

Summary of students' activities with the ELPID platform

This document presents a summary of the different activities that the students carried out with the platform in the three years of implementation of the ELPID project.

The statistics about students' activities are, unfortunately, available just for the Moodle platform, which collects log files of what the students do during their interaction with the platform functionalities. The following results are a direct consequence of the progressive changes that the platform has undergone along the three years of the project, showing a progressive detachment of students from its functionalities, towards an environment whose functionalities are distributed across different tools.

Total number of activities carried out with the Moodle platform

The following graph shows the total number of activities carried out on the Moodle Platform provided by SRCE on a daily basis. The trends are shifted in time, in order to align the beginning of each course to the same day (here generically referred as Day 1).

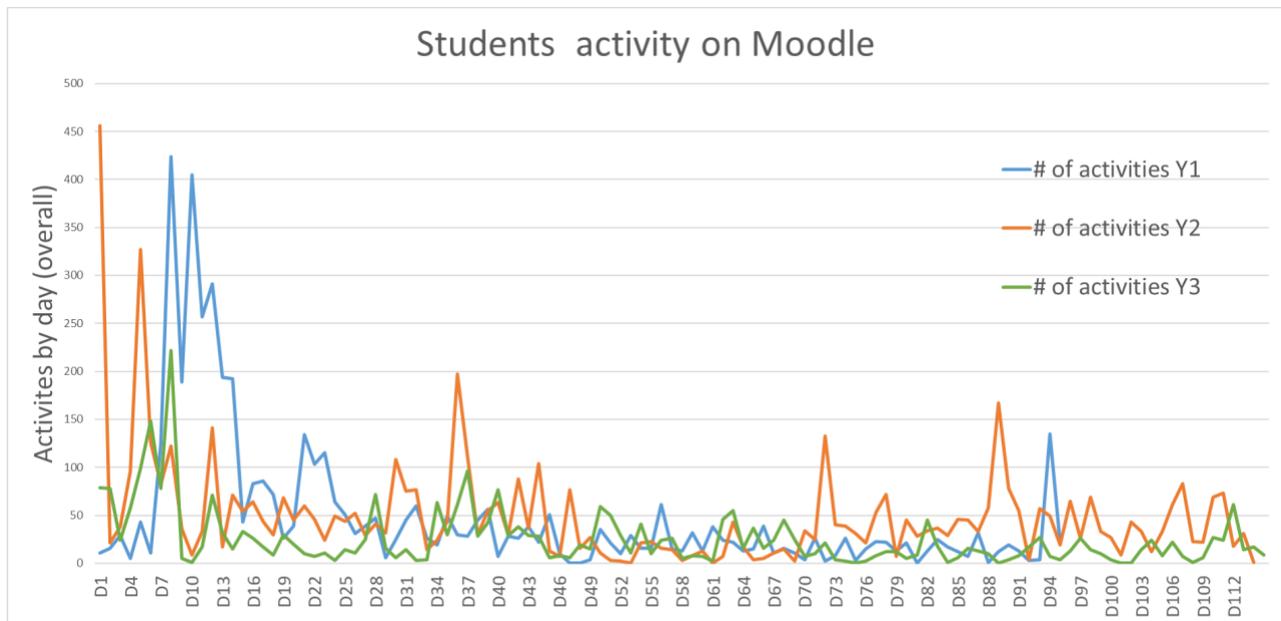


Figure 1: Total number of activities carried out by the students (instructors/teacher/coaches/administrators are not counted).

The following table collects the total amount of activities carried out in the first 100 days of each course in order to keep consistency among the different durations of the same.

The trend shows a progressive decrease of the usage of the platform (see Table 1), as for the way the consortium implemented the activities after year 1, highlighting a progressive shift towards an alternative platform (Microsoft Teams, for which, however, there are no log files available to run a similar investigation).

