Final Report – T.I.M.E. Project

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This report summarizes our work for the T.I.M.E. (Top International Managers in Engineering) association. It aims to synthesize in a single document the steps we followed and the results obtained and to facilitate the transfer of information to another group that might continue our work.

We thank Gwenaëlle GUILLERME, Secretary General of the T.I.M.E. association, for giving us the opportunity to work on this project and for guiding us throughout its implementation. Our project takes place within our academic training, and we also wish to thank the entire teaching team that supervised us, particularly our academic advisor, Caroline LEPLATOIS. Finally, a big thank you to all the people who answered our questionnaires, without whom we could not have completed this project.

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I – Project Context

I.1) T.I.M.E. Association

The T.I.M.E. (Top International Managers in Engineering) association aims to promote international mobility for engineering students. It was created in 1989 in the context of a newly globalized world where travel from one continent to another became increasingly simple, fast, and affordable. Today, the association's network includes 56 schools in 24 different countries across all continents. T.I.M.E. partner schools have a strong international dimension in both research and teaching and are committed to facilitating student exchanges while recognizing studies completed at other institutions.

I.2) Environmental crisis

The environmental crisis is an omnipresent issue in today's world, including the question of the carbon footprint. It is undeniable that the transport of people is a major source of pollution, even if some modes of transport pollute less than others. Thus, international mobility represents a significant part of the carbon footprint of schools. For example, in 2019, Pascal Da Costa (Sustainable Development Officer at CentraleSupélec) announced that travel accounted for 28% of the school's total carbon footprint.

I.3) COVID Crisis

During the COVID crisis, administrators and partners of the T.I.M.E. network were forced to hold remote meetings, allowing them to test new means of collaboration. They then questioned the purpose of international mobility in light of environmental considerations and whether these could be replaced by video conferencing. This allowed them to engage in reflections on the balance between remote and in-person interactions. Their reflection then extended to students: the leaders want to know if students have similar questions, i.e., if environmental issues influence their mobility choices. In the discussions that emerged, network leaders realized they lacked precise data to support their debates, whether from a carbon footprint perspective or student and teacher-researcher opinions.

II – Project objectives and purposes

II.1) Carbon footprint assessment

There are currently few precise resources on the carbon impact of international mobility, especially for students. One of the objectives of the project is therefore to carry out the carbon footprint of the T.I.M.E. network with a dual objective: to support debates with quantified data and to enable students to have all the information they need to make their mobility choices.

II.2) Study on the purpose of international mobility

The purpose of international mobility is the subject of the next General Assembly of the association in October 2024. The aim of our project is to understand the meaning of international mobility for engineering students, but also for teacher-researchers and members of International Relations offices. What are the benefits that students expect from international mobility? What do those who have already completed one gain from it in their lives? How important are environmental issues in mobility choices? Is video conferencing a viable option to replace some trips? These are questions we have tried to answer in order to inform the DRI so that they can be as well-informed as possible in making their decisions.

II.3) State of the art of measures within the network

It is a fact that the partners of the T.I.M.E. network consult very little, if at all, when it comes to taking environmental measures: each one acts on their own. The last objective of our project is therefore to make an inventory of the environmental measures implemented by the various partners of the T.I.M.E. network so that their administrators can be inspired by what is already being done by others with a view to overall improvement.

III – Approach taken to meet the objectives

III.1) Implementation of questionnaires

The objective is to gather the opinions of stakeholders as well as data that only they can provide us. The most effective solution we thought of was to conduct questionnaires. These had a dual purpose: first to ask quantitative questions to allow us to establish an average carbon footprint of the different mobilities and then to ask more qualitative questions about the importance of environmental issues in mobility choices. We created three

questionnaires: one for students, a second for teacher-researchers, and a third for administrations.

III.1.a) Student questionnaire

In practice, there were two student questionnaires. As we are students from CentraleSupélec, we knew it would be easier for us to start by surveying CentraleSupélec students, so we began by creating a questionnaire dedicated to them, available in Appendix 1a. In the first part, we asked questions to identify the respondent's profile and classify them into one of the following three categories: student who has not yet undertaken mobility, student currently in mobility, or student who has completed mobility. Indeed, it was clear to us that the questions to be asked to a student who has not yet undertaken international mobility were not the same as those to be asked to a student who had already completed it. For students who had not yet left, we focused on the motivations and reasons for the envisaged mobilities: what type(s) of mobility, which destination(s) were considered, what benefits were expected, and also questions about whether environmental factors were taken into account in the choices. Students currently in mobility and those who had finished mobility also had questions regarding the type of mobility and destination, but we were also able to ask them more quantitative questions, particularly about the means of transport used, to establish a carbon footprint.

A major difficulty in constructing the student questionnaire was collecting qualitative data on the meaning and contribution of mobility. On one hand, these questions are related to personal feelings: it is therefore more appropriate to leave open responses for these questions. On the other hand, we wanted a simple and concise questionnaire to get as many responses as possible. Therefore, we chose to limit the number of these questions and make them optional. However, understanding the meaning and contributions of mobility being at the heart of our project, we decided to conduct individual interviews to delve deeper into these questions with volunteers, who had the option to leave their contact information at the end of the questionnaire.

Obviously, all these steps and reflections were carried out with the client, who approved each step of the process. The questionnaire was sent to CentraleSupélec students at the beginning of April, through all the communication channels we had. We regularly followed up on the communication channels (weekly) until early May, when we closed the questionnaire, with 360 responses, of which we are very satisfied.

After sending the questionnaire to CentraleSupélec students, we slightly adapted it (Appendix 1b) to suit any student from one of the network's partner schools, and more generally to engineering schools. To avoid sending multiple emails, we sent the student questionnaire to the different schools at the same time as the other two questionnaires, on

April 29. We also shared it with our personal contacts, and we closed the general student questionnaire on May 24, with 127 responses.

