
SITUATION ANALYSIS REPORT OF THE QUESTIONNAIRES FOR STUDENTS



www.codeisloading.com

Empowering

**the digital leaders of
today and tomorrow**



www.codeisloading.com

   /codeisloading

SITUATION ANALYSIS

REPORT OF

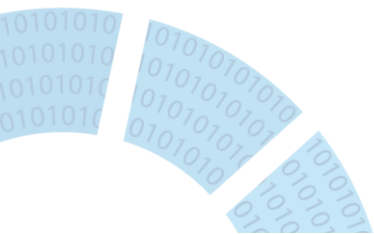
QUESTIONNAIRES

FOR STUDENTS

RESULTS OF QUESTIONNAIRES TO DETERMINE
STUDENTS' ATTITUDES TOWARDS THE CODING
AND PROGRAMMING

November, 2019

Albacete, SPAIN



Index

Introduction.....	4
The Universe.....	4
Methodology	4
Results	6
Preliminary questions.....	6
Previous Experience	9
Classroom Environment	13
Programming languages perception	15
Expectations	21
Conclusions.....	25
References.....	27



Introduction

The Universe

This study wants to determine student attitudes towards coding and programming. The main objective is to know the programming languages in which the students from different countries are interested and their thoughts and perspectives about programming.

Methodology

This section describes the methodology and the specific objectives of our study. In relation to the first aspect, the starting information of this study comes from a survey carried out for a sample of students of secondary schools (from seven different European countries) by answering to a questionnaire through Google Forms. We show the technical study sheet in Table 1. The sample is made up of High School students from seven countries (United Kingdom, Hungary, Italy, Poland, Portugal, Spain, Turkey).

Table 1. Study Technical Sheet

Universe	High-school students
Scope of study	secondary schools from 7 different countries
Questionnaire design	University of Castilla-La Mancha
Sample size	731
Realization date	April 2019
Data recording	Albacete Informatics Research Institute
Analysis and Report	University of Castilla-La Mancha

The questionnaire is divided into five scales: the profile, previous experience, classroom environment, programming perception and programming language. In order to design the survey, we followed the guidelines of the next authors: Krosnick (2018), Bradburn (1079) and Blair (2013). Questions related to interest, perceived competence, effort, pressure and usefulness have been inspired by The Intrinsic Motivation Inventory (IMI) scale (Deci,



1994). This survey is a multidimensional measurement tool intended to assess participants subjective experience related to a target activity.

The specific objectives were:

- To collect some preliminary data related to age, gender, country, institution and the speciality at school (electronics, science, technology, engineering, biology, etc). They had to respond two multiple-choice questions (age and gender) and three open-ended questions (country, institution and speciality).
- To know the previous experience with programming. They had to respond to nine questions related to the programming languages and devices they know (seven yes/no questions and two multiple-choice questions).
- To know the interest and curiosity of students in programming (three yes/no questions).
- To know how students perceive themselves when programming (three yes/no questions).
- To know if they feel pressured when they have to program (four yes/no questions).
- To know if they think it's useful to know how to program (five yes/no questions).
- To know their future expectations related to jobs and programming (three yes/no questions).
- To know which programming languages they know. They had a table with a list of programming languages and they had to answer "yes", "I don't know" or "no".
- To know which programming languages they think are useful. They had a table with a list of programming languages and they had to answer "yes", "I don't know" or "no".
- To know which programming languages they think are funny. They had a table with a list of programming languages and they had to answer "yes", "I don't know" or "no".
- To know which programming languages they think are easy to learn. They had a table with a list of programming languages and they have to answer "yes", "I don't know" or "no".
- To know which programming languages they think are the most demanded by companies. They had a table with a list of programming languages and they have to answer "yes", "I don't know" or "no".



Results

Preliminary questions

We started asking for some preliminary data. First of all, we asked about the age of the students. The results are shown in figure 1. Most of the students are in the range of 14-16 years old.

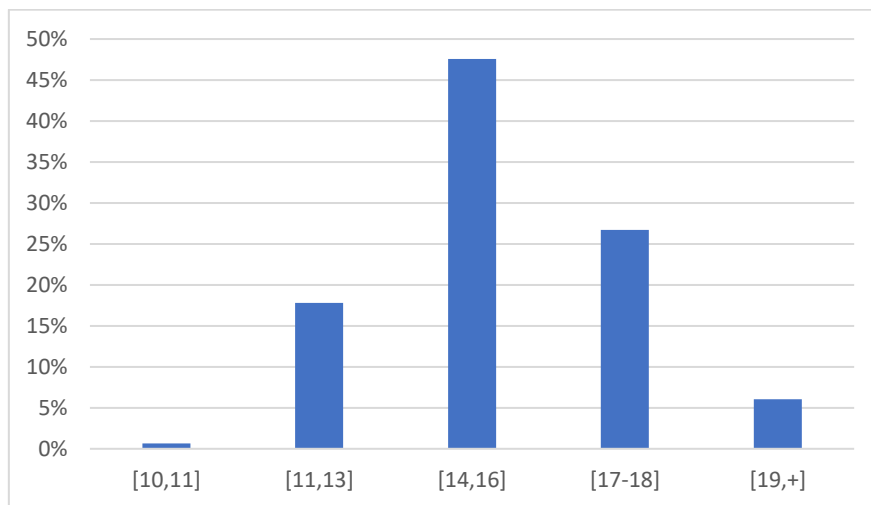


Figure 1. What is your age range?

Regarding the origin country, there are some differences: in Hungary and Italy, the majority of students surveyed were in the range 17-18 years old. In Poland, Portugal, Spain and the UK in the range 14-16 years old. Only in Turkey, the majority of students were of 11-13 years old. We can see these results in figure 2.



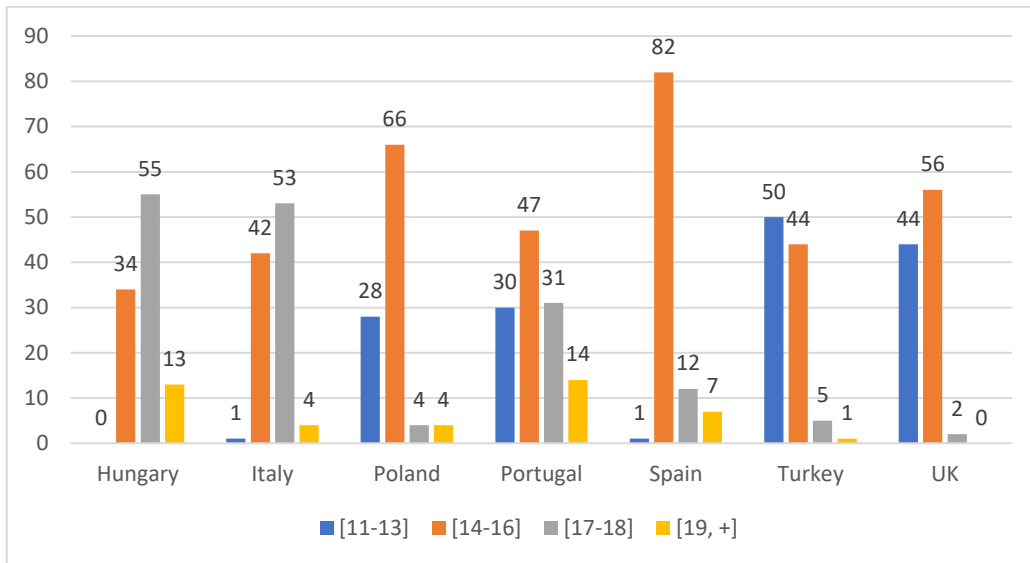


Figure 2. What is your age range? (by country)

Gender was balanced in general (see figure 3), which is fantastic. However, there were some differences depending on the country (see figure 4). In Portugal, there were more boys whereas in Italy more girls.

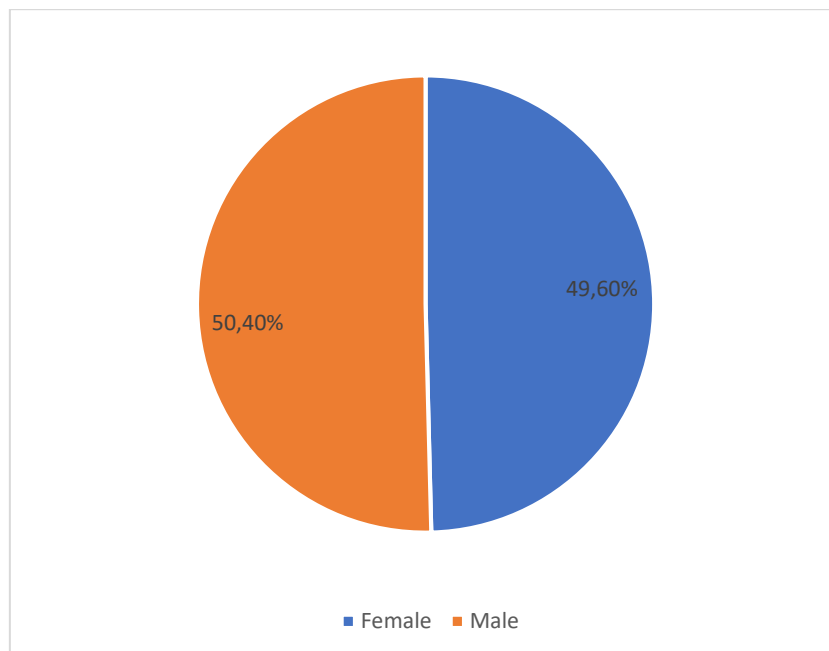


Figure 3. What is your gender?