Table 1: Data concerning the activities carried out by the students in the first 100 days of the ELPID class

	Year 1	Year 2	Year 3
Students' activities on moodle (D1-100)	4682	5131	2704
Students' activities on moodle by day (D1-100)	46,8	51,3	27,04
Students' activities on moodle by student (D1-100)	167,2	128,3	69,3
Students' activities on moodle by day by student (D1-100)	1,7	1,3	0,7

Total number [cumulative] of activities by team and by University

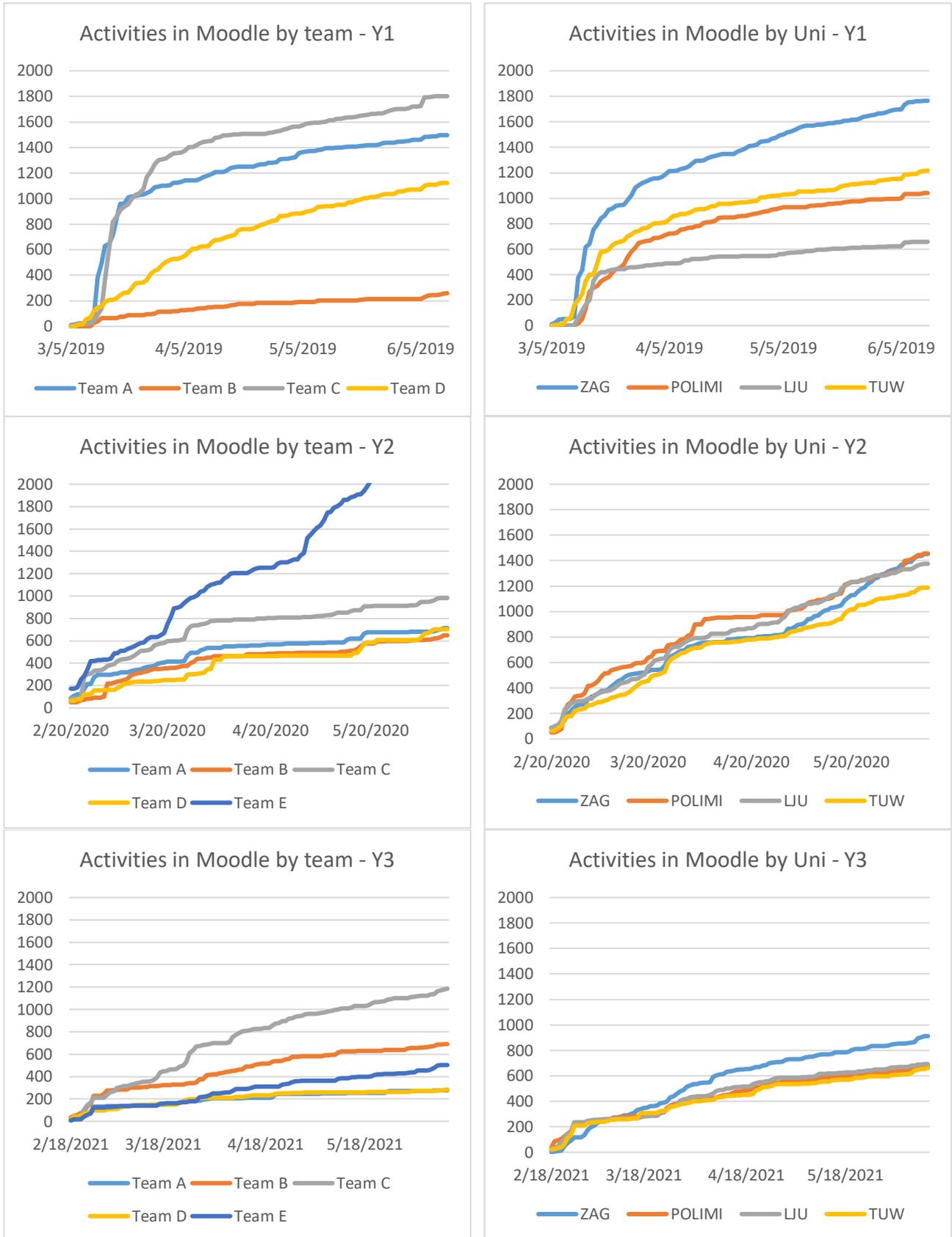


Figure 2: Cumulative number of activities carried out by the students (instructors/teacher/coaches/administrators are not counted) per team (left column), per university (right column), per year (year 1: first row; year 2: second row; year 3: third row).