III.1.b) Administration questionnaire

For us, the expectations regarding this questionnaire were less clear, probably because the issues and concerns of administrations are much less familiar to us. Therefore, we asked for help from Mrs. GUILLERME, who provided us with a framework of what she expected for this questionnaire, and we based the administration questionnaire on this framework, available in Appendix 1c. Like the student questionnaire, this one begins with a few general questions to determine the respondent's profile. The main part of the questionnaire asks questions about student practices and then about the school's environmental policies. Finally, the respondent is asked for their perspective on student mobility. The questions about environmental policies related to mobility also helped us conduct a state-of-the-art review of the existing measures within the network. As mentioned in the previous paragraph, this questionnaire was sent on April 29 to various representatives of the partner schools and was closed on May 25, with 31 responses from 28 different institutions, representing half of the network. The respondents come from 13 different countries, 12 of which are located in Europe.

III.1.c) Teacher-Researchers questionnaire

The questionnaire for teacher-researchers (Appendix 1d) is quite similar to the student questionnaire: after 2 questions to classify the respondent's profile, they are asked about mobility in the context of their work. The objective is, once again, twofold: to understand the importance of environmental issues for the respondent and to try to establish a carbon footprint. The last questions are dedicated to the respondent's perspective on student international mobility. These questions seem particularly relevant and important to us because, for a student, dialogue with teachers is essential to enable them to envision an international future. This questionnaire was also sent on April 29 and closed on May 25, with 48 responses from around twenty different institutions, spread across 10 countries.

III.1.d) General remarks on all questionnaires

We faced two major difficulties during the drafting of the questionnaires. The first was to remain as objective as possible. Indeed, the purpose of our study is not to judge the habits or behaviors of individuals, but rather to obtain honest data and opinions to pass on to the leaders of the T.I.M.E. network, allowing them to make the decisions they deem appropriate. Several feedbacks we received congratulated us on managing to create fairly objective

questionnaires, and we received as many comments suggesting the questionnaires were biased one way as the other: we therefore believe we succeeded in overcoming this difficulty.

The other major difficulty was getting responses to our questionnaires. For the questionnaire dedicated to CentraleSupélec students, we knew we would achieve a satisfactory number of responses because we are ourselves part of conversations involving almost entire cohorts. With several reminders, we managed to get 347 responses from the P2019 to P2026 cohorts (ours), which is very satisfactory. For the other questionnaires, however, we sought help from Gwenaëlle GUILLERME, our client. As the Secretary General of the T.I.M.E. association, we suspected she could provide us with contacts in the various schools and universities in the network. Thus, we had agreed that she would inform her various contacts in the administrations that we would be asking them to collaborate with us by responding to and transmitting the questionnaires. Seeing that, despite this, the number of responses was relatively low, Gwenaëlle regularly followed up with her contacts herself, which significantly increased the number of responses to the questionnaires. Additionally, we leveraged our personal network to distribute the student questionnaire. Indeed, we all have acquaintances studying in some of the partner schools of the network to whom we asked to share this questionnaire in student conversations, which also helped us get more responses from students who are not from CentraleSupélec.

III.2) Individual interviews

We gave all students the option to leave their contact details at the end of the questionnaire so that we could reach out to them for a twenty-minute individual interview, in which we could revisit their responses and delve deeper into the details. These interviews allow us to better understand the respondent's perspective, their thought process, and for some, their feedback on the international experience they had. This nicely complements the optional questions in the questionnaire with the aim of answering the question: "What is the meaning of international mobility?" The interviews also help to understand the students' motivations, for example, regarding mobility destinations and their expectations of international mobility.

Of the 350 students who responded to the CentraleSupélec student questionnaire, about 60 volunteered for an interview, and about 30 responded positively to the general questionnaire. Due to tight deadlines for conducting these interviews, we were only able to conduct about twenty individual interviews. The deadlines also forced us to conduct these interviews with CentraleSupélec students, as this questionnaire was closed in early May while the general questionnaire was open until May 25. However, we were very careful to maximize diversity in the profiles when selecting the individuals we would contact.

III.3) State of the art

For the state-of-the-art review, we used two approaches: first, the most obvious one, we used the internet and conducted research on the websites of the schools. The second approach involved leveraging the administration questionnaire, as it includes questions about whether the school has implemented rules to regulate international mobility, particularly regarding the transportation methods used. These two sources proved to be complementary and allowed us to establish a fairly satisfactory state of the art of the environmental measures in place.

However, in the student questionnaires and interviews, many students shared measures they consider relevant and feasible to implement. Mrs. GUILLERME and we thought it pertinent to discuss these measures in this state-of-the-art section, as its purpose is to compile measures to inspire the administrations of various schools to promote more responsible international mobility.

IV - Results obtained

IV.1) Carbon footprint

The perspective of the GHG (often mistakenly called carbon footprint) perfectly aligns with providing tools to better understand the climate impact of international transportation. However, it is important to remember that this criterion is one of the factors impacting the environmental crisis but not the only one. It is always relevant to consider our extended impact on other criteria such as land-use change and resource utilization.

In the entire GHG footprint analysis, we will focus on the 100-year global warming potential, including the non-CO2 effects associated with transportation. This is particularly relevant for aviation, as non-CO2 effects generally have a warming potential similar to that caused by CO2.

The idea here was to get a rough estimate of the share of emissions in our individual carbon footprint to evaluate the effectiveness of implementing action levers. We can use the per capita emissions for a few countries as examples to put our carbon footprint data into perspective: France: 6.4t, USA: 16.5t, Canada: 13.2t, Brazil: 2.2t, Australia: 13.1t. We can also keep in mind that to meet the Paris Agreement targets, each individual should emit a maximum of 2t CO2eq/year. The carbon footprint of the transportation sector represents approximately 30% of emissions for a Canadian, about 4t/year **[1]**.

During discussions with the client, we decided to break down the results into three sources of emissions: the round trip related to mobility, the round trip plus returns to one's home country during mobility, and the round trip plus returns plus tourism related to being in another country. For this, we needed data on the kilometers traveled by students using different modes of transportation to reach the exchange university, the number of round trips made during mobility, and the transportation used for tourism in the host country.