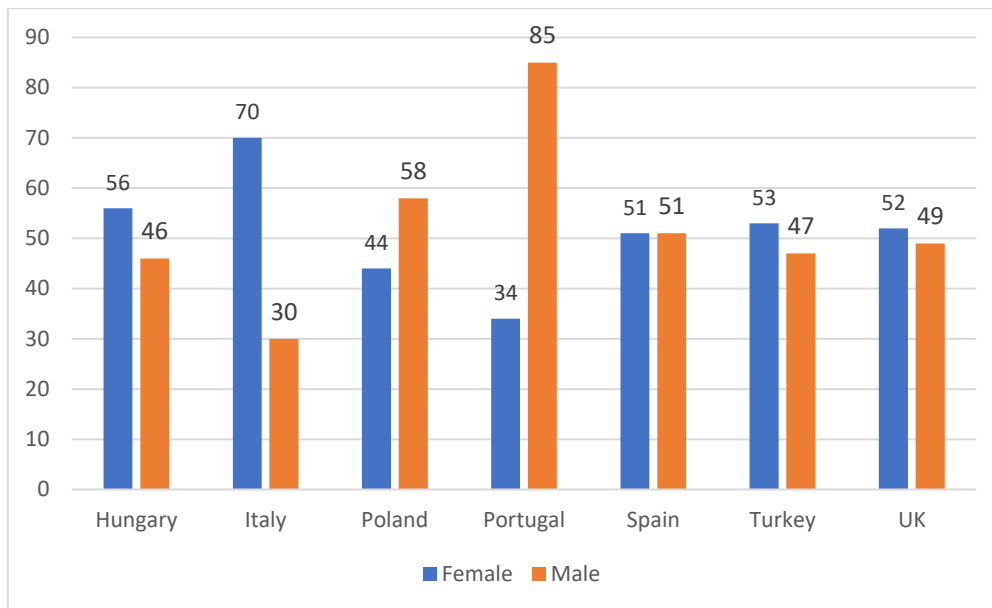


Figure 4. What is your gender? (by country)

When asking about language programming in general, the answer was also quite balanced (see figure 5).

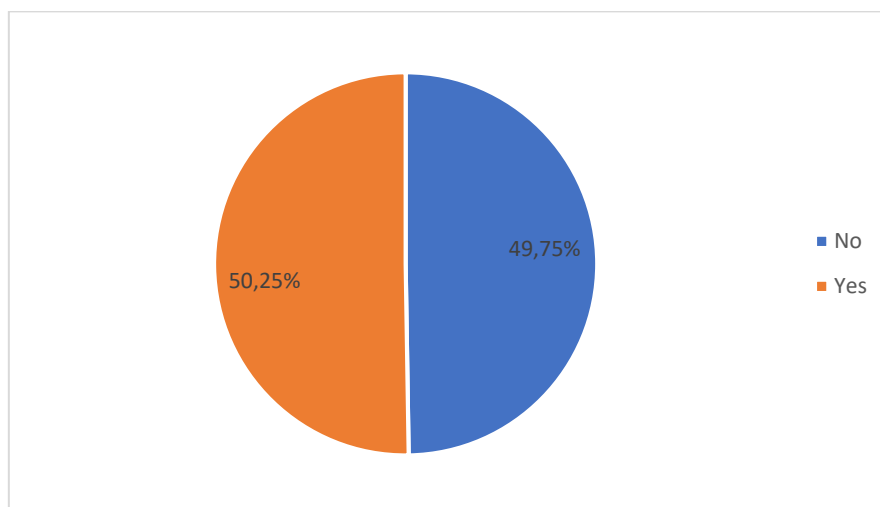


Figure 5. Do you know any programming language?

By country, there were some differences: in Turkey, Poland and Italy majority of students answered “no” and in Portugal, Hungary, Spain and UK the majority answered, “yes” (see figure 6).



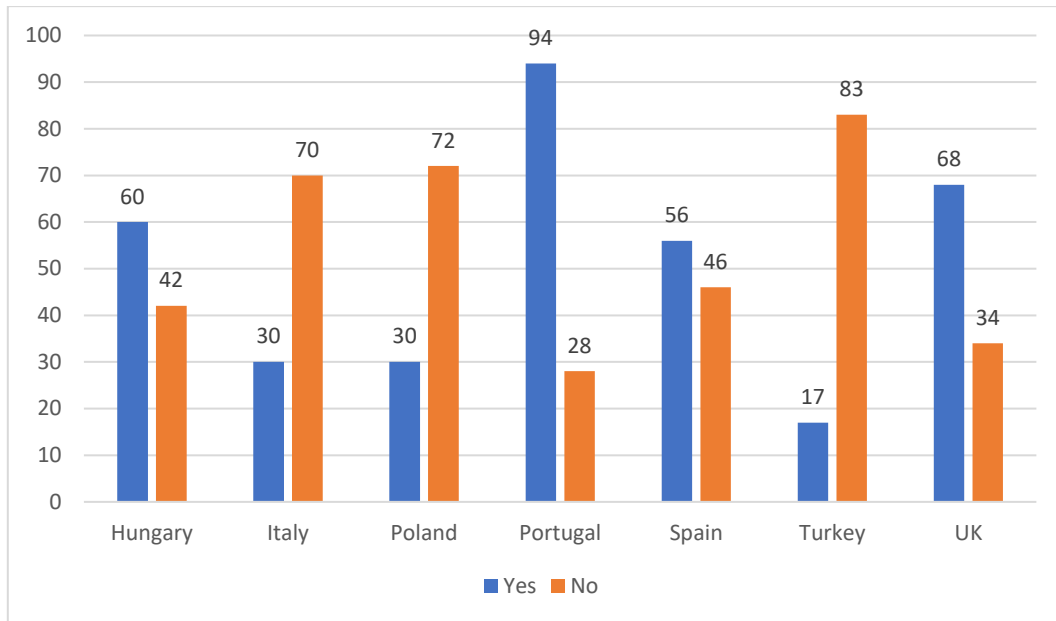


Figure 6. Do you know any programming language? (by country)

Previous Experience

The second part of the questionnaire was related to previous experience.

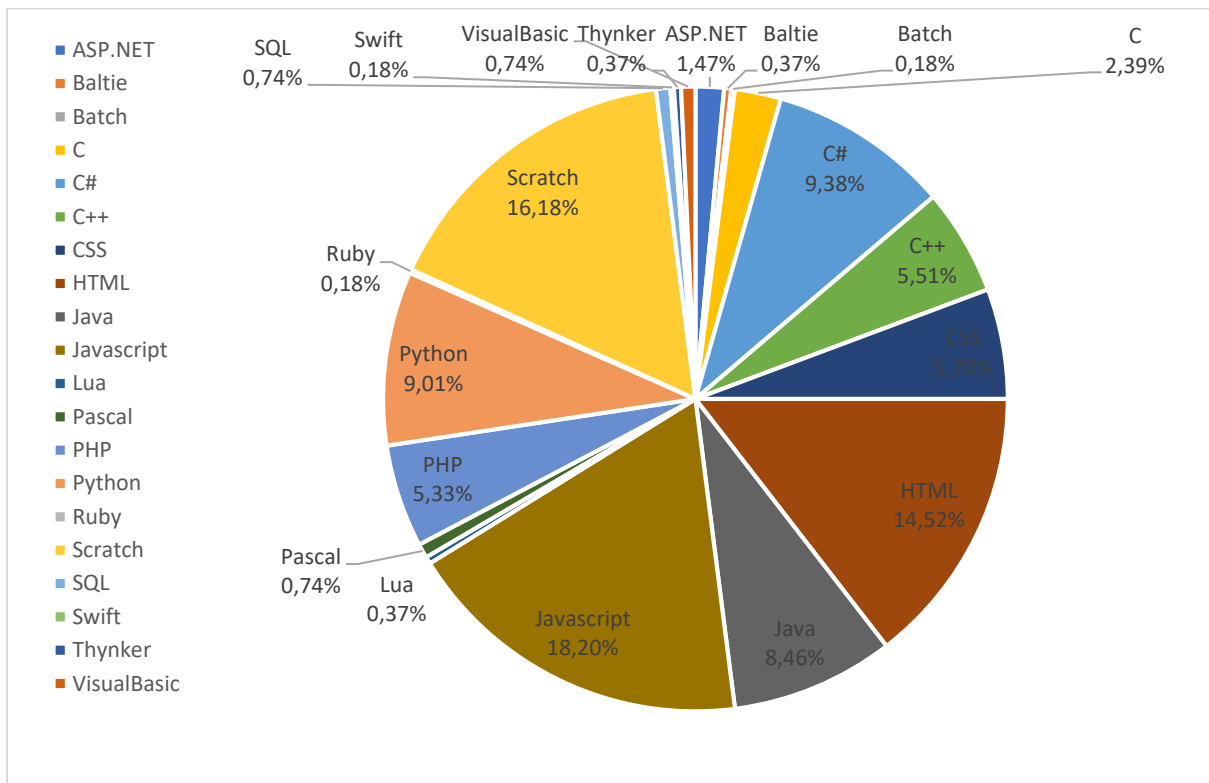


Figure 7. Which programming languages do you know?



Figure 7 shows the general answer to the question “which programming languages do you know?”. There were a lot of languages but the most popular (more than 15% of the responses) were Javascript and Scratch, followed by HTML.

Figure 8 was to determine the teachers’ program developing background. More than half of the respondents answered “no” (53,61%) to the question “Have you ever developed any program?”

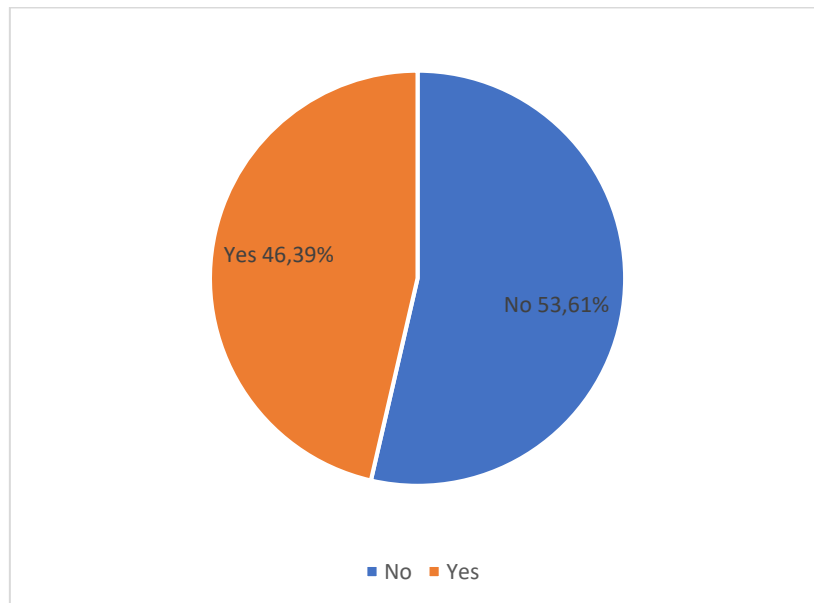


Figure 8. Have you ever developed any program?

We also asked about the frequency of the students’ in making programming activities, where only the 10,91% admitted being programming “every day” (see figure 9).

