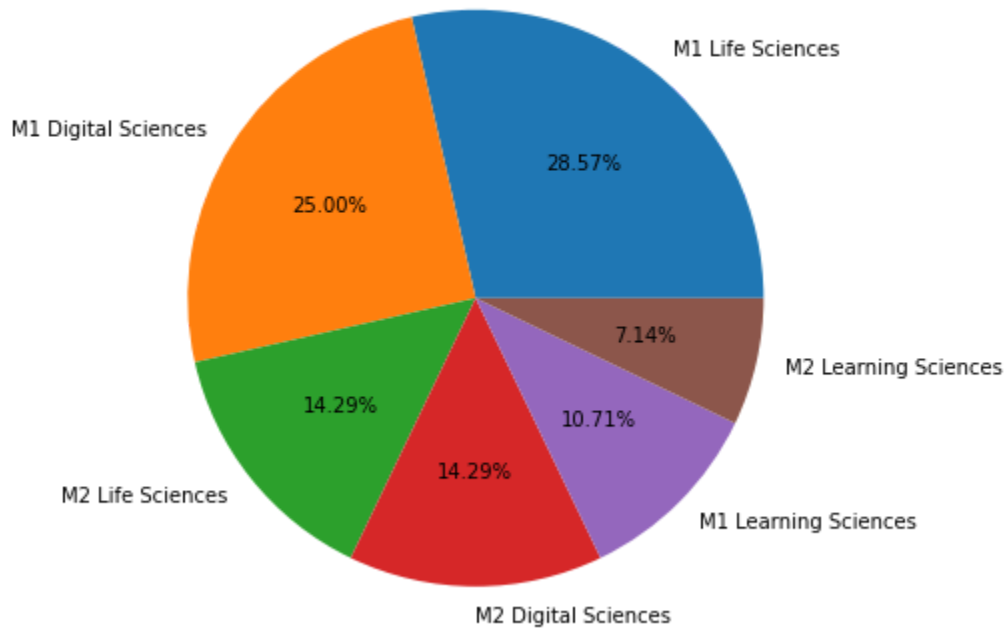


Figure 2: Pie chart showing the repartition of answers based on teachers' tracks. Each teacher can teach at multiple tracks (either digital, life, or learning track) and level of study (either M1 or M2). If a teacher teaches at multiple tracks and levels, it will appear once per category.

We can observe on figure 3 the perception of the importance of interdisciplinarity for students and teachers of the CRI in their relative fields of study (referring to the 3 tracks described above). The KDE curve of students is on average higher than the ones of teachers, meaning that teacher perception of the importance of interdisciplinarity in their fields of study is on average lower than that of students. More precisely, between scale 6 and 7 out of 10, 0 being not important, and 10 being highly important, the KDE of teachers is higher than the one of students. Above scale 7 out of 10, the KDE of teachers is lower than the one of students.

It is important to note that the teachers dataset and the students dataset are not equal or proportionate. We have an approximation of 2 times more answers from students.

Figure 4 shows the perception of the degree of interdisciplinarity of the courses delivered during the AIRE Master for students and teacher in their relative tracks. The KDE curve and distribution of teachers answers is right skewed, with a majority of answers above 6 on the scale of 0 to 10. The distribution and KDE curve of students answers is more symmetrical and slightly bimodal reaching the max points of the distribution at 5 and 7. The KDE curve of teachers exceeds the one of students at 5 of the 0 to 10 scale. Teachers have a higher perception of the degree of interdisciplinarity of the courses delivered during the AIRE Master for students and teacher in their relative tracks than students do.