Initially, we considered ways to calculate the carbon footprint of mobility solely based on student responses and concluded that we needed to keep it brief and intuitive to maximize student participation in the questionnaire. We opted for average travel times for each mode of transport, which are more easily quantifiable by students. This approach would allow us to use the average speed of the transportation methods to calculate the distance and, therefore, the carbon emissions. Indeed, we only have emission factors in kgCO2eq/km and very rarely in kgCO2/h. We, therefore, had to estimate the average speeds of the different transportation methods.

Through some initial research, we found the various emission factors for the five most popular modes of transportation among students, namely airplanes, trains, buses, cars, and boats.

IV.1.a) Airplane

Air travel represents by far the largest source of emissions for international mobility due to a high emission factor: up to 230g CO2eq/km **[2]** for short flights, but especially because of the long distances it can cover. Given its significant impact, we decided to calculate the emissions related to air travel more precisely. For this, we calculated the distance between the departure and arrival airports when cities were specified. In cases where only the country was mentioned, we chose a major central city in the country as the arrival airport. This allowed us to achieve better accuracy, minimizing uncertainty in the final calculation.

Calculating the distances between airports enabled us to classify the flights into three types for which ADEME provides specific emission factors: short-haul (between 500 and 1000 km), medium-haul (between 1000 km and 3500 km), and long-haul (over 3500 km). We then calculated the round-trip emissions using these three different factors, but for the tourism part, we referred to the number of hours provided by the questionnaire and determined an average speed of an airplane in flight (850 km/h).

IV.1.b) Train, Bus, Car, and Boat

For these means of transport, all emissions were determined by calculating average speeds for various destinations at different distances. We then associated an average travel time with each response (e.g., for the response "Between 1h and 3h", we associated an

average duration of 2h) and an average speed calculated using travel time calculators like Google Maps for journeys around 2 hours long. These approximations remain legitimate given the orders of magnitude of other transport modes compared to air travel.

The different emission factors (in gCO2eq) are those found in ADEME's footprint database **[3]** : **24g** for trains (average of TER and TGV), **100g** for buses, **230g** for cars, and **19g** for boats (ferries) **[4]**.

IV.1.c) The average carbon footprint of students

Using all the emission data, we calculated the three cumulative sources of emissions: round trips, round trips plus returns home during mobility, and round trips plus returns home during mobility plus tourism. We then obtained results for each category, for CentraleSupélec (CS), and for other universities, for students currently in mobility, and for those who have already completed their mobility. We observed that the differences in the carbon footprint tend to be similar whether the mobility is finished or not, though there is generally a decrease in emissions related to returning home during mobility, potentially due to underestimation, but more likely due to variability from the small amount of data.

Using all the previously explained methods, we obtained the tables below, *Figures 1.A* and *1.B*. *Figure 1.A* is based on data from questionnaires sent to CentraleSupélec students (sample of 141 students), and *Figure 1.B* is based on questionnaires sent to partner universities (sample of 81 students).

	Ongoing IM	Completed IM
Round trip	**1091 kg**	**1197 kg**
+ returns	**2056 kg**	**1702 kg**
+ tourism	**2846 kg**	**2610 kg**

Figure 1.A: Carbon Footprint of Mobilities for CentraleSupélec Students (in kgCO2eq)

	Ongoing IM	Completed IM
Round trip	1507 kg	1283 kg
+ returns	2570 kg	Ø
+ tourism	3301 kg	2655 kg

Figure 1.B: Carbon Footprint of Mobilities for Students from TIME Network Universities (in kgCO2eq)

Based on these results, we can analyze the contributions of different students to the overall carbon footprint and the per capita footprint. It turns out that a small proportion of students (~25%) account for the majority of GHG emissions (~65%). This trend is observed for students undertaking very distant mobilities, necessarily by airplane (Japan, Australia, China, Singapore...), with travel distances exceeding 6000 km.

IV.1.d) The Carbon footprint of the network

Using a table of student mobilities (origin-destination) and observed trends in the modes of transport used for certain destinations, we determined a preliminary estimate of the TIME network's carbon footprint. We classified the mobilities into three categories: short distance (0-1000 km), medium distance (1000-5000 km), and long distance (>5000km). On one hand, we assigned a category to each mobility. On the other hand, we calculated per capita emissions for each category based on our questionnaire data. This led to emissions of about 1200tCO2eq (only for round trips), which corresponds to the order of magnitude of international mobility emissions for CentraleSupélec in 2018 (1600t CO2eq) **[5]**.

IV.1.e) Action levers

Following these carbon footprint assessments, we can identify three types of mobilities: i) long-distance mobilities by airplane, ii) short-medium distance mobilities by airplane, iii) short-medium distance mobilities by low-carbon transport (mainly train).

The emissions of these three types of mobilities are significantly different. For example:

i) Round trip Paris-Vancouver by airplane: **2500 kg CO2eq**

ii) Round trip Paris-Copenhagen by airplane: **460 kg CO2eq**

iii) Round trip Paris-Copenhagen by train: **72 kg CO2eq**

In light of these results, we can identify two main action levers to reduce emissions. The first is to reduce, as much as possible, the distance by focusing on medium-distance mobilities. This shift from type i) to type ii) mobility represents a **five-fold** reduction in emissions for the example used, which is a very strong action lever. The second action lever aims to replace air travel with train travel whenever possible. The example of the round trip Paris-Copenhagen would involve a **six-fold** reduction in emissions by shifting from type ii) to type iii).

[1] : www.cbc.ca/news/science/how-canadians-can-cut-carbon-footprints-1.6202194

[2] : greenly.earth/fr-fr/blog/actualites-ecologie/empreinte-carbone-vol-en-avion

[3] : greenly.earth/fr-fr/blog/actualites-ecologie/empreinte-carbone-comparatif-transports

[4] : www.visualcapitalist.com/comparing-the-carbon-footprint-of-transportation-options

[5] : hal.science/hal-04349108

IV.2) Purpose of mobility

Through the analysis of various questionnaires from CentraleSupélec as well as global ones, we have noticed that students' relationship with international mobility is very personal, with each individual having different sensitivities towards this topic. Nevertheless, we can extract three main types of responses, which we will detail with numerical data later on:

- International mobility is an enriching experience on a personal level, particularly by fostering an open mind.