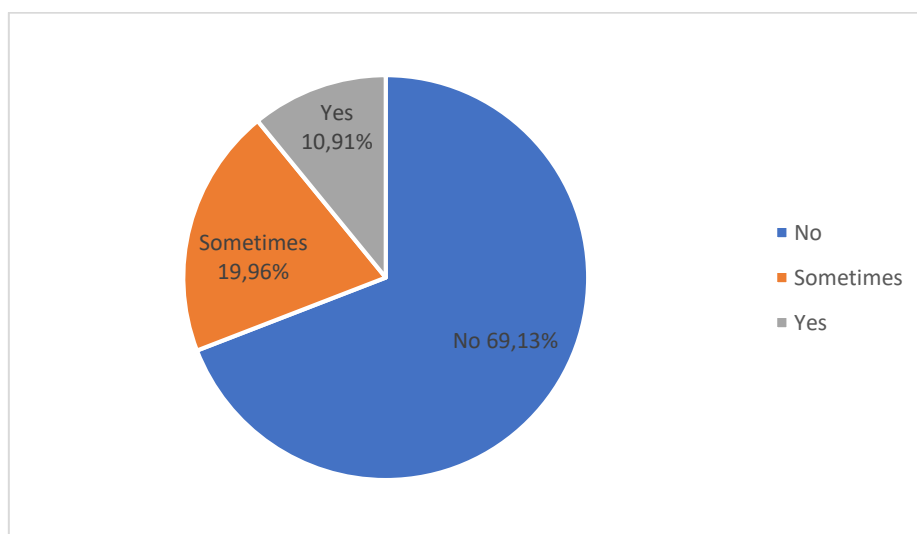


Figure 9. Do you program every day?



Nevertheless, almost half of the students think programming is fun, almost a third think it's funny sometimes and only 20 % think it's not funny (see figure 10). Besides, more than half (63,28 %) think programming activities are very interesting (see figure 11).

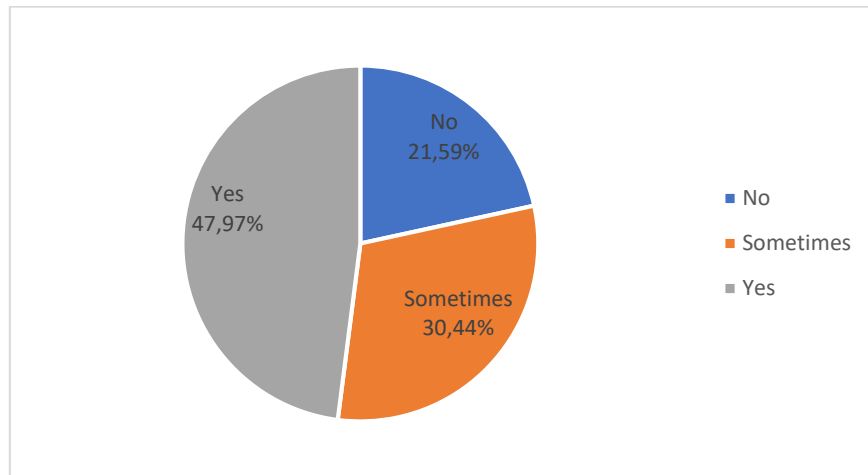


Figure 10. I think programming is fun

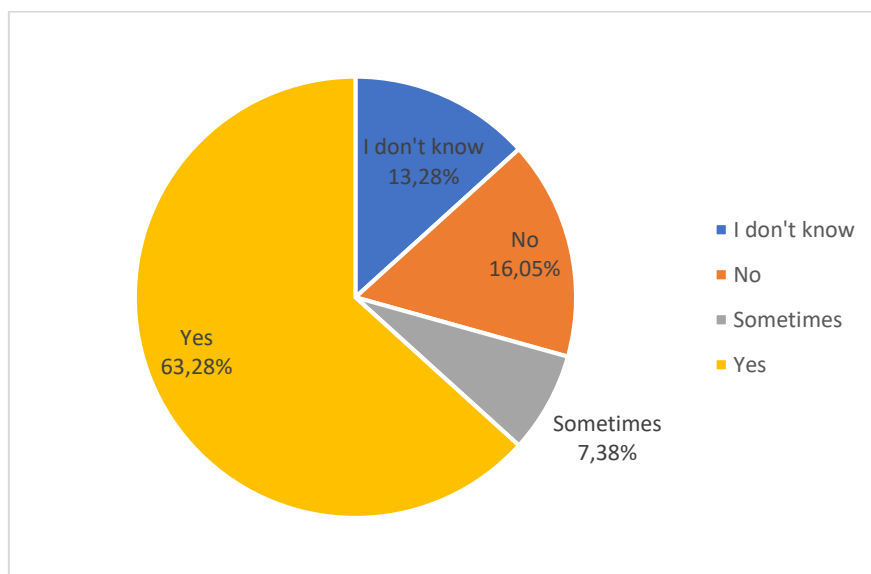


Figure 11. I think programming is very interesting

Although; around 65 % think that programming is interesting, only 23 % think they are good at programming (see figure 12).



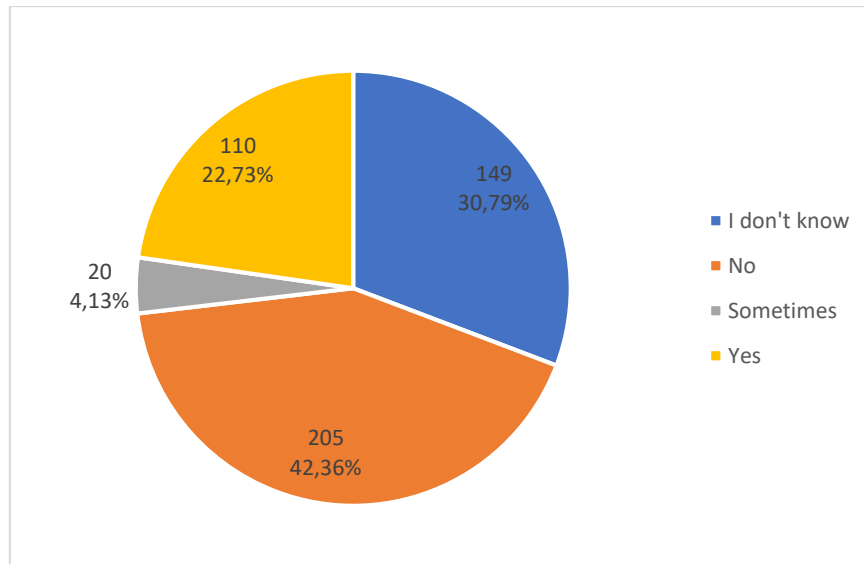


Figure 12. I'm good at programming

Furthermore, a 38 % feel good after programming whereas a 36 % feel good sometimes and 27 % don't feel good after programming. Perhaps these students don't know the programming language in-depth and don't know which data structures or instructions to use (see figure 13).

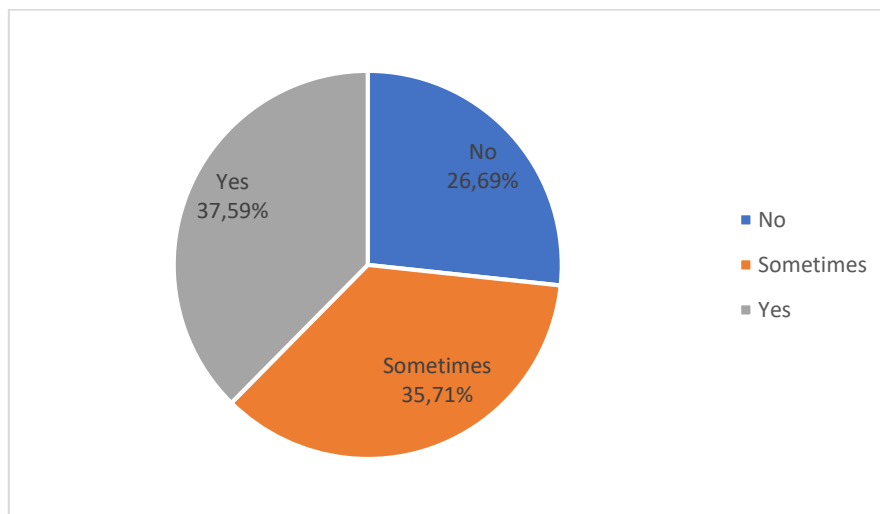
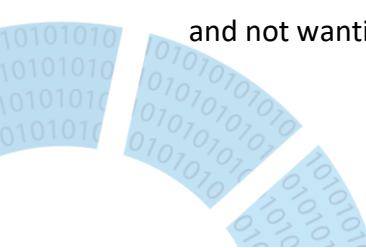


Figure 13. I feel satisfied after programming

The good news is that 65 % of students are not frustrated when it comes to programming. Only 6 % affirm they feel frustrated when they program (perhaps as a result of not knowing the language programme) and nearly 30 % of students sometimes feel frustration. This is a worrying fact because this feeling could lead to abandoning the activity and not wanting to do it anymore (see figure 14).



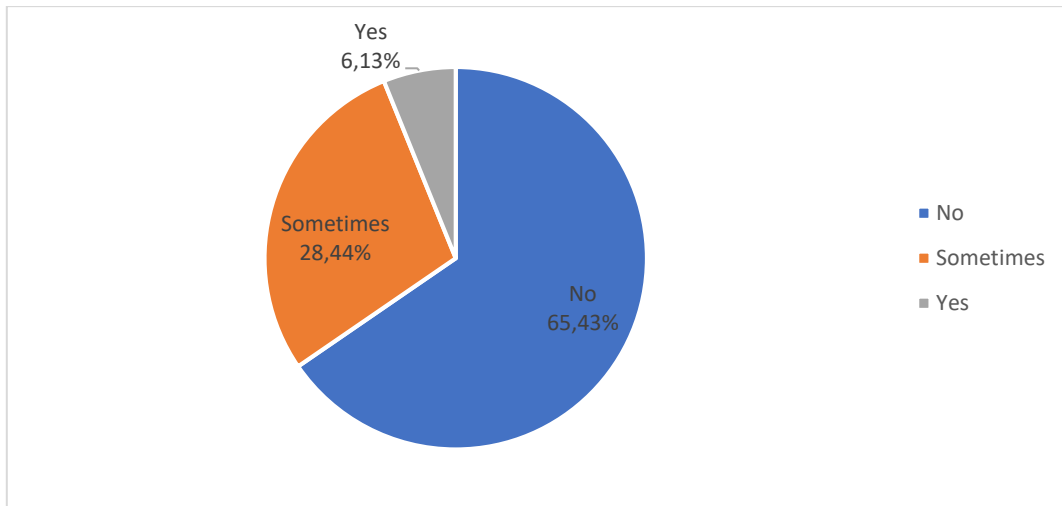


Figure 14. I feel frustrated after programming

Classroom Environment

The third part of the questionnaire was related to the daily activities performed in class. The first graphic in this sense shows their opinion on feeling the need to learn to program. Luckily only 19 % think they don't. 60% think they need to learn how to program and 21 % do not know if they need to learn to program. If we convince this 21% to learn to program and offer a fun way to do so, we will achieve up to 80% of students learning programming languages (see figure 15).