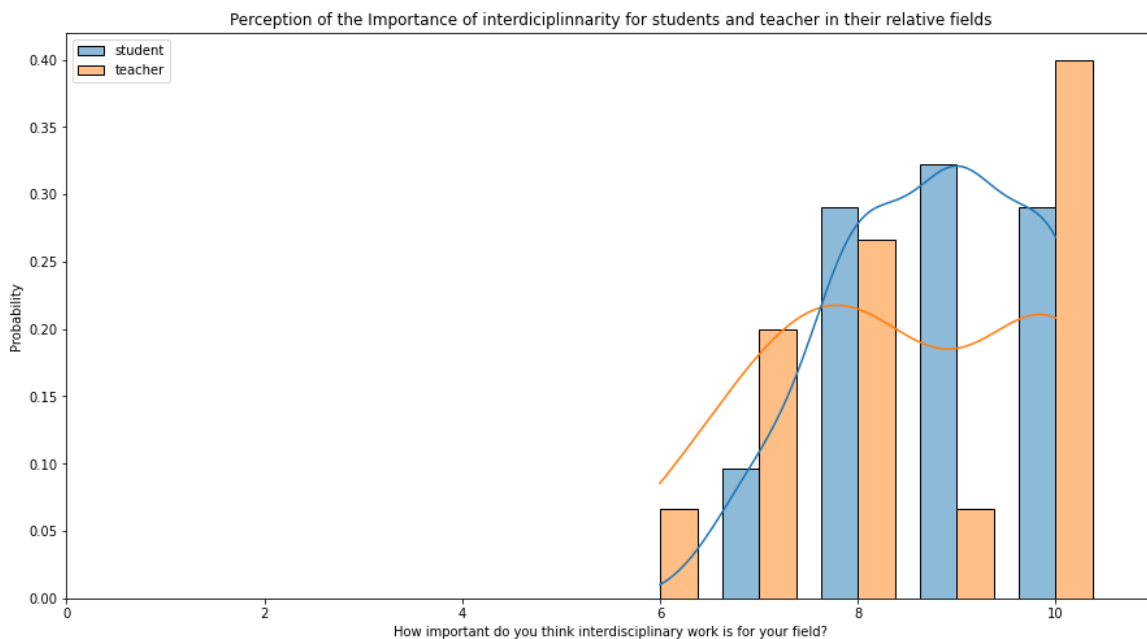


Figure 3: Histogram showing the perception of the importance of interdisciplinarity for students and teachers of the CRI in their relative fields of study (referring to the 3 tracks described above).

Students are represented in blue, and teachers in orange. The perception was given as a scale from 0 to 10, 0 being not important, and 10 being highly important. The frequency of each answers was calculated to obtain a probability. A KDE curve was plotted for the teachers and students, representing the data using a continuous probability density curve in one dimension. Relative to our histogram, KDE is producing a plot that is less cluttered and more interpretable.