- International mobility is an enriching experience on a professional level and develops adaptability.

- International mobility is greatly impacted by ecological awareness, particularly in the choice of destinations and the means of transportation used.

Firstly, the personal benefit of international mobility is considered the most important by students. Indeed, **83.5%** of CentraleSupélec students who have not yet participated in mobility believe that it will be beneficial on a personal level, and this figure rises to **90.37%** once they have completed their mobility. These proportions are similar for students worldwide in the T.I.M.E. network. Indeed, **94.6%** of them see personal benefits in mobility. Among the various aspects that can illustrate the term "personal benefit," the desire to discover a new culture (**65.09%**) and to learn a new language (**57.08%**) are the most cited by CentraleSupélec students.

Secondly, students in the T.I.M.E. network also find international mobility to be a significant professional benefit. However, this perception decreases once the mobility is completed, as students tend to find more personal rather than professional benefits. Indeed, **60.38%** of CentraleSupélec students who have not yet participated in mobility believe that it will be beneficial on a professional level, compared to **50.37%** for those who have completed mobility. These proportions are again similar for global students in the T.I.M.E. network, with **64.3%** of them finding professional benefits in mobility. The aspect most cited by CentraleSupélec students is the development of adaptability (**78.67%**), far ahead of the prestige of having attended a renowned foreign institution (**34.91%**).

Thus, there remains a strong interest in international mobility within the T.I.M.E. network. Looking to the future, **15.57%** of CentraleSupélec students even consider living in the country of their mobility after completing their engineering degree.

Several questions then arise around international mobility. Indeed, completing international mobility is mandatory in France to obtain an engineering degree. But what do students think about it?

	For	Against	Indifferent
CentraleSupélec NMI	56.13%	16.98%	27.83%
CentraleSupélec Ongoing IM	69.62%	15.19%	17.72%
CentraleSupélec Completed IM	57.14%	23.21%	23.21%
World	40.90%	39.10%	20.00%

Figure 2: Student opinions on the rrequirement of international mobility. 460 Responses.

A large majority of French students support and approve of this measure, whereas it is more controversial for international students, who are necessarily less familiar with this "constraint" specific to France and which does not exist in most other countries in the network. But what are the perceived advantages and disadvantages of this mobility?

	A personally enriching experience	A professionally enriching experience	An experience that develops adaptability
CentraleSupélec MI	83.49%	60.38%	77.36%
CentraleSupélec NMI	90.37%	50.37%	80.74%
World	94.60%	64.30%	82.10%

	Too polluting	Too expensive	Should remain a personal choice	No interest in international mobility
CentraleSupélec MI	58.02%	53.30%	31.60%	5.66%
CentraleSupélec NMI	54.81%	41.48%	34.81%	5.19%
World	29.60%	68.50%	60.20%	1.90%

Figure 3: Percentages of Students Agreeing with the Proposed Point. 460 Responses.

The advantages are generally the same as previously mentioned. However, there are several disadvantages to note.

Firstly, we notice a difference in perspective between French and international students. Indeed, while both groups agree that international mobilities are sometimes too expensive, French students also emphasize that international mobilities are too polluting, which is not necessarily the opinion of international students. The latter tend to stress that international mobility should remain a personal decision and not be imposed.

Moreover, feedback from CentraleSupélec students who have completed their mobility shows that the disadvantage related to the high cost of international mobility is not necessarily as significant as imagined by students who have not yet gone abroad.

A second major question surrounding international mobility concerns the environmental impact related to the travel necessary for these mobilities. It is therefore legitimate to wonder if the environmental impact due to distance is a criterion in choosing the country for mobility.

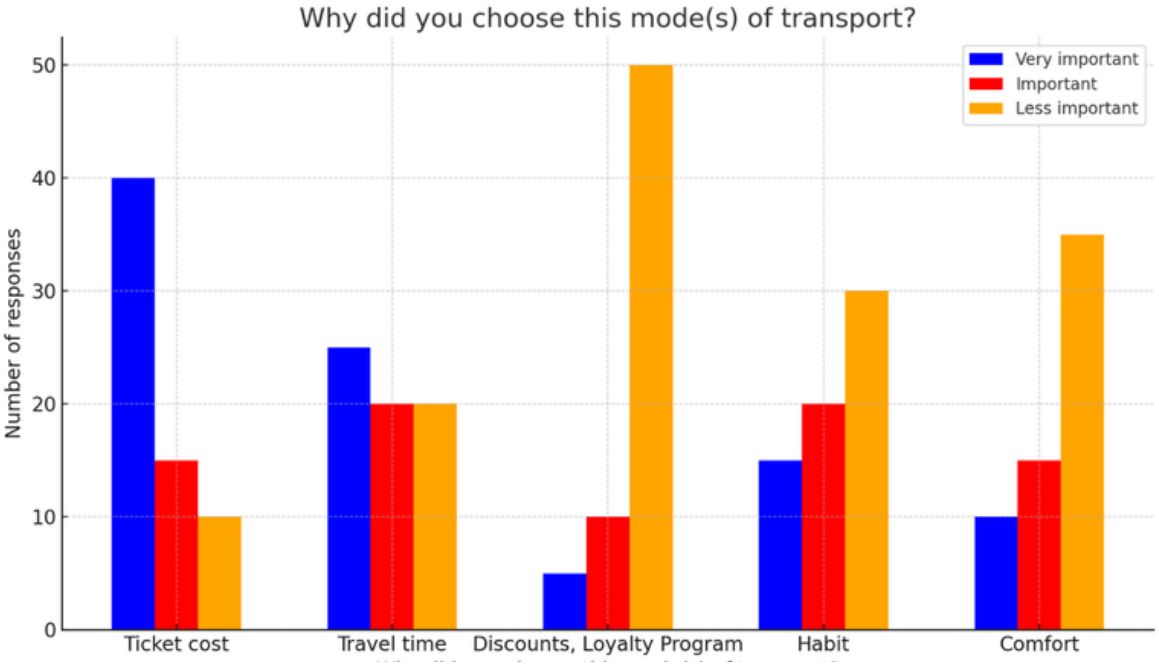
	Strongly agree	Partially agree	Strongly disagree
CentraleSupélec NMI	10.38%	42.92%	42.92%
CentraleSupélec MI in progress	12.66%	45.57%	40.51%
CentraleSupélec MI completed	16.07%	55.36%	28.57%
World	5.20%	37.40%	56.60%

Figure 4: Student Responses to the Statement: "The environmental impact due to distance is a criterion in choosing the country for mobility." 460 Responses.