The graphs presented in Figure 2 collect 6 different diagrams. They are organized into 3 rows and 2 columns. By column, the 6 graphs display the cumulative activities carried out respectively by the teams involved in the courses (4 teams for Year1, and 5 teams for both year 2 and 3) and by the universities, the students involved in the project were enrolled in. By row, the diagrams present the number of activities carried out in a specific year of the ELPID course. These diagrams collect the cumulative number of activities, so that it is possible to magnify the differences among the different data series considered in each of the 6 graphs as time progresses.

These diagrams, in addition to what raised inside Figure 1, provide an additional angle to understand the degree of interaction that the students have with the platform. In fact, the analysis of the degree of interaction by team and by university of origin is one of the key to highlight potential biasing factors that are due to local practices/familiarity as well as by the style of conducting the supervision of teams by academic coaches.

With reference to the first year, it is possible to notice that the highest number of activities took place during the first weeks of the project for two teams. Then, with a similar behavior for all the teams, proceeded with a regular pace that did not record particular accelerations, nor by team (Figure 2, 1st row, left) or university (Figure 2, 1st row, right).

With reference to the university of origin (Figure 2, 1st row, right), it appears clearly that students from the University of Zagreb had a more intense interaction with the platform. Probably this is a consequence of their higher familiarity with the Moodle instance implemented for the ELPID class, which was completely coherent with the system already in place for the standard classes held at that university. Lower degrees of interactions are evident just for the students from the University of Ljubljana.

During the second year, the differences emerged in the first year were definitely less evident. All the teams started interacting with the platform with a similar degree of involvement, which remained approximately constant for 4 teams out of 5, with the only exception of team E, who had a more significant interaction with the platform until the end of the ELPID class. This degree of interaction appears to be more intense than the previous ELPID year (many more than 2k interactions). The remaining four teams appeared progressively to stop using the platform, as the rate of growth of their interaction is almost negligible (Figure 2, 2nd row, left). The lack of a stronger interaction with the platform at the very beginning of the project could be potentially explained with a set of guidelines the students were provided with during the ELPID workshop carried out in Lecco. This helped students to figure out what they could do with the Moodle platform, thus reducing their need to explore it and learn how to interact with its functionalities.

From the perspective of the university of origin (Figure 2, 2nd row, right), year 2 also shows differences with year 1. There are no clear differences between the 4 institutions in the degree of interaction with the platform. These data, crossed with the ones represented in the left column for year 2, suggest that most of the growth for the interactions count with the Moodle platform depends on team E, whose members were equally carrying out.

For what concerns the third year (last row of Figure 2) there is an even lower degree of interaction with the platform, as confirmed by the data presented in Table 1. As for year 2, the students received guidelines to interact with the Moodle platform and its functionalities. This, probably, did not require them to interact intensively with the platform at the beginning of the class to learn its main features and the relatively constant degree of interaction during the semester show that they accessed it regularly, despite for a very small subset of its functionalities. Differences by team are a little more evident, as team C almost doubled the interactions of the second team considered.

From the perspective of the university of origin the trend of interaction is pretty similar across the four institutions with a slightly higher prevalence for the University of Zagreb, that can be explained with similar considerations raised for the first year of the project.