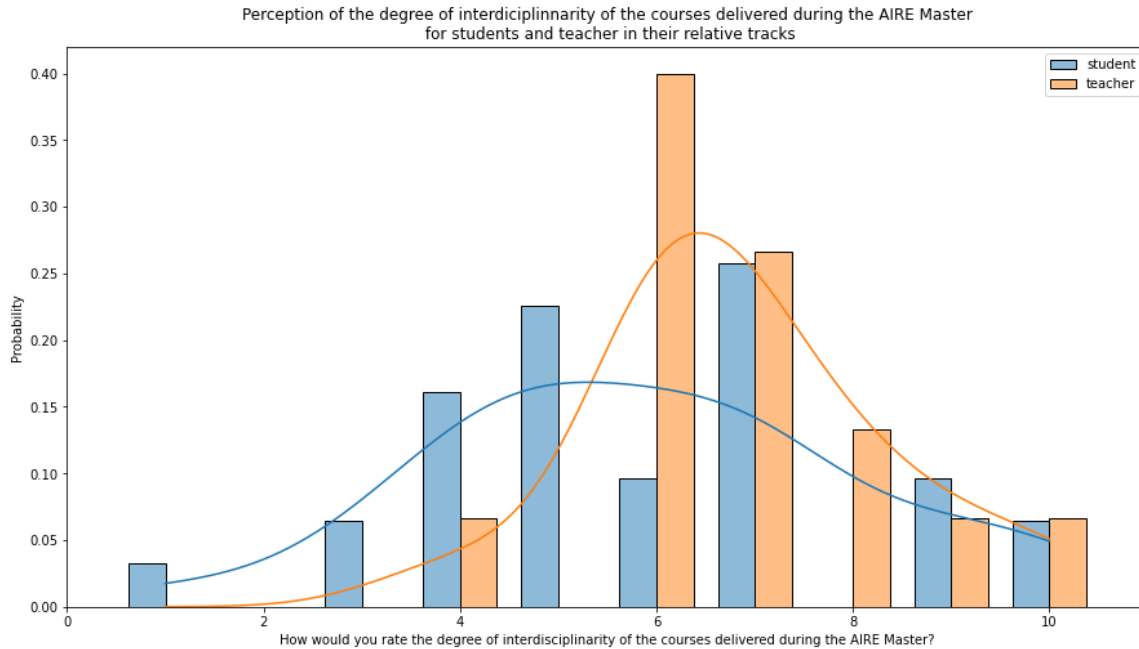


Figure 4: Histogram showing the perception of the degree of interdisciplinarity of the courses delivered during the AIRE Master for students and teacher in their relative tracks. Students are represented in blue, and teachers in orange. The perception was given as a scale from 0 to 10, 0 being not important, and 10 being highly important. The frequency of each answer was calculated to obtain a probability. A KDE curve was plotted for the teachers and students, representing the data using a continuous probability density curve in one dimension. Relative to our histogram, KDE is producing a plot that is less cluttered and more interpretable.