We notice two phenomena. Firstly, CentraleSupélec students who have completed their mobility are much more aware of this environmental issue than those who have not yet

gone abroad. Conversely, we find that international students consider the environmental criterion less in their choice of destination compared to French students.

Given these responses, it is therefore legitimate to ask how students choose their mode of transportation.



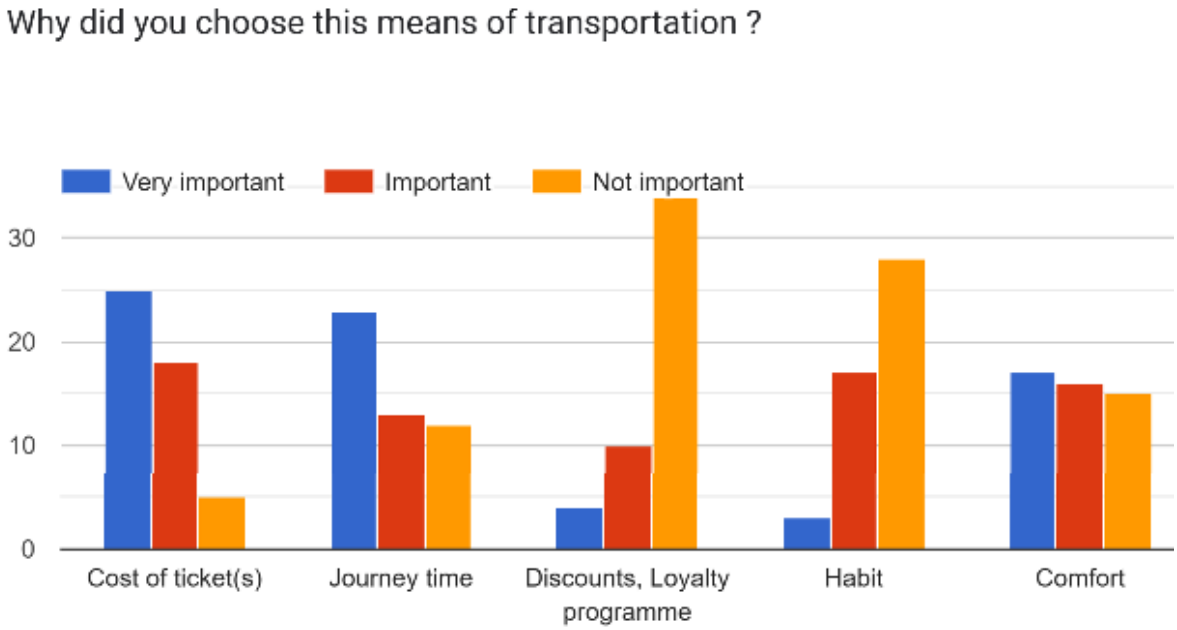


Figure 5: Questions Asked to Students on Criteria for Choosing Transport. (CS students - 53 Responses and International students - 48 Responses).

We can see here that ticket cost and travel time are the two most important criteria for choosing a mode of transport. Thus, the airplane sometimes remains the best option meeting these criteria and is therefore preferred despite the desire to consider environmental considerations. Additionally, some destinations impose geographical constraints that sometimes necessitate the use of air travel, hence the ongoing debate around this mode of transport.

Alongside these questionnaire analyses, we conducted about twenty interviews with students having diverse profiles and opinions to better understand the arguments stemming from the questionnaire responses. We asked them questions about both their mobility choices and the regulations of international mobilities.

Initially, regarding students who have not yet participated in mobility, we observed very different expectations and conceptions of mobility. For some, international mobility constitutes a form of escape: it allows them to discover a world and a culture where they hope to thrive personally and take the opportunity to tour the country visited and neighboring countries. The academic or professional aspect is entirely secondary to the point where some destinations that offer more free time are preferred. Stepping out of their comfort zone and enjoying themselves are their main objectives. For others, the interest in discovering a new part of the world remains a desire but not necessarily a priority: they seek academic excellence, specialization, and the opportunity to test different careers and sectors. They are more concerned with developing their professional skills and expanding their network. Some countries are more interesting to them than others because they want to learn about the ways of doing things and the work mentality specific to a particular place. Of course, we cannot categorize all students into one of these profiles, but often their choice of mobility rests on one or the other viewpoint. The overall expectations of students who have not yet gone abroad are often similar: better language proficiency, open-mindedness, developing adaptability, autonomy, independence, and a new way of life. It is also frequently a means for students to test countries and either strengthen or question their desire to live in certain regions later on.

As for students currently engaged in or having completed their mobility, not only did they share these same expectations before their departure, but they also largely consider that these expectations were met. They feel they have acquired all the previously mentioned skills, and in addition, those who had no academic expectations often took the opportunity to thoroughly explore their host country and the surrounding region, while others were pleasantly surprised by the mentalities and professional world they discovered. We found that expectations also evolve with the number of mobilities; those who had the opportunity to enjoy multiple excursions had varying expectations between these two profiles. Furthermore, the added value of mobility significantly depends on its duration and destination. Generally, students in double-degree programs with mobilities lasting at least one year become much more immersed in the local culture and have time to truly change their lifestyle, whereas those

who restrict themselves to six-month exchanges sometimes find it more difficult to break away from the circle of expatriates from the same country of origin. Finally, depending on the cultural difference with their home country, they may feel more integrated into local life or, on the contrary, enjoy the sense of being in a completely different environment.