Type of activities carried out on Moodle during the three years of ELPID classes

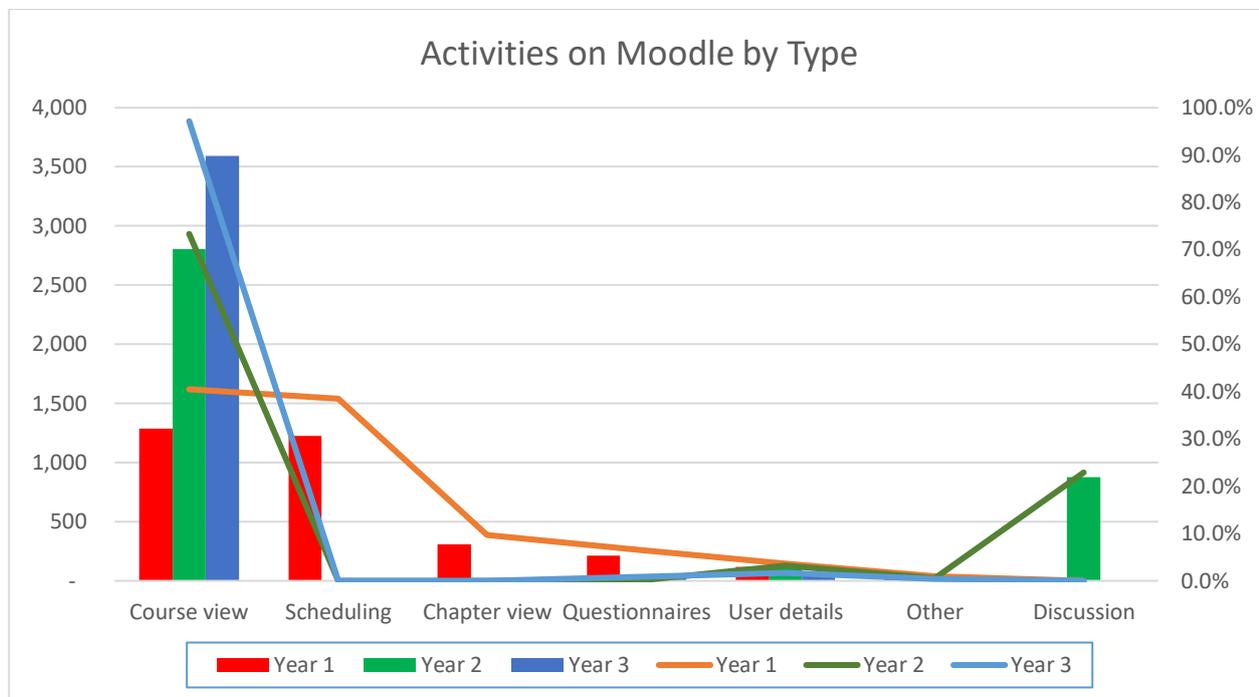


Figure 3: Activities carried out by the students on the Moodle platform, by type and by year. Bars for actual values, lines for ratios.

Figure 3 shows the distribution of activities carried out with the Moodle platform by type. The diagram presents two y-axes: one on the left and one on the right hand side. The former provides the actual number of activities, while the latter provides their ratio, measured with reference to the complete set of activities carried out by the students in one of the years in which the ELPID course took place. The height of the bars is to be referred to the y-axis on the left hand side. The vertical position of the lines to the y-axis on the right.

The diagram shows that most of the interactions, during the three years, that the students carried out with the platform referred to viewing the materials the academic staff provided them to address the design task or challenge that they had to carry out during the ELPID semester.

For what concerns the first year, the red bars are shorter and distributed more uniformly than the bars referring to the other years. This slightly higher balance among the different categories of activities, in fact, is also witnessed by the lower position of the orange line. More specifically, the red bar about scheduling show a similar degree of interaction with the platform by the students, suggesting that Moodle was also used in order to organize and plan meetings among team members and together with the coaches. However, the sudden drop of this functionality after the first year show that the Moodle platform, despite it integrates a scheduler, was not used as the elective tools for this purpose. This also suggests that the students found different solutions that they used as a valuable alternative for the same purpose. Students also used the platform to answer questionnaires developed by their coaches in order to evaluate the quality of support they received by the same and the degree of collaboration by their team members, with a peer evaluation logic. Unfortunately, the Moodle platform logging system does not record this activity the same way after its update in the second year, as these items disappeared from the activity logs despite the

students filled in coach and peer evaluation questionnaires every ELPID year (these items were probably absorbed by the “course view” activities).