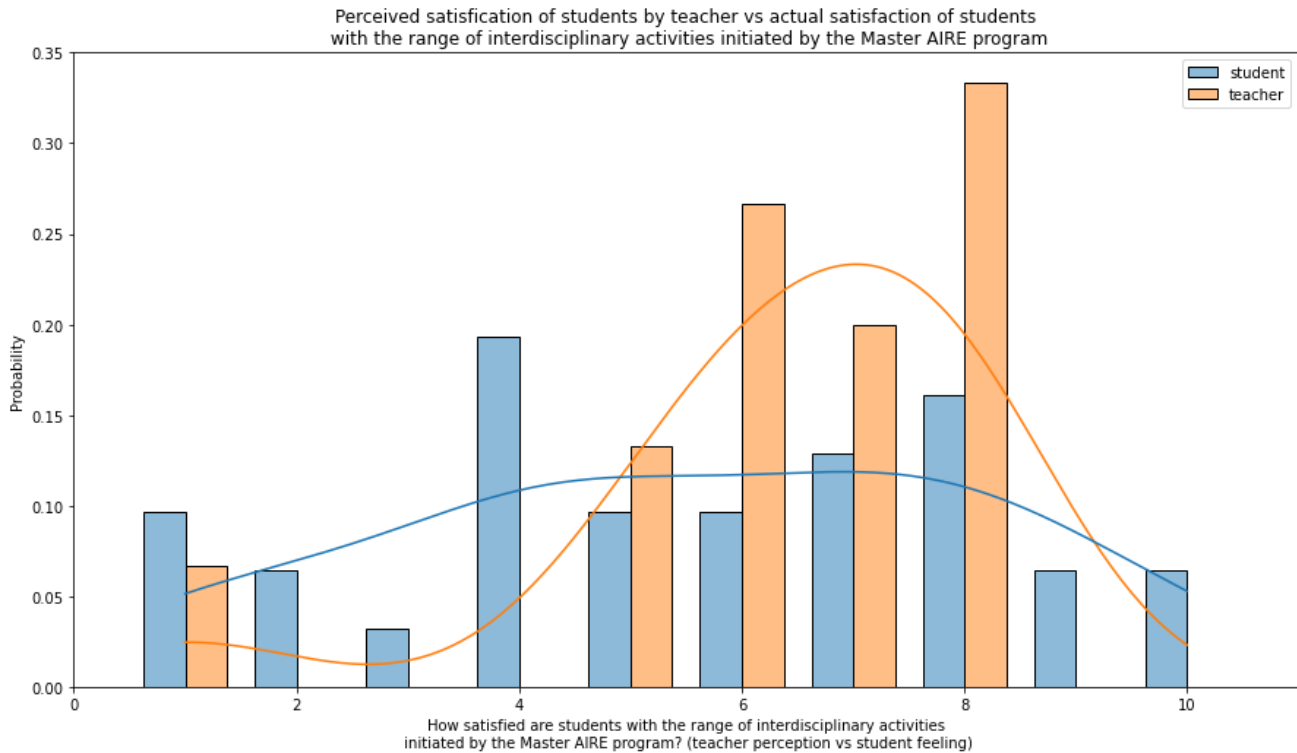


Figure 5: Histogram showing the perceived satisfaction of students by teacher versus the actual satisfaction of students with the range of interdisciplinary activities initiated by the Master AIRE program. Students are represented in blue, and teachers in orange. The perception was given as a scale from 0 to 10, 0 being not important, and 10 being highly important. The frequency of each answers was calculated to obtain a probability. A KDE curve was plotted for the teachers and students, representing the data using a continuous probability density curve in one dimension. Relative to our histogram, KDE is producing a plot that is less cluttered and more interpretable.

Figure 5 shows the perceived satisfaction of students by teacher versus the actual satisfaction of students with the range of interdisciplinary activities initiated by the Master AIRE program. The question comes to complete the one of figure 4. The KDE curve and distribution of students' satisfaction with the range of interdisciplinary activities initiated by the Master AIRE program is approximately uniformly distributed, with the maximum probability of satisfaction is at scale 4 on a range of 0 to 10. So students are not really satisfied with the range of interdisciplinary activities proposed at the AIRE program. The teacher KDE curve and distribution is left skewed with the maximum probability of satisfaction at scale 8 on a range of 0 to 10. So teachers have a really high perception of the satisfaction of students with the range of interdisciplinary activities initiated by the Master.

Discussion

The sample size of the student versus teacher respondents was different enough (31 vs 14) that the absolute number of responses from the two groups cannot be directly compared. To address this issue, we normalised the data to the respective sample sizes, represented in figures 3-5 as probabilities of a respondent of a particular group having a given response.

As seen in Figure 3, teachers and students both think that interdisciplinarity is important in their field: every response was greater than or equal to 6 (on our survey, 5.5 would be the “neutral” response, and any number above that indicates a degree of “is important”). Teachers were more likely than students to consider interdisciplinarity a “10 - Very Important,” as half of the teachers responded with that value, with an overall average response of 8.5. Students also assigned a very high value to the importance of interdisciplinarity, with the majority of student answers lying from 8 to 10, with an average of 8.81.

When asked about the perception of interdisciplinarity of the courses in their respective tracks (Figure 4), students and teachers gave a wide range of answers, spreading the full spectrum of 1 (“not interdisciplinary at all”) to 10 (“very interdisciplinary”) for students and 4 to 10 for teachers. Both groups seem to mostly be in agreement that the courses are not hitting the “10-very interdisciplinary” part of the spectrum, but are more interdisciplinary (>5.5) than not, as on average, students answered 5.9 to that question while teachers assigned a slightly greater value to it with an average at 6.85. There is a greater spread in the answers from the students than in the answers from the teachers, which could be partially attributed to disparities between tracks: while the average for the Learning Science respondents is close to the overall student average, there is a larger gap between the Life Science average response of 7.2 and the Digital Science average response of 4.9 (see supplementary figure 1).

There are also differences between self-reported student satisfaction with interdisciplinarity at the CRI and the teacher perception of student satisfaction with interdisciplinarity at the CRI (Figure 5). There is a wide spread of student satisfaction, again ranging from 1 (“not satisfied at all”) to 10 (“very satisfied”), with an average response of 5.6, which is very close to the 5.5 that represents the center of possible answers. On the other hand, teacher answers were concentrated on the right side of the graph, with 80% of answers above 5.5, and with average of 6.4. This data suggests that teachers overestimate how satisfied students are with the range of interdisciplinary activities at the CRI.