The environmental impact of mobility is another criterion gaining increasing importance. We can identify three types of student profiles: those for whom this criterion is fundamental and who will never take a plane, those for whom this criterion is not negligible but will not restrict their choice of destination, and those who completely ignore it. In the first case, these students believe they do not necessarily need to travel to the other side of the world to see beautiful landscapes or discover different cultures and are perfectly satisfied with neighboring countries. If they do wish to travel far, they will prioritize modes of transport such as trains or ferries as long as it is economically reasonable, regardless of the travel time. In the second profile, we find students who are well aware of the issues but do not want to close any doors. This is expressed by the fact that they will avoid (or very rarely) returning home once they are on-site, try to limit their tourist visits to the surrounding areas, or at least use more responsible modes of transport. However, this can prove more difficult than they thought, especially when it comes to island countries or when the local mentality is completely disengaged from the climate cause. Finally, in the last case, we find those who do not question their travel home or their choice of transport. Although we can generally find students who are not very concerned from this point of view and for whom financial and opportunistic arguments take priority, it is very rare to see students completely unaware of what they are doing. Even those who fly 20 times in six months in Singapore to explore Southeast Asia do so because they take advantage of being close to these destinations to discover them once and for all and avoid making these trips from their home country.

In conclusion, these interviews corroborate the results of our surveys and have allowed us to better understand the different profiles that emerge, their expectations, and their opinions on current regulations.

IV.3) State of the art of measures taken

In the previously mentioned context of global warming, universities must adapt to contribute at their level to collective efforts. After documenting student sensitivities regarding the environment and international mobility, it is important to understand the perspectives of administration members. This is what we aimed to understand through this survey. The objective was to comprehend the questions and measures discussed by administrations in response to student expectations. We did not attempt to perform a "carbon footprint" analysis of the respondents to this survey.

One of the first questions posed in this survey reveals that 50% of respondents have not noticed any change in student behavior regarding international mobility in connection with climate change. Conversely, 37.5% of respondents think that the environment is an important criterion for students. These results highlight the heterogeneity of opinions on this matter. Some countries are very committed to this issue, as illustrated by this quote from a German administration member: *"It is a generally important criterion for the younger generation"* while in other countries, these considerations are not the most important, as indicated by a member of a South American university administration: *"I work at the mobility department and I haven't had or heard any query regarding environmental issues related to destination choices."*

We also sought to understand the policies implemented by schools regarding international mobility and the environment. On one hand, we learned that environmental considerations do not significantly affect the choice of new partners for most institutions, except for some European institutions (*see Figure 6*). This does not mean that these institutions do not consider environmental issues, but rather that they allow their students to choose their destinations.

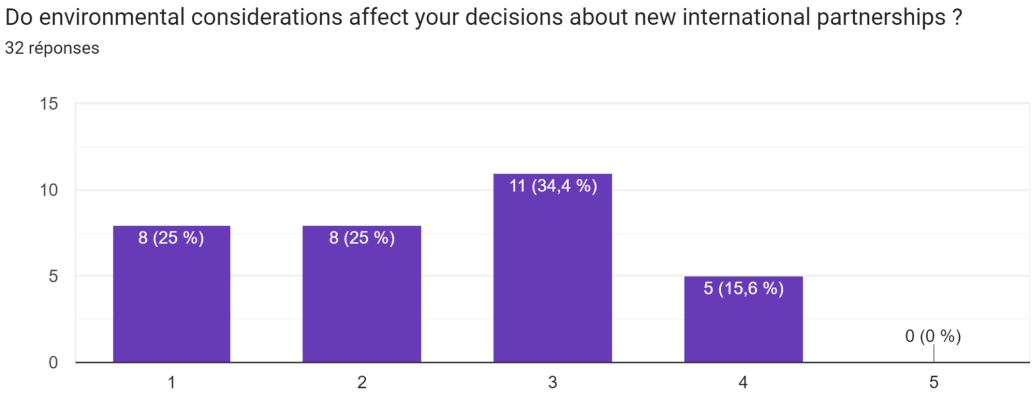


Figure 6: Responses to an Administration Survey Question on the Importance of Environmental Issues in Partnerships. 32 Responses.

On the other hand, we note that the surveyed universities are in favor of mandatory international mobility *(see Figure 7*). The choice is not left to the students, as the surveyed administration members unanimously agree that international mobility is important for students. The arguments in favor of this requirement, cited by respondents, include the development of professional skills, learning or improving a language, autonomy, or developing an international culture necessary for engineers. Some respondents mention disadvantages, such as the financial and environmental costs that international mobility can entail.

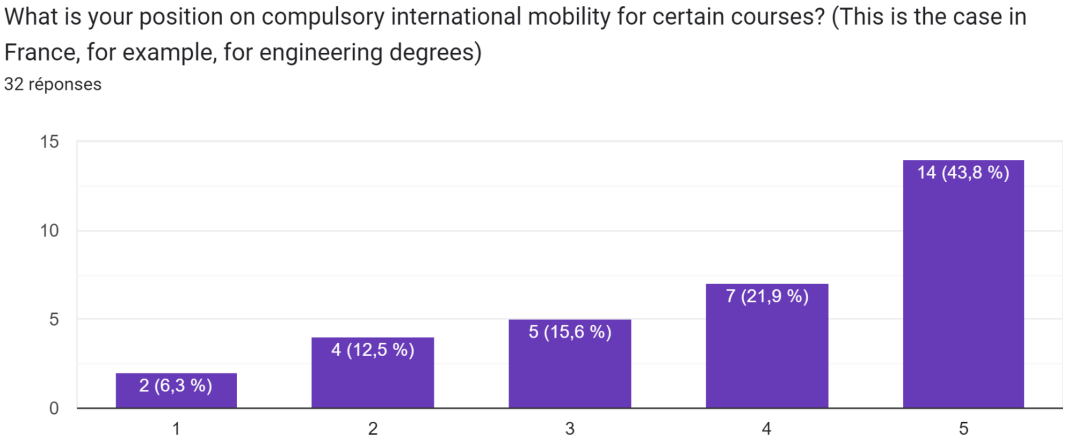


Figure 7: Responses to an Administration Survey Question on the Requirement of International Mobility. 32 Responses.