For what concerns year 2, it is important to notice how the Moodle platform enabled the discussion, as approximately 30% of the activities carried out in that year belong to that category. This happened as one of the coaches asked the team supervised during the ELPID course to carry out the discussion by means of the Moodle platform functionalities. Crossing these results with the data plotted in Figure 2, 2nd row, 1st column, it is possible to highlight that it was Team E. The team, in fact, had this kind of information exchange with their coach, with sudden increase of discussion activities that, in time, approximately correspond to the shift between phases of the projects (e.g. before the review with the company at the end of one phase as well as right after that). In year 3, according to the easier communication made available by Microsoft Teams, the activities belonging to the discussion category became negligible.

A category of activities that does not appear to be numerically significant during the three years is the one about the capability of the platform to inform other users about the details of their peers (e.g. email addresses, the right spelling of names and surnames...). The small number of activities of this kind, however, is the one which remained approximately constant during the three years. This suggests that, as a functionality, the capability of providing a complete address book of peers, coaches and academic staff is necessary and, despite these information were provided in other documents, the students mostly relied on Moodle for a reliable source to find this piece of information.

Type of activities carried out on Moodle during the three years of ELPID classes

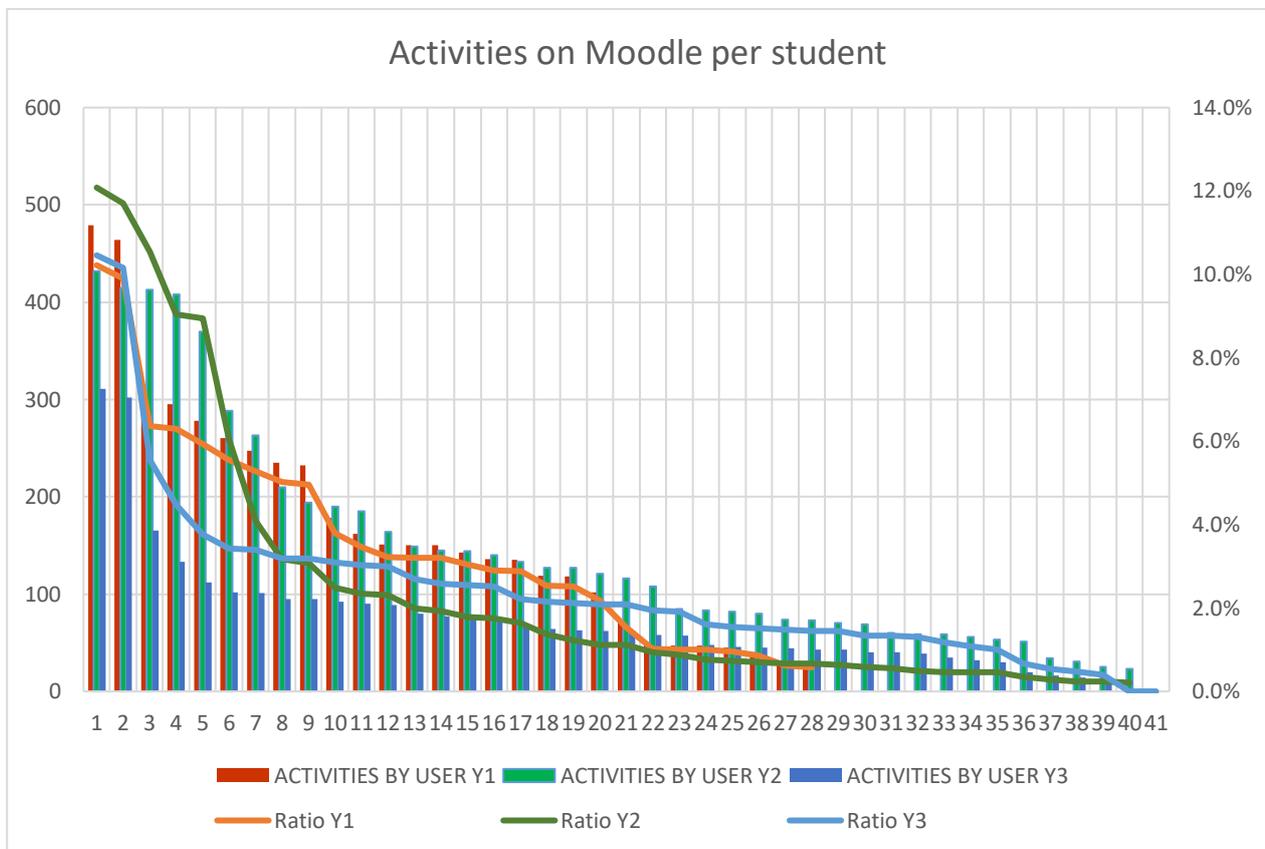


Figure 4: The activities carried out by each of the students involved in the ELPID class every year. The most active students appear on the left hand side of the diagram, with a progressive decreasing trend leading to less active ones on the right hand side. Bars are for actual values, lines are for ratio of activities. The x-axis present students by number of participants: the different number of students involved in the three years, as well as their lack of activities with the Moodle platform, explains the missing bars in Year 1, 2 and 3.

The diagram presented in Figure 4 completes the picture that describes the degree of interaction that the students had with the Moodle platform during the three years of the ELPID project. It collects the data per each of the students that participated in the ELPID semester. Students' names are omitted and all the students are presented on the x-axis with a number. This number also reflect the student's ranking for what concerns the number of activities carried out with the Moodle platform that year (1 → most active student). As for Figure 3, also this diagram has two y-axes. The one on the left hand side refers to actual values. It describes the number of activities carried out by a single student. The y-axis on the right hand side, in turn, is for the ratio of activities that one single student carried out with reference to the total number of activities carried out by him/her and his/her peers during the same ELPID semester. Bars and lines are, respectively, for actual values and for ratios. Thus, they also refer to, respectively, the left and the right y-axis.