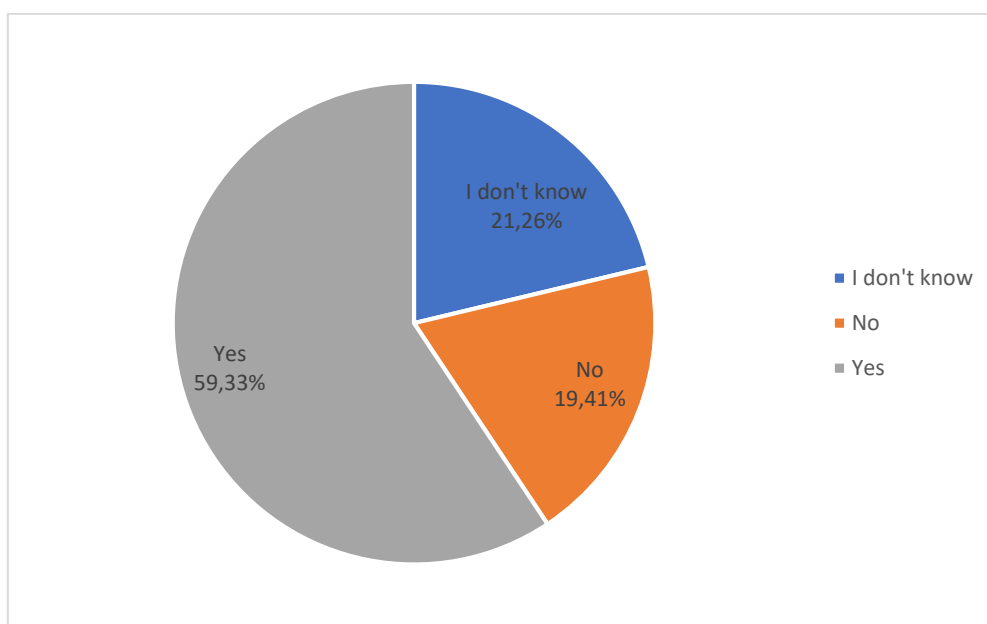


Figure 15. I feel need to learn to program



The next graphic shows the devices used in class. Students use different devices, mainly desktop computers, followed by smartphones and laptops (see figure 16).

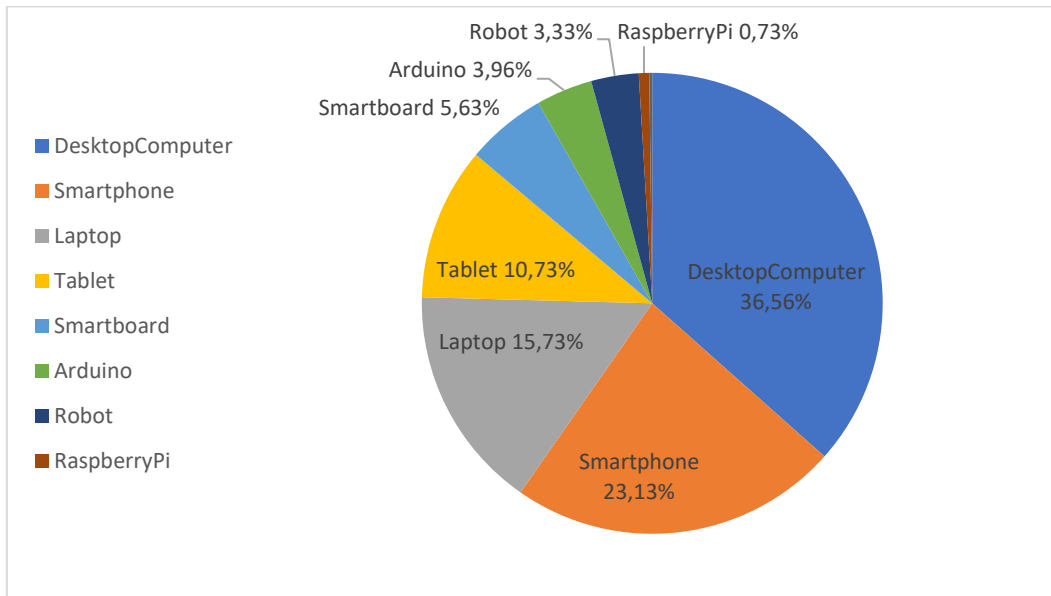


Figure 16. Which device(s) do you use in the classroom?

Nearly 50 % of students responded positively to the question about their intention whether to be involved in activities related to programming. 5 % of students responded “sometimes” and 21 % were not sure. In total, 75 % of students could participate in the high-school in activities related to programming. These are good news which motivates us to continue working on our project (see figure 17). Besides, 73 % of students like working in groups. This is a very interesting aspect and a highly valued soft skill both at the high-school level and later in the companies where the students will work (see figure 18).

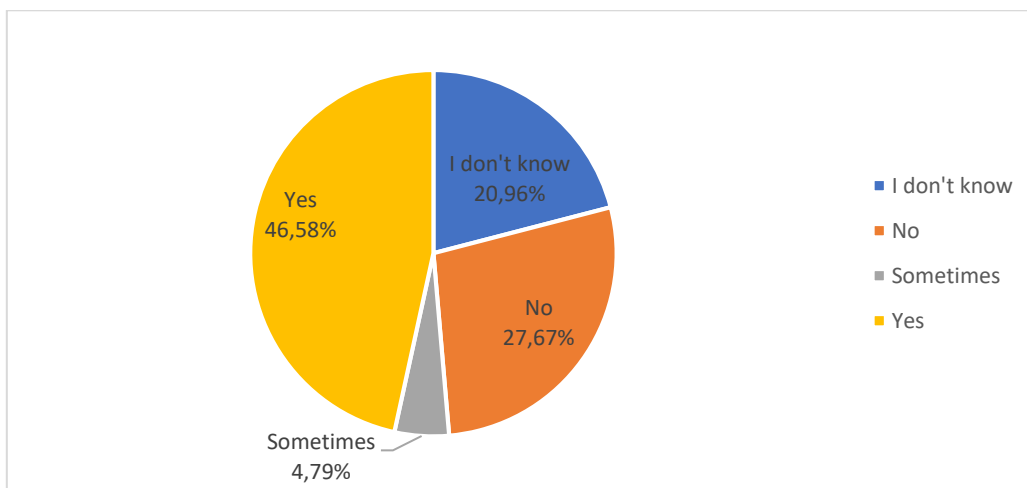


Figure 17. Would you like to get involved in programming activities at your school?



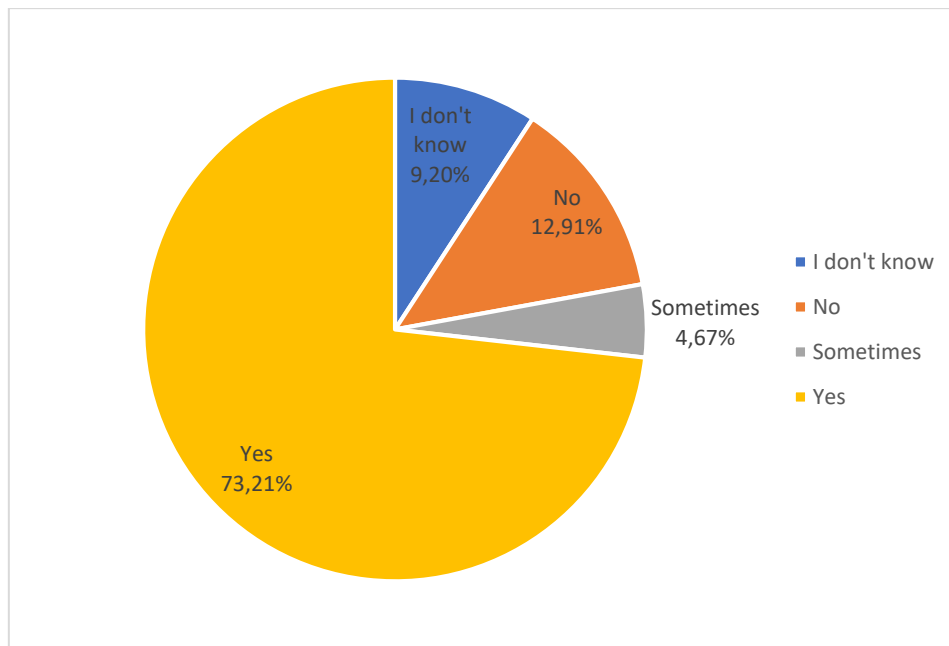


Figure 18. Do you like working in a group?

Programming languages perception

This section is oriented to know more precisely the languages the students know and think are very interesting and more demanded by companies.

Figure 19 shows the answers related to programming languages the students know. They had to respond “yes”, “no”, or “I don’t know”. The language that has obtained the majority of “Yes” has been Scratch followed by JavaScript and HTML. Scratch is the language used in the activity the “Hour of Code” organized by Code.org®. It is a nonprofit dedicated to expanding access to computer science in schools and increasing participation by women and underrepresented minorities. Every student in every school has the opportunity to learn computer science, just like biology, chemistry or algebra. Code.org provides the leading curriculum for K-12 computer science in the largest school districts in the United States and Code.org also organizes the annual Hour of Code campaign which has engaged 15% of all students in the world. Code.org is supported by generous donors including Amazon, Facebook, Google, the Infosys Foundation, Microsoft, and many more (see <https://code.org/learn>).