IV.3.a) Measures already taken

Aware of the environmental impact of international mobility, some universities have already begun to take measures to reduce it. These measures are divided into four categories at the university level.

The first category of actions aims to assess student opinions and the environmental impact of international mobility at the institutional level. Twenty-two percent of universities implement such actions. This can be realized through surveys and interviews to understand student sensitivities, or by conducting a carbon footprint analysis to determine the pollution caused by the institution's activities. For example, a carbon footprint analysis determined that in 2022, international mobility was the fourth most polluting factor at the Mines de Saint-Etienne. The carbon footprint analysis allows for targeted actions, knowing in detail the origin of the pollution caused.

Another category of actions is communication measures, implemented in different forms by 40% of the surveyed universities. This can translate into environmental awareness campaigns or communication campaigns about certain partner institutions. We notice that universities are divided on their role in raising awareness about the means of transport used or about ecological behaviors to adopt on-site (see figures). However, it is important to note that some countries are isolated, and the choice of available transport means to travel abroad is limited. During these information and communication campaigns, which are addressed to

both students and staff, some schools also emphasize long-term mobility over semester exchanges.

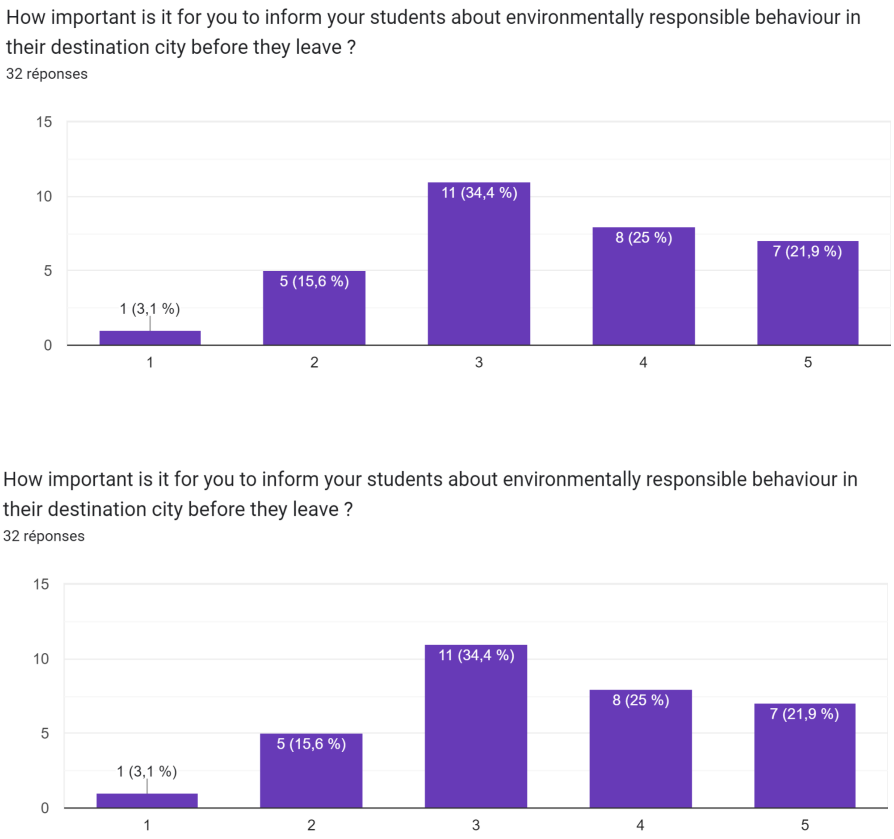


Figure 8: Responses to questions asked to administrations on raising student awareness. 32 Responses.

Another category of actions implemented is support measures for international mobility. So far, students and administration members have not reported such measures at the university level. However, many mentioned the Erasmus+ program and its green mobility component, which provides a 50-euro grant at the European level if the student uses green transportation to reach their international mobility destination.

The last category of measures is constraint-based, requiring students or staff to adopt certain behaviors. Some institutions encourage or mandate videoconferencing to limit foreign travel. Other institutions have implemented carbon offsetting to balance the pollution caused by international mobility. Some universities in France have chosen to be stricter by implementing a "carbon quota" not to be exceeded during the academic program or by banning air travel if there is an equivalent train journey with a duration of less than four hours.

Finally, several universities are currently discussing new measures to implement and participating in barometers to assess the potential effectiveness of each measure.

IV.3.a) Measures to be taken

During individual interviews or in our questionnaires, we also asked students about the measures they would like to see to reduce the carbon impact of international mobility.

Regarding communication measures, students would appreciate if geographically closer destinations were highlighted to offer them more visibility compared to more distant universities. Other students propose organizing more awareness campaigns on the theme of ecology, for both students and administration members. This would allow students to make informed choices and administration members to take measures adapted to the situation. "Carbon sheets" giving the carbon impact of each destination during the mobility choice process were also mentioned.

Concerning support measures, many students pointed out the weakness of current measures. The Erasmus+ financial aid of 50 euros is often deemed insufficient and does not cover the price difference between train and air travel. Students would therefore like additional grants to implement their preferences. Other students would appreciate logistical support measures, such as finding complex train routes, to show that this alternative is feasible.

Some students also propose restrictive measures, such as banning air travel for some or partial bans for others. In particular, several students are in favor of banning air travel if an equivalent train journey has a duration of less than six hours. However, this six-hour value is debated, and students do not always share the same opinion. Another restriction proposed by students is to set quotas for the number of students who can travel to distant international mobility destinations to reduce the carbon impact of transport. The expansion of the previously mentioned "carbon budget" is also a measure shared by some students.