The bars show that the number of students significantly active with the platform is very small as at least one third of the whole number of interactions is linked to the activities of approximately 5 students. If the same analysis gets extended to the set of the first 10 students by number of activities carried out on Moodle, the number appears to be even more extreme. During Year 1, the top 10 active students carried out activities for more than 60% of their total number. This means that the remaining 23 students (70% of the 33 participants) carried out approximately the 35% of the activities on Moodle. During Year 2, the top 10 active students (corresponding to one fourth of the 40 participants) carried out more than 70% of the activities –and this could be partially due to the request of running the discussion with the Moodle platform for Team E). During Year 3 the trend is a little less marked, but still evident: the top 10 active students (on 41 participants) carried out more than 50% of the whole activities recorded by the Moodle logging system.

It is also worth noticing that during Year 2 all the participants carried out at least some activities with the platform: the least active student carried out 23 elementary activities, just for the occasion of the first login to the platform, without any other additional activity carried out during the course. On the contrary, during Year 1 and Year 3, part of the students participating to the ELPID semesters did not interact with the platform at all. They were 5 out of 33 during Year 1 (approximately 15%) and 2 out of 41 during Year 3 (approximately 5%).

General considerations

All these data show that students find the Moodle platform, at least for the implementation of a Project-Based Learning course carried out with blended modalities, as not fully functional for their needs. Most of the activities with the Moodle platform took place during the very first days of the activities, unless the students are explicitly asked to behave differently. This behavior can be explained with the need of exploring and checking the platform functionalities: once the students understand what Moodle enables them to do, they decide to progressively abandon it except for some of its functionalities that are not available elsewhere, such as the questionnaires (which the coaches implemented in here, despite equally functional alternatives are available).

This is also witnessed by their own voice, as recorded during the interviews carried out during or at the end of the ELPID semesters. For instance, different teams clearly pointed out that Moodle was just used as an aggregator of contents, as it presented links to other sources as well as files about the lectures they attended during the semester or at the beginning of their project, during the initial workshop. The following excerpts of the transcripts of their interviews clarify this point:

Q: "Did you use Moodle, Uh, and in case you did, for what?"

A: «I think just to get to templates and information and to answer the questions after each phase. But uh, other than that I don't think so. Questionnaire and file repository, nothing more.»