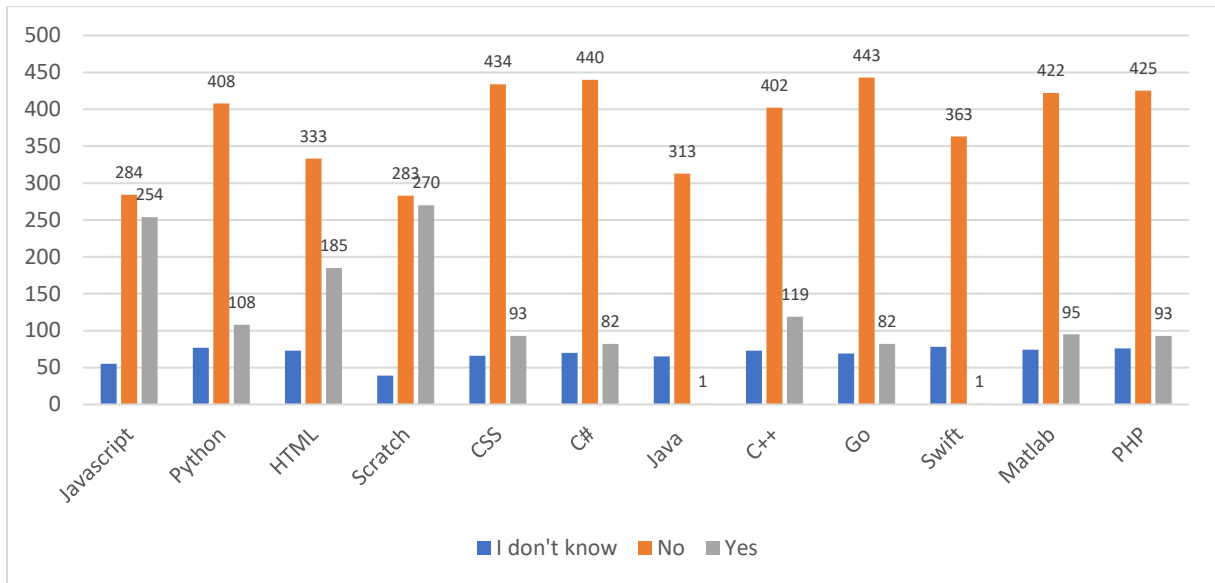


Figure 19. Which of these programming languages do you know?

Figure 20 shows a breakdown of the “yes” answers. 20% of the students answered “yes” for Scratch, 18% for Javascript and 13% for HTML. 19.52% is the highest percentage for a programming language.

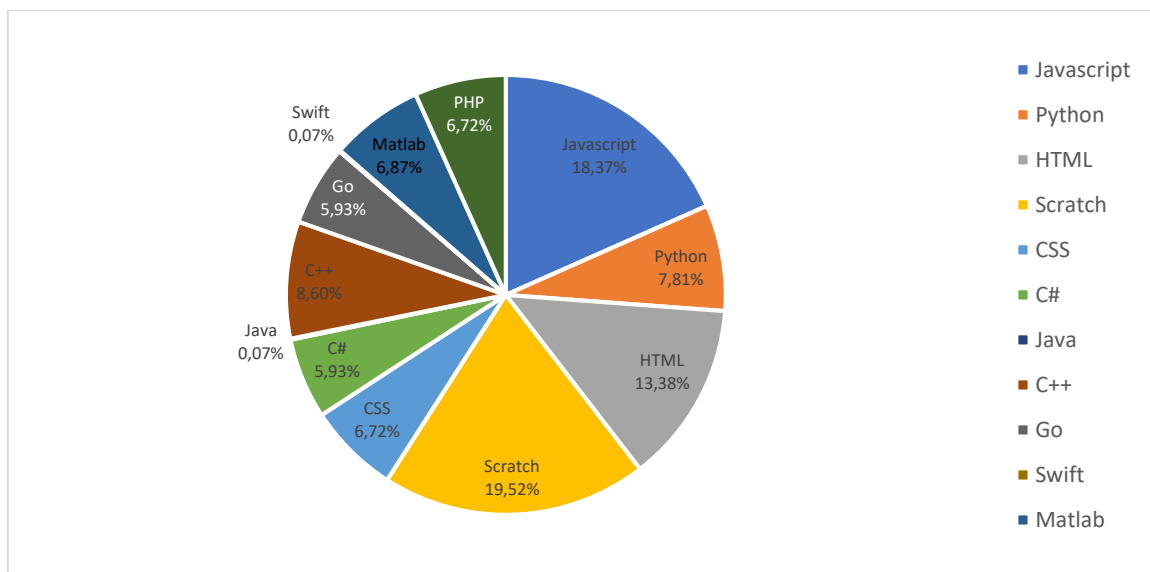


Figure 20. Which of these programming languages do you know? YES

The most unknown programming languages for students are Go, CSS and C#. All values were below %10 ,with 9.74% being the maximum obtained by Go (see figure 21).



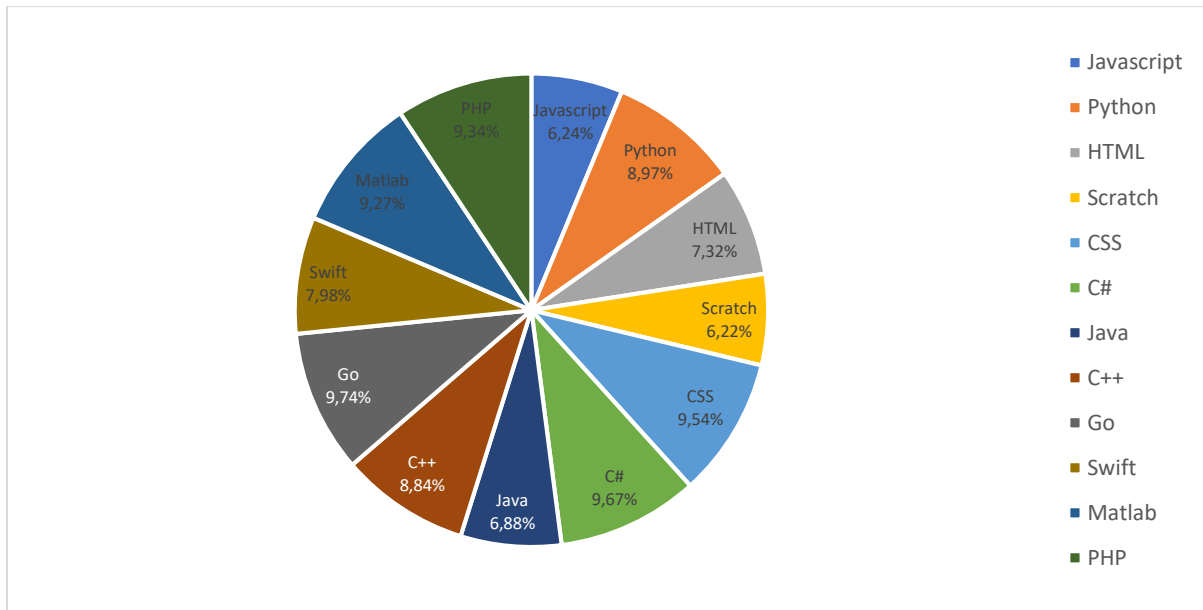


Figure 21. Which of these programming languages do you know? No

In general, as a summary of the above graphics, above 19 % of the students know some of the languages listed in the questionnaire and 70 % do not know them. It is a very high percentage that shows the great lack of knowledge that students have about programming languages. Results like this motivate us to continue working on this project to enable students to learn new programming languages that are sure to be of great use to them (see figure 22).

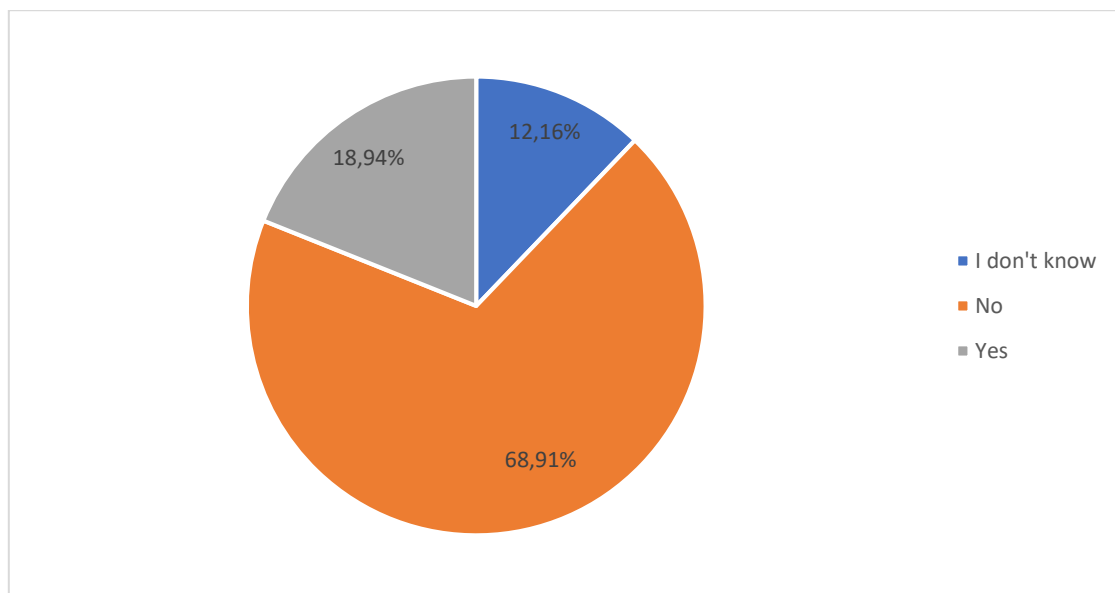
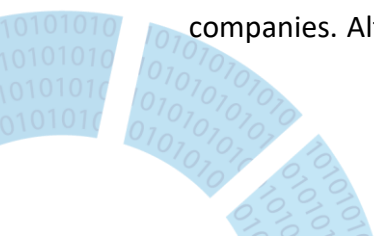


Figure 22. Do you know these programming languages?

Figures 23 and 24 show the students' opinion about the most useful languages in companies. Although the option that has got the most of the answers is "I don't know", we



can see that students believe that the most useful language for companies would be HTML, followed by Java and Javascript.