At the administration level, many students would like the chosen partner universities to be geographically closer, committed to ecological transition, and more highlighted. Other measures proposed by students include requiring a motivation letter for students wishing to travel to distant destinations to select fewer students traveling far while being certain of their motivations. Some also mention timetable adjustments, which could allow students to travel to distant destinations using green transportation.

On a larger scale than universities, students think that the Erasmus+ offer should be improved, including an Interrail pass or increasing the grant received when traveling without flying. Several students also mentioned the development of organizations at the continental level rather than the global level, which could favor student exchanges over shorter distances,

maintaining the richness of international exchanges while reducing the carbon impact associated with them.

IV.4) Recommandations

Many ideas emerged from the various actions of our project. Here is a list, which is obviously not exhaustive, of recommendations we could make:

- Encourage stakeholders to use **greener modes of transport**, but not solely with ecological arguments. Among the reasons to use trains or buses (instead of planes), we can mention the ease of making use of time spent in transit, the practicality of city-center train stations, not having to check in long before departure, and the possibility of stopping and discovering many different places along the way, which can be quite enriching and fun, especially if the journey is made with friends.

- **Mandate train travel for short distances** (when it is a viable option). The remaining question is to determine the threshold above which the train is no longer mandated. Some schools have already implemented this measure, setting a time limit ranging from 4 to 8 hours. All the students surveyed welcome this measure, and some even think that a 4-hour limit is too short. This measure can apply to students as well as to researchers and administration staff.

- **Better plan trips** to avoid numerous round trips. For researchers and administration staff, this can involve grouping trips within a certain geographical area. It could also be beneficial to use tools that help plan the journey, such as Interrail, which helps find train routes.

- **Provide financial support** for those choosing greener modes of transport. While there are already measures like the Erasmus+ grant, this is sometimes insufficient. For example, a French student on exchange in Copenhagen told us in an interview that a round trip between Paris and Copenhagen costs €80 by plane, while it costs €200 by train. The €50 Erasmus+ grant does not cover this large difference. Another idea to limit the carbon impact of students on site would be to subsidize a **public transport subscription** for commuting between school and home when there are few or no accommodations on campus.

- **Increase awareness** of environmental issues using fun methods. For example, INP Grenoble has implemented a "carbon quota" per student. Each student is invited to calculate their carbon footprint and try not to exceed the individual quota, set at 6teqCO2 over the entire schooling period.

- Ask students wishing to travel far to **justify their choice**, for example, through a motivation letter where the student explains precisely what leads them to request this mobility.

V - Conclusion

Our project shows that today, nearly half of the students take environmental considerations into account in their mobility choices. The concerns of the network leaders are therefore not in vain, and the questions raised are entirely pertinent. The figures from the questionnaires and individual interviews show that students have ideas but have not found answers, or rather that the answer lies in the sensitivity of each individual. Nevertheless, there are trends that we were able to highlight, and we hope that our study will provide useful information to school staff and students preparing for their mobility.

VI - Possible openings

VI.1) Continuation of questionnaires and Interviews

A major problem with our study is the limited amount of international data. Indeed, out of the 467 students who responded to our questionnaires, only 115 are not from a French school (i.e., students coming to France as part of an international mobility program are included in the 115; and among these 115, a large majority lives in Europe). Thus, this sample is sufficient to understand global and European trends, but it does not really allow us to highlight differences of opinion between different regions of the world. Additionally, due to a lack of time, we were only able to conduct a few individual interviews with international students, which could have also helped us better understand foreign trends.

Therefore, the first way to continue the study would simply be to keep circulating the questionnaires within the network schools, in order to obtain more responses from students, but also from teacher-researchers and administrations. We believe that the best way to get responses from students is to find the contact of a student from the respective school and ask them to distribute the questionnaire in the various groups and mailing lists of students in their school. This is indeed how we obtained 360 responses from CentraleSupélec.

The results obtained in this way can then help us confirm or, on the contrary, refute the conclusions that our data lead us to draw. Conducting new individual interviews can prove just as relevant. Indeed, they allow for a better understanding of the respondents' points of view by delving deeper into the arguments than is possible via the questionnaire.

VI.2) Creation of an informative tool

Another possible continuation of our study would be the creation of an interactive tool for anyone considering undertaking international mobility. Its purpose would be purely informative, ensuring that individuals have all the information they need to make an informed decision. This tool would allow users to both read feedback from people who have already

experienced mobility in the target location and to consult the carbon impact of such mobility, with recommendations on how to reduce it.

The format of this tool is yet to be defined, but we believe it is quite important to maintain the interactive aspect, especially for the carbon footprint part, which might bore some people. The work associated with creating this tool seems quite substantial, but it could represent a real help for the international relations departments of various schools.

VI.3) Repeating the study in a few years

Our study is the first of its kind conducted by the T.I.M.E. association, and it allows us to gauge the opinions of stakeholders in 2024. We find it very interesting to conduct a similar study in a few years to observe how these opinions evolve, as they can actually change quite rapidly. For example, a few years ago, it was quite rare to see a student refuse to fly for their international mobility, whereas today nearly 10% categorically refuse to use this means of transport.

We hope that if the study is conducted again in a few years, our work could serve as a basis and reference for making comparisons, which underscores the importance of this current report in our view.

VII - Annexes

VII.1) Questionnaires

VII.1.a) CentraleSupélec Student Questionnaire

https://docs.google.com/forms/d/1mXVEO_K06dQpv6S3NQ3w_odjYhmVQQooH_I8oTkIUis/prefill

360 Responses

VII.1.b) General Student Questionnaire

https://docs.google.com/forms/d/1qZnwc7kjKyI6X8sG3OKpHQPuEh4wsMqGZIwoa3W0Ke8/prefill

127 Responses

VII.1.c) Administration Questionnaire

https://docs.google.com/forms/d/1Xtb39GpB0O2RrnqAjKanudV3hYYy08rfdb0xJGygHc4/prefill

32 Responses

VII.1.d) Teacher-Researcher questionnaire

https://docs.google.com/forms/d/1VYJHjCFTTmOXNZt65sfkYmLbcZzh6fEhAw30YnzjwHw/prefill

48 Responses