Another interesting point is that the collected data show that the teachers think of the content of their class to be more interdisciplinary than the average of classes in their respective tracks (supplementary figure 2).

Research Limitations

It is important to note that given the relative sample size of respondents (with 14 teachers and 31 students), our results are potentially not statistically significant. Additionally, the low number of answers from the teachers made it hard to break down results in terms of specific tracks (which we were able to do for students, see supplementary figure 1).

Furthermore, we should consider the possibility for a self-selection bias in the data given that people who responded to the survey could be predisposed to have a certain set of common beliefs that are different from the overall population of CRI's teachers and students.

To improve the robustness of our study, we would need to find methods to increase the response rate to the survey while also integrating a strategy to ensure that the collected answers are representative of the overall population. It would also be important to have more identical questions between the students and teacher surveys in order to more directly compare views, as it seems that this gap between the understanding of interdisciplinarity from the student and the teacher sides is one of the key learnings from our study.

Future Research

Our results do show that disparities exist between the perception of the teachers and the students, which invites further exploratory work on these questions.

Given the recent name change from “Center for Interdisciplinarity Research” to “Learning Planet Institute”, which removes the term “interdisciplinary” from the school’s name, future work could focus on studying the impact of such name change onto the view of CRI’s staffs, students and teacher of interdisciplinary practices. In other words, would the results of our study hold constant across future cohorts of teachers and students, given the change of name ? Furthermore, given that all parties agree on the importance of interdisciplinarity, it would be beneficial for the Learning and Teaching community to have comparative studies on the kind of structure that could be put in place to promote interdisciplinarity. How could we change pedagogical approaches at the CRI to promote interaction across tracks and fields?

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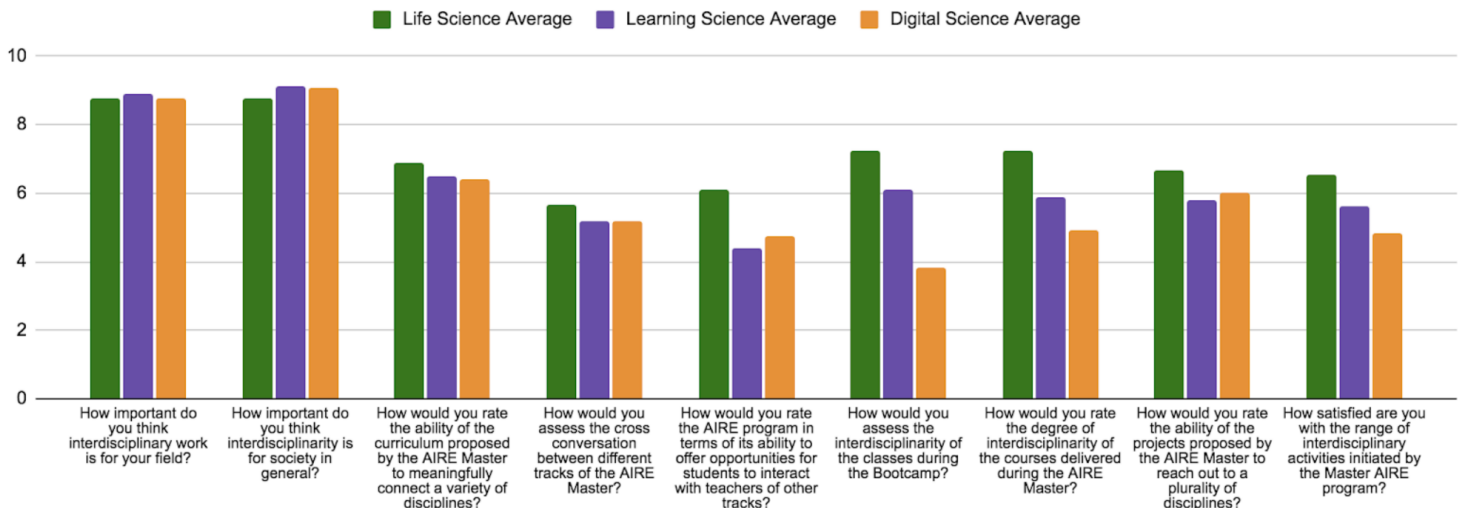
Annex 1. Survey questions