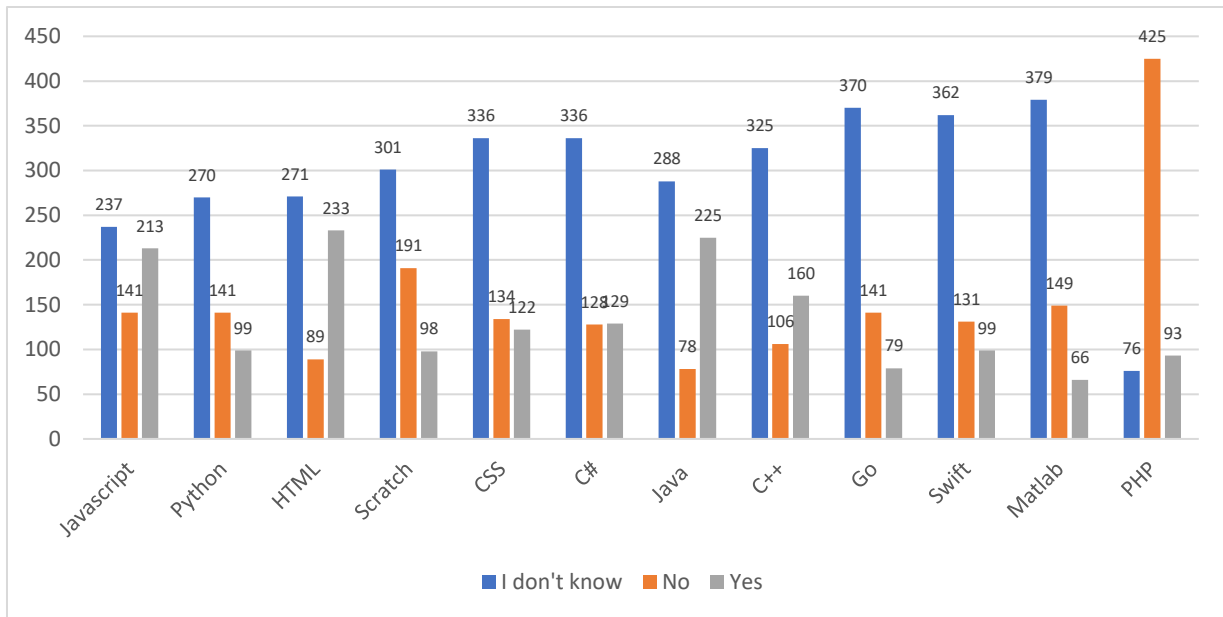


Figure 23. Most demanded programming languages by companies

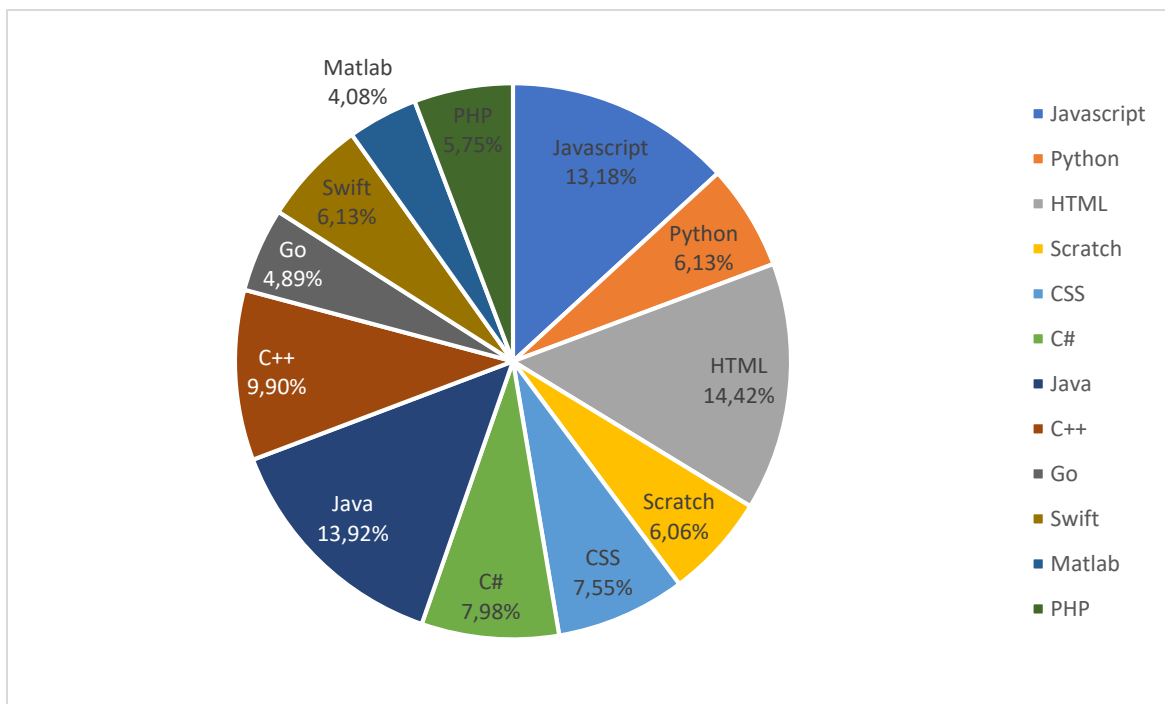


Figure 24. Most demanded programming languages by companies (in %)

In Figure 24 ,we asked them the programming languages that they would like to learn. The answers show that they would mainly like to learn Java, C++ and C#. These languages



have received more than 10 % of the votes. The language with more than 5% of the votes was (from most voted to least voted) Scratch, Javascript, Phython, HTML, PHP and Swift (see figure 24).

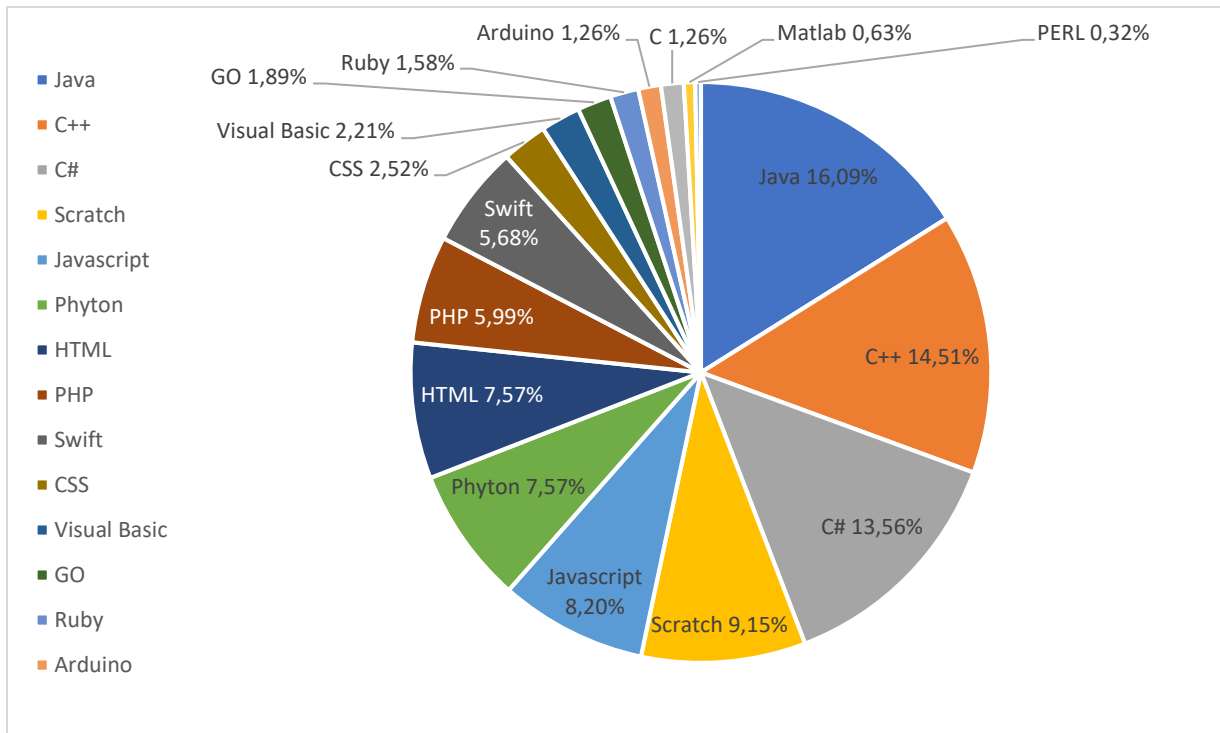


Figure 24. Which programming language would you like to learn?

About the question asking whether programming is important for their professional career, about 60 % of students said “yes”, 25 % said “I don’t know” and only 15 % said “no”. Therefore, 75 % of students might want to learn to program because they believe it would be good for their professional career which has been encouraging results to continue our work on this project (see figure 25).



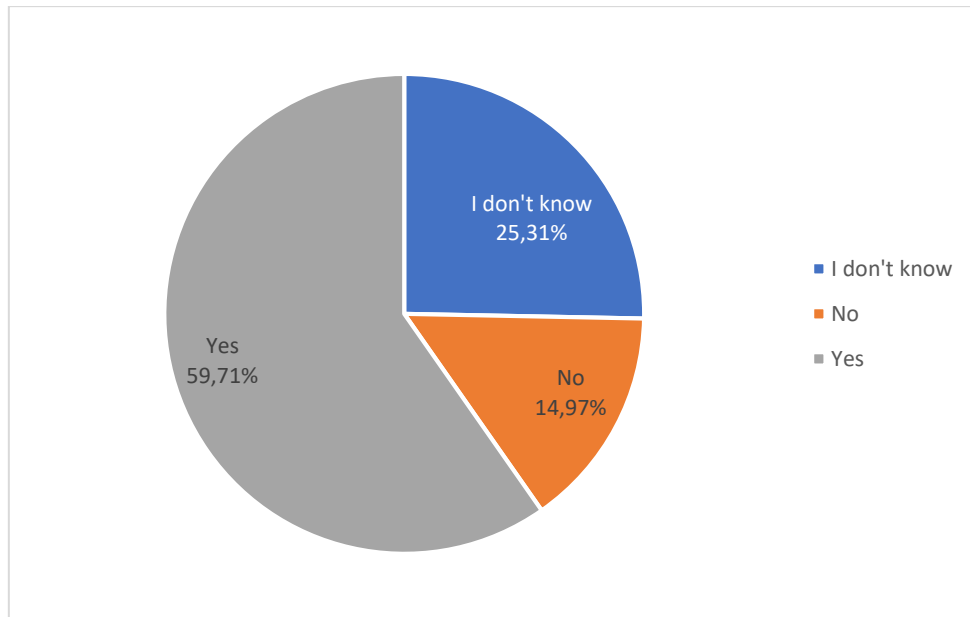


Figure 25. Is programming important for my professional career?

In addition to the results shown in figure 25, figure 26 shows students' opinions about the question related to the usefulness of having programming skills. The 58 % of students said "yes", 26% said "I don't know" and only 16 % said "no". 84 % of students think that programming is a good skill.