Q: *"But Moodle for what?" For exchanging [info]?*

A: *"Seems for the first and second Phase I went through these two or three presentations that were there, but I don't know what else."*

A: *"Uh, we actually didn't use Moodle at all. Only for the, uh, the How is called the... Question is.. questionnaires"*

A: *"at the beginning of the phase, [the coach] told me what should I read where, some useful information and I only found it. Those, the literature on the model and that's it."*

A: *"We mostly used Moodle for posting committing agenda and meeting minutes. Uh, but besides that, with it we exchange some information with Nicola. Also about reports, writing and report. We haven't used it to extensively."*

Moreover, the fact that the students stopped using Moodle to plan their work also emerged during the interviews, when they described how they started using different platforms for the same purpose. Here are a few elements transcribed to highlight how they preferred to use Trello as a Project Management tool to plan and distribute tasks among the different team members and that this kind of planner is not really a necessity for some of the teams.

A: *"Uh, Trello, we didn't really use much."*

Q: *"So how you how you organize yourself?"*

A: *"Basically we divided tasks for people and who's responsible and then we can actually everything wrote it in the meeting minutes."*

This also emerged during the discussion with other teams:

Q: *"How did you organize your work?"*

A: *"We created the Gantt charts, which no one actually looked, but the Trello was one that we try to update weekly. [...] I think that they should receive the emails with their tasks. So I think that we updated it quickly and tried to follow that. So until the end of the project"*

A: *"[Trello] was for let's say to put a final objective that is a final card, and then in some like internal communication on WhatsApp."*

A: *"Uh, but then I put all the task on Trello. With description and everything. [...] I think all we mainly use the phone, cloud and Trello".*

These last excerpts also highlight that the communication among team members took place through different means, without a single ICT tool that works as the reference one for everybody. This choice is generally fluid and depending on most of the team members availability to access the platforms. This probably explains why most of the teams decided to use WhatsApp in order to share information and contact the whole team or part of its members. The following part of the transcripts from the interviews highlight this.

A: *"we were divided by... by pairs and we continued the communication through a WhatsApp Group. So yeah, we communicated. I would say quite well. It wasn't like a meeting and then one week of no communication but like a voice or verbal communication was like once or maybe twice per week."*

A: *"Uh, we we I think so we had like together all of the meetings and WhatsApp Group like with the all A team eight members but we had a separate group that left from the first like month first phase with the Slovenian guys and there we could like... We discussed a bit more"*

A: *"Of course there were some exchange of information or what they exchange of what they think about the best thing [to do], but this was mostly done on I think WhatsApp and through like private messages".*

Then, it is also important to consider that Moodle does not fully enable the collaboration required during a collaborative Project-Based Learning activity, unless extended with some add-ons, whose ease of use is not well demonstrated as the results of the interactions recorded by the log files witness. Students needed a shared whiteboard/white wall to externalize and visualize their ideas in order to share them with their teammates. Despite they received suggestions about multiple alternative ICT tools available for free in the internet, most of them decided to use Miro.

Q: *"How did you share ideas and how did you collaborated during the sessions?"*

A: *"We tried to do a brainstorm session on Adobe Connect and uh on Miro. Uh, so after we did those, uh solution finding we put all things together in morphology matrix".*

A: *"Oh well, for the collaboration we used Miro quite extensively. We worked quite a lot and like brainstorming on Miro, uh, we also use it for presentation of that we had on... on meetings. I think Miro is very useful for collaborating because a lot of people can work on it at the same time".*

A: *"Actually all of the functions we created in Miro. I shared my screen or they share their screen. We went through. Like with the mouse showing the specific functions..."*

Q: *"To what extent you use Miro?"*

A: *"In the second and third Phase. In the second phase we did the problem framing and the morphological table there and it was quite useful."*

For these reasons, beyond text editors, spreadsheets and CAD tools, it is necessary to think about the integration of means that make possible, for students, to directly interact in a synchronous way by visualizing in real time what the others are doing. Miro, from this perspective, offers them the possibility to access a different way of communication, as it potentially complements written communication (text editors), numerical communication (spreadsheet), geometrical communication (CAD tools) with a less structured but more versatile style of communication (i.e. sketching and creating diagrams and/or mind maps).