Student Survey	Teacher survey
<ol style="list-style-type: none"> 1. What's your track? 2. How old are you? 3. Gender 4. Please describe what the term interdisciplinarity means to you? (open question) <p><i>The role of interdisciplinarity on a broad scale</i></p> <ol style="list-style-type: none"> 5. How important do you think interdisciplinary work is for your field? (1-10) 6. How important, if at all, do you think interdisciplinarity is for society in general? (1-10) <p><i>The reflection of the role of interdisciplinarity at the CRI</i></p> <ol style="list-style-type: none"> 7. How would you rate the ability of the curriculum proposed on paper by the AIRE Master to meaningfully connect a variety of disciplines? (1-10) 8. How would you assess the cross conversation between different tracks of the AIRE Master? (1-10) 9. How would you rate the AIRE program in terms of its ability to offer opportunities for students to interact with teachers of other tracks? 10. How would you assess the interdisciplinarity of the classes during the Bootcamp? (1-10) 11. How would you rate the degree of interdisciplinarity of the courses delivered during the AIRE Master? 12. How would you rate the ability of the projects proposed by the AIRE Master to reach out to a plurality of disciplines? 13. How satisfied are you with the range of interdisciplinary activities initiated by the Master AIRE program 14. Please provide any suggestions on how the current status of interdisciplinary activities at the CRI can be improved (open, not required) 	<ol style="list-style-type: none"> 1. Which track do you work with? 2. Gender 3. Please describe what the term interdisciplinarity means to you (open question) <p><i>The role of interdisciplinarity on a broad scale</i></p> <ol style="list-style-type: none"> 4. How important do you think interdisciplinary work is for your field? (1-10) 5. How important, if at all, do you think interdisciplinarity is for society in general? (1-10) <p><i>The reflection of the role of interdisciplinarity at the CRI</i></p> <ol style="list-style-type: none"> 6. How would you rate the ability of the curriculum proposed on paper by the AIRE Master (all three tracks) to meaningfully connect a variety of disciplines? (1-10) 7. How would you assess the cross conversation between different tracks of the AIRE Master? (1-10) 8. How would you rate the AIRE program in terms of its ability to offer opportunities for students to interact with teachers of other tracks? 9. How would you assess the interdisciplinarity in the learning objectives of the classes during the Bootcamp (if you don't teach during the Bootcamp period, please answer based on what you've heard from colleagues or based on your perception of student experience)? (1-10) 10. How would you assess the interdisciplinarity in the learning objectives of the semester-long classes with the track that you teach (the whole track, not your course specifically)? (1-10) 11. How interdisciplinary do you think your course is? That is, how well do you think