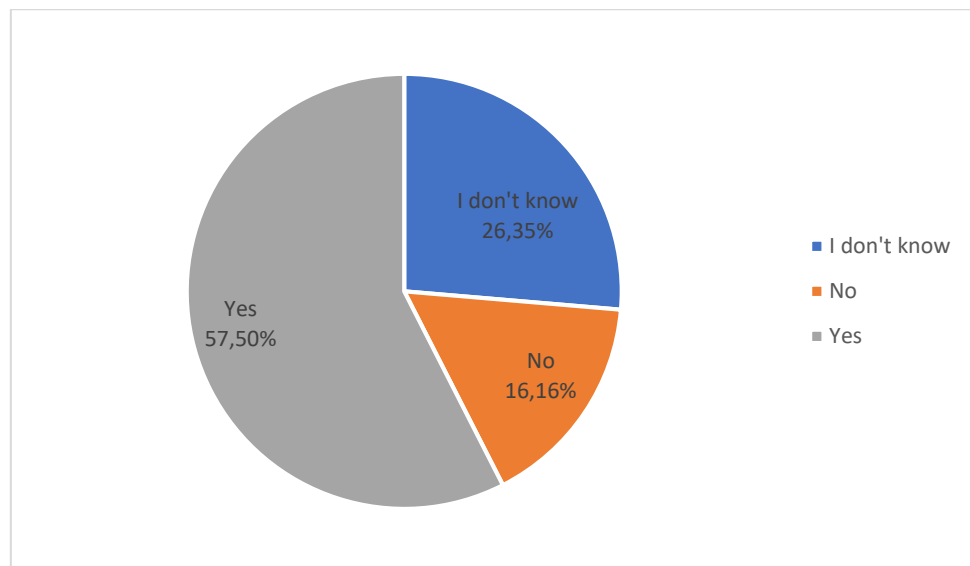
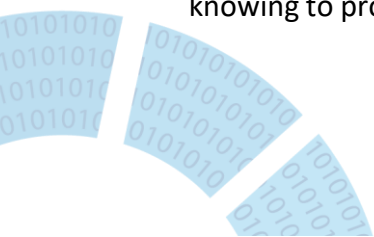


Figure 26. I think that having programming skills is very useful for me

Now, the following question has the intention of making students think about whether knowing to program can help them create new projects to improve society and make a better



world. 63 % of students said “yes”, 20 % said “I don’t know” and only 17 % said “no” (see figure 27).

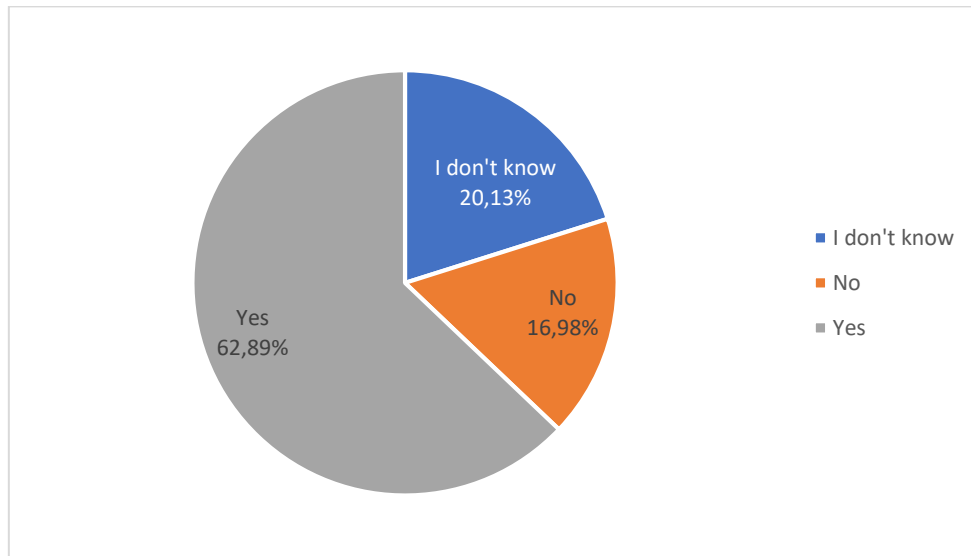


Figure 27. I feel that if I learn to program I will be able to create new projects to improve society and make the world a better place

Figure 28 shows the results of a more materialistic question, will learning programming help them get a good job and earn money? 66 % of students said “yes”, 18 % said “I don’t know and only 16 % said “no”.

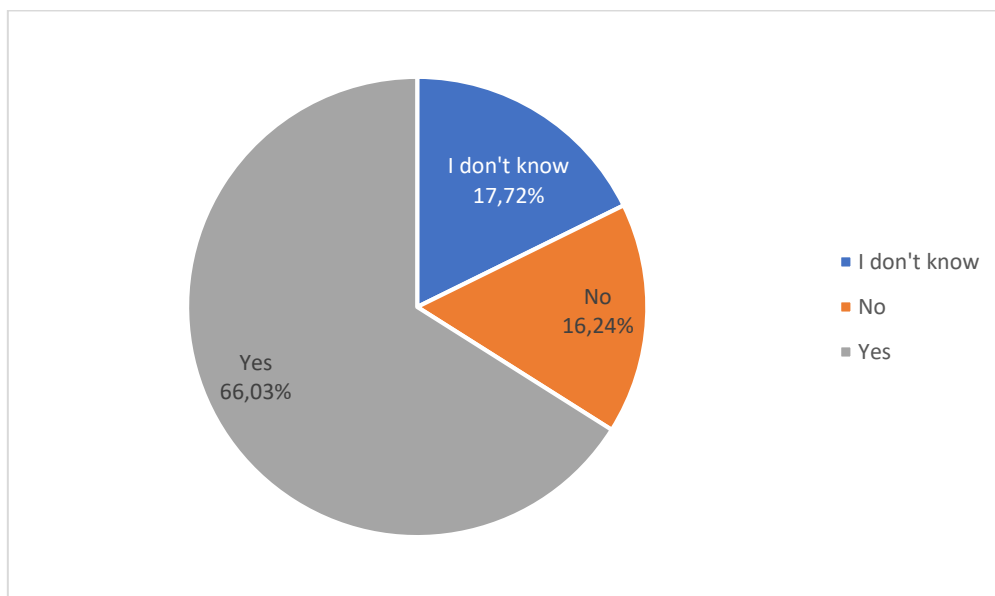


Figure 28. Learning programming will help me get a good job and earn money

Expectations



This is the last part of this report. Now, our intention is that students think a little about the future and tell us their opinion about which ones would be their preferred platforms, the projects they would like to develop and the companies in which they would like to work.

Figure 29 shows their opinions about favorite platforms to develop applications. The three winning platforms were Apple (32%), Windows (25%) and Android (21%).

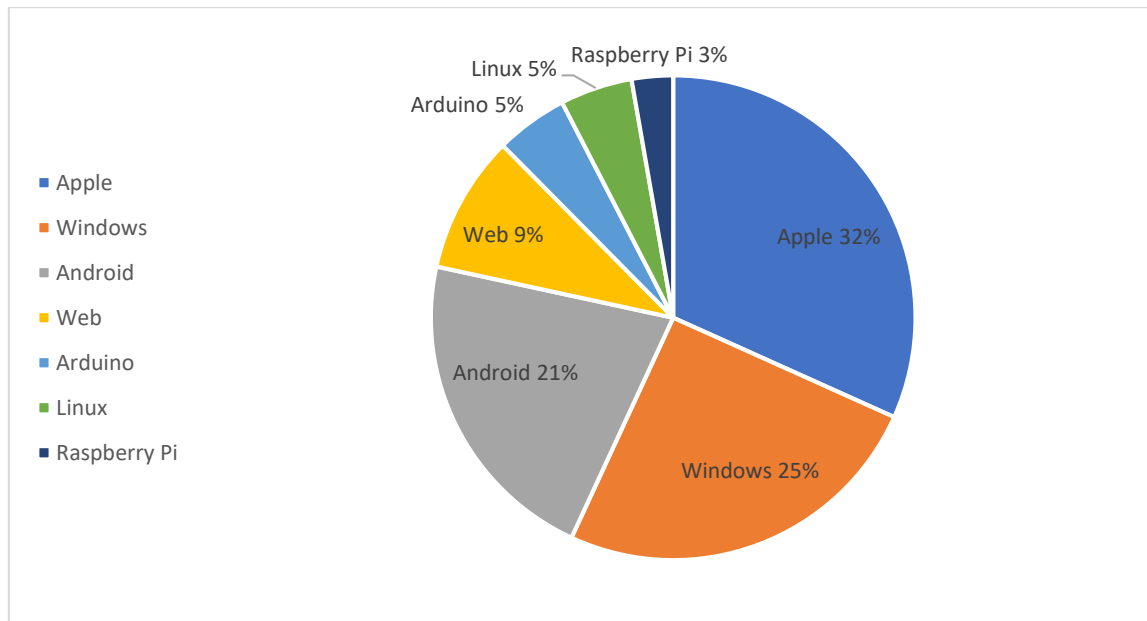


Figure 29. Favourite platforms to develop applications

After the question about platforms, the following one is related to the projects they would like to develop. There are multiple options (games, apple applications, social projects, android applications, web pages, educational projects, aircraft & space lab applications and cultural applications) but the three most-voted applications were Games (23.5 %), Apple applications (14.7 %) and Social projects (14.7 %) (see figure 30).



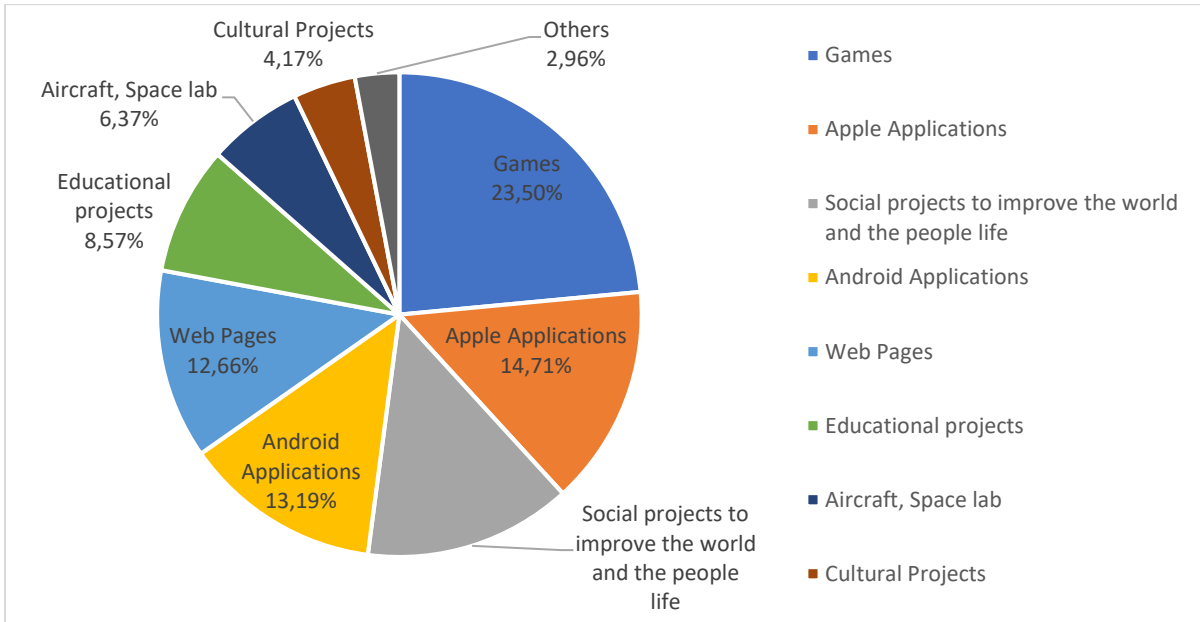


Figure 30. In which kind of project would you like to program?

Figure 31 shows results related to the company where each student would like to get a job. The most voted was Apple with 40 % of the votes, followed by Google (31.5 %). These two companies got 71 % of the votes. Behind them appear Amazon, Facebook, Microsoft and Instagram, among others.

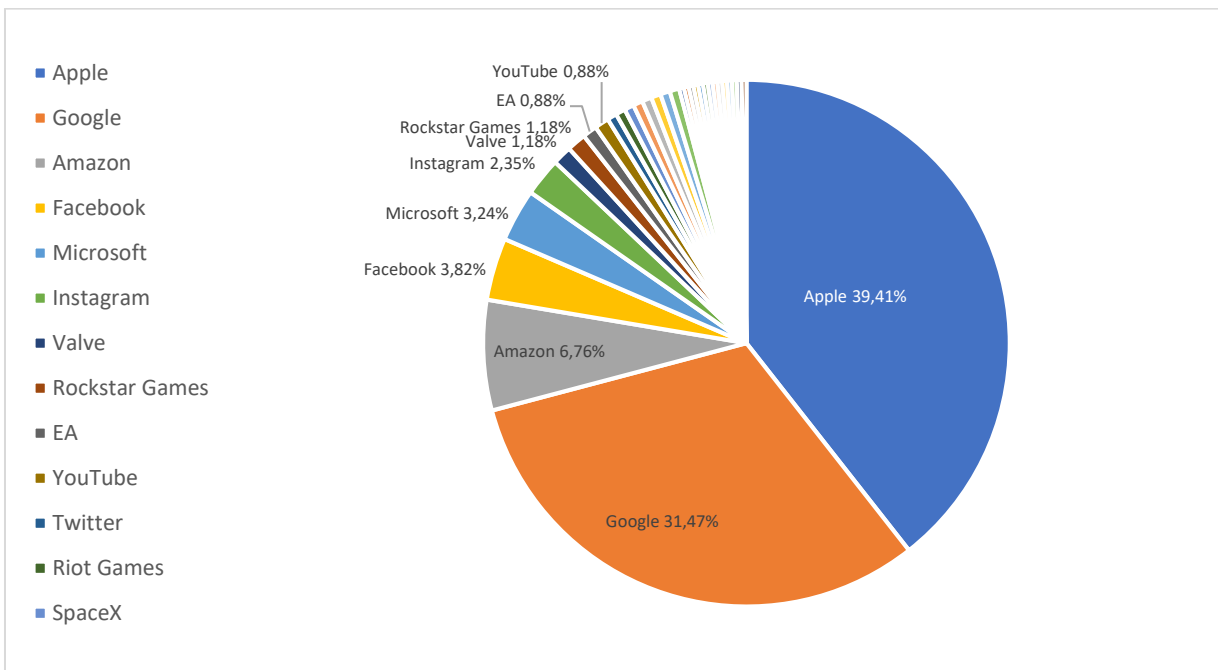


Figure 31. In which company would you like to get a job.



Figure 32 shows another important question: “would you like to learn to program to create your own company?” Almost half of the students think it is a good idea, 23 % said “I don’t know”, and 30 % said “no”. This last percentage is very high, perhaps because they do not know how to program or because they do not know the power that one has when he or she knows how to program. Now this project has the opportunity to teach this potential.

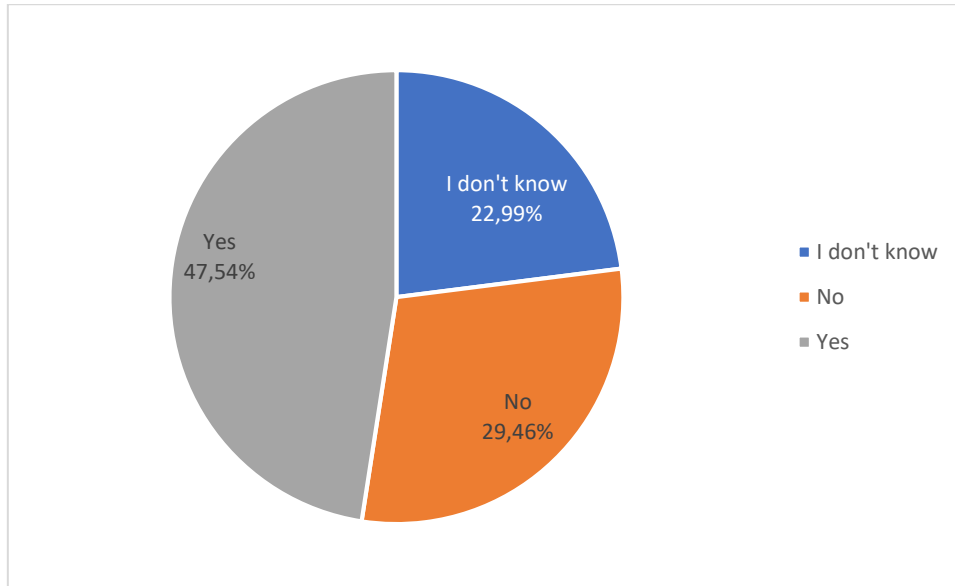


Figure 32. Would you like to learn programming to create your own company?

Figure 33 shows the total number of respondents for these questionnaires. We have 731 completed questionnaires from seven countries , more than one hundred from every country.

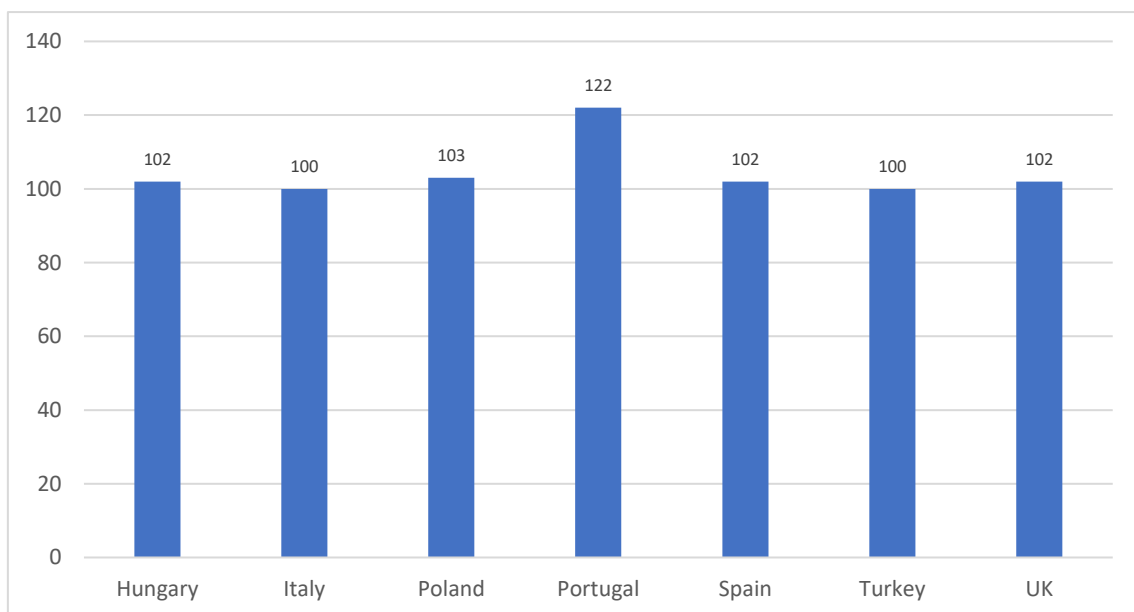


Figure 33. Total number of respondents for these questionnaires: 731



Conclusions

A. Preliminary section

(1) A 50 % know how to program but the other 50 % do not: It is advisable to develop “Programming Fundamentals” videos, in addition to “programming languages” videos.

B. PREVIOUS EXPERIENCE

(1) The winning languages (the most known): 1st JavaScript, 2nd Scratch and 3rd HTML

(2) 54 % have never developed a program:

They need to learn methodologies, data structures, and the first program: “hello world”, etc. (fundamentals).

(3) Programming is: fun (48 %) and very interesting (63 %)

(4) After programming: ONLY the 6 % felt frustrated

(5) BUT: a 42 % think that they are not good at programming!!!

C. CLASSROOM ENVIRONMENT

(1) They need to learn programming: 60 %

(2) The most used devices: 1st Desktop Computers, 2nd Smartphones and 3rd Laptop

(3) 47 % would like to get involved in programming activities

(4) 73 % like working in a group

D. PROGRAMMING LANGUAGES PERCEPTION

(1) The most known: JavaScript, Scratch and HTML

(2) The most unknown: Go, C# and CSS

(3) 69 % don't know (at least) one of the languages from the list: they need videos to learn programming in an easy way

(4) Opinions:

- The most important languages for companies: HTML, Java and JavaScript
- The most interesting languages to learn (> 5 %): 1st Java, 2nd C++, 3rd C#, 4th Scratch, 5th JavaScript, 6th Python, 7th HTML, 8th PHP, 9th Swift
- Programming is important for my professional career: 60 %
- Programming is very useful for me: 57 %
- Programming is important to improve our world: 63 %
- Programming is important to get a job and earn money: 66 %



E. EXPECTATIONS

- (1) Favourite platforms: Apple, Windows, Android
- (2) Favourite projects: 1st Games, 2nd Apple APP, 3rd Social Projects, 4th Android APP and 5th Web pages
- (3) Favourite companies: Apple, Google and Amazon
- (4) Programming is good to create your own company: 48 % yes



References

- Blair, J. C. (2013). *Designing surveys: A guide to decisions and procedures*. Sage Publications.
- Bradburn, N. M. (1979). *Improving the interview method and questionnaire design: Response effects to threatening questions in survey research*. San Francisco: Jossey-Bass.
- Deci, E. L. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, 62, 119-142.
- Krosnick, J. A. (2018). *Questionnaire design*. In *The Palgrave handbook of survey research*. Palgrave Macmillan, Cham.