	<p>the design of your course allows your students to make meaningful and effective connections to other disciplines? (1-10)</p> <p>12. According to your interaction with your students, how satisfied do you think they are with the range of interdisciplinary activities at the CRI? (1-10)</p> <p>13. Rank the following questions (1 being the one you agree the most with and 10 being the one you disagree the most with):</p> <ul style="list-style-type: none"> a. Interdisciplinary research usually has less scientific depth. b. Interdisciplinary research does not require everyone to converge on definitions based on one specific discipline c. Any complex problem facing society today requires interdisciplinary research. d. Interdisciplinary research needs the contribution of non-academics. e. Peers in my core discipline(s) often consider interdisciplinary research less rigorous f. Interdisciplinary research often provides better job opportunities g. Additional training is required to undertake interdisciplinary research h. Interdisciplinary research provides more learning opportunities through the interaction with experts in other disciplines <p>14. Please provide any suggestions on how the current status of interdisciplinary activities at the CRI can be improved (open, not required)</p>
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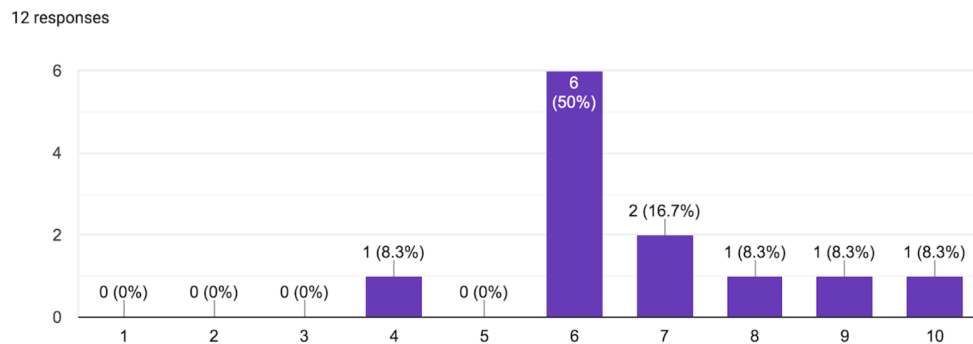
Annex 2. Supplementary Figures

	How important do you think interdisciplinary work is for your field?	How important do you think interdisciplinary is for society in general?	How would you rate the ability of the curriculum proposed by the AIRE Master to meaningfully connect a variety of disciplines?	How would you assess the cross conversation between different tracks of the AIRE Master?	How would you rate the AIRE program in terms of its ability to offer opportunities for students to interact with teachers of other tracks?	How would you assess the interdisciplinarity of the classes during the Bootcamp?	How would you rate the degree of interdisciplinarity of the courses delivered during the AIRE Master?	How would you rate the ability of the projects proposed by the AIRE Master to reach out to a plurality of disciplines?	How satisfied are you with the range of interdisciplinary activities initiated by the Master AIRE program?
Life Science Average	8.77777778	8.77777778	6.88888889	5.66666667	6.11111111	7.22222222	7.22222222	6.66666667	6.55555556
Learning Science Average	8.9	9.1	6.5	5.2	4.4	6.1	5.9	5.8	5.6
Digital Science Average	8.75	9.08333333	6.41666667	5.16666667	4.75	3.83333333	4.91666667	6	4.83333333

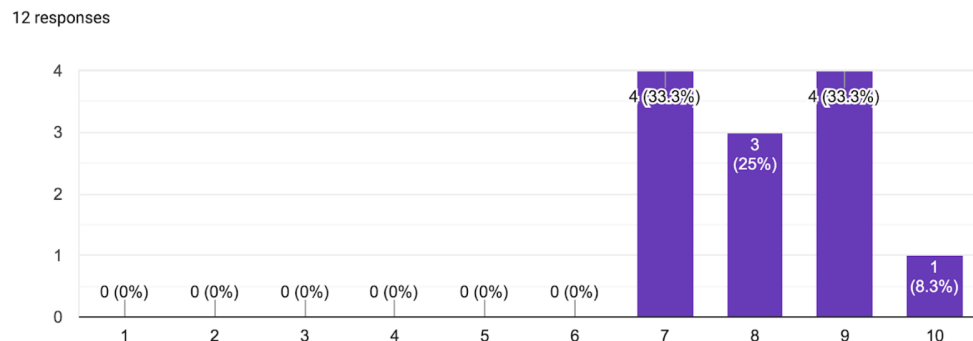


Supplementary figure 1: Average student responses to the different survey questions broken down by track

How would you assess the interdisciplinarity in the learning objectives of the semester-long classes within the track that you teach (**the whole track, not your course specifically**)?



How **interdisciplinary** do you think **your course** is? That is, how well do you think the design of **your course** allows your students to make meaningful and effective connections to other disciplines?



Supplementary figure 2: Teacher perception of interdisciplinarity of other courses vs their own