SITUATION ALAYSIS REPORT OF THE QUESTIONNAIRES FOR TEACHERS

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SITUATION ANALYSIS REPORT OF QUESTIONNAIRES FOR TEACHERS

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

November, 2019

Albacete, SPAIN

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Introduction

The Universe

This study wants to determine the teachers' attitudes towards coding and programming. Its main objective is to gather mainly teachers' opinions about programming, to know the languages they teach, whether they are willing to organize activities related to programming and whether they believe that programming is a useful skill for students, apart from other interesting data.

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 to a sample of teachers at high-school level (from seven different European countries) by applying a questionnaire through a Google form. The study technical sheet is shown on Table 1. The sample is made up of high-school teachers from seven different countries (United Kingdom, Hungary, Italy, Poland, Portugal, Spain, and Turkey).

Table1. Study Technical Sheet

Universe	**High-school teachers**
Scope of study	High-schools teachers from 7 different countries: Great Britain, Hungry, Italy, Poland, Portugal, Spain and Turkey
Questionnaire design	University of Castilla-La Mancha
Sample size	175 questionnaires
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

the survey , the guidelines of the following authors have been followed: Krosnick (2018), Bradburn (1079) and Blair (2013). Some 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' individual experience related to the target activity.

The specific objectives were:

- To know some preliminary date related with age, gender, country, institution, work experience (electronics, science, technology, engineering, biology, etc.), years of experience, and knowledge of programming languages.
- To know the daily classroom environment, devices and methodologies, and the teachers' willingness to organize after-school activities related to programming.
- To know the programming perception of the teachers, to understand whether they teach programming by imposition or with their own initiative, If they feel programming could improve their professional career and the society in general, and if they think programming is a very useful skill/competence for students.
- To learn the 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 their opinion about the programming languages they think are most demanded by companies. The last question of this block directly asked if they would like to incorporate programming into their classes.

Results

Preliminary questions

The first question is age. Most are in the range of forties (see figure 1).

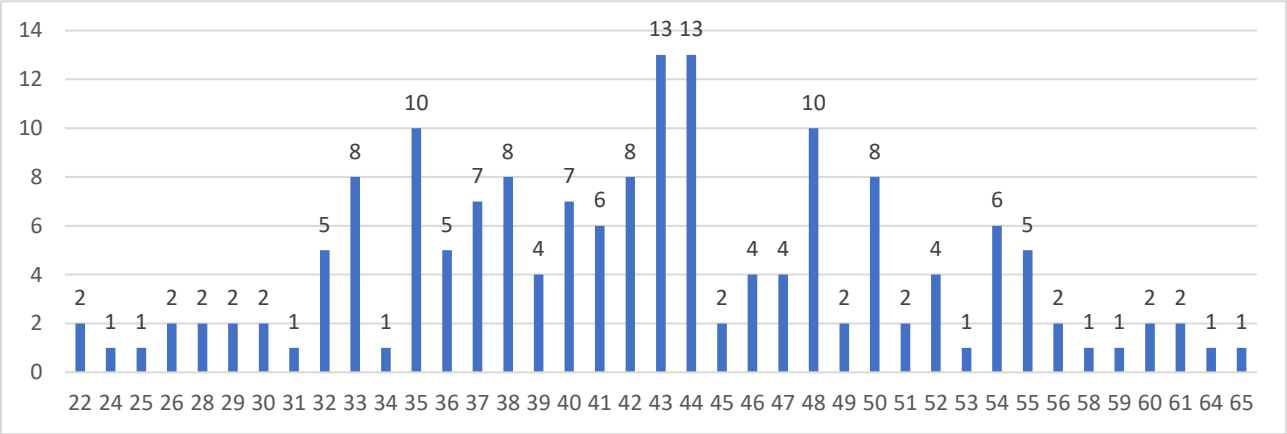

Figure 1. What is your age? Average age 43 years old

Gender is balanced in general. Almost half of the teachers are men and slightly more than half are women (see figure 2).

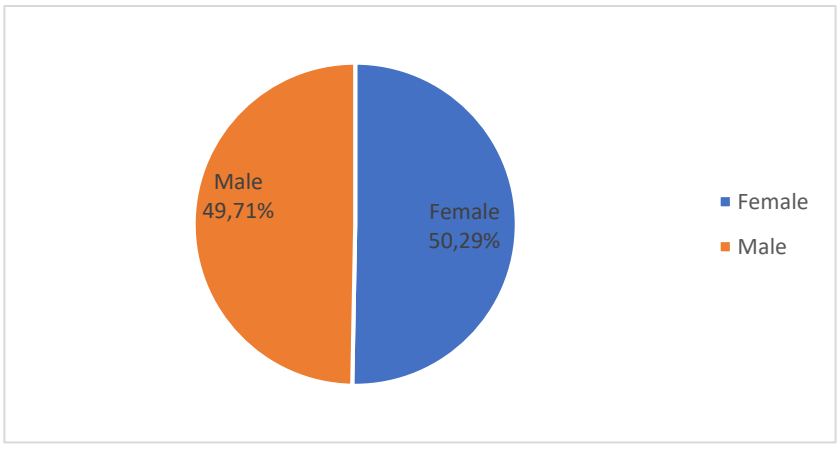

Figure 2. What is your gender?

Also, It is interesting to show the gender breakdown by countries. Figure 3 shows this data. The most important differences appear in Hungary, where the number of women is twice as many as men, but in UK, conversely, the number of men is three times greater than the number of women.

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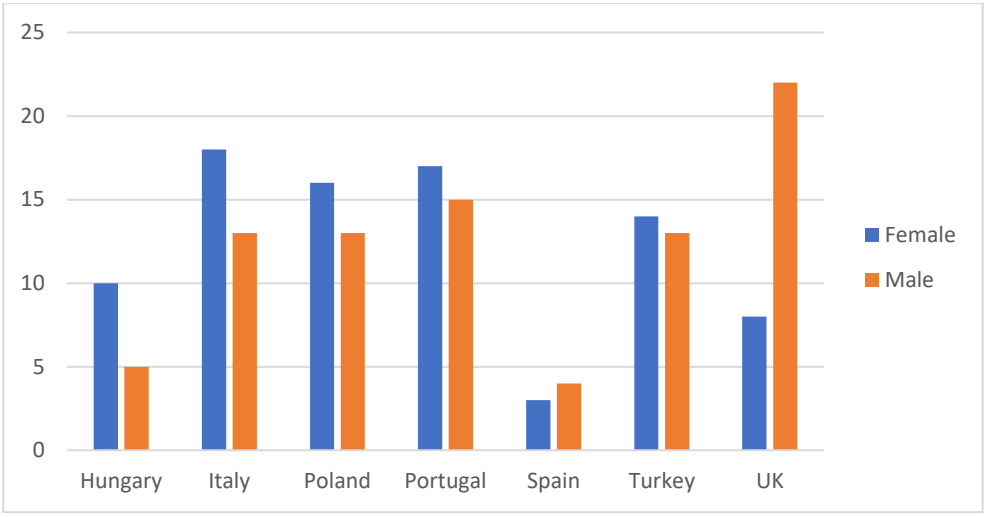

Figure 3. What is your gender? (by country)

We also asked about their work experience (in years). In general, 74 % of the teachers have more than ten years of experience. (The majority is- The majority of the teachers are) in the range eleven-fifteen years of work experience as a teacher (see figure 4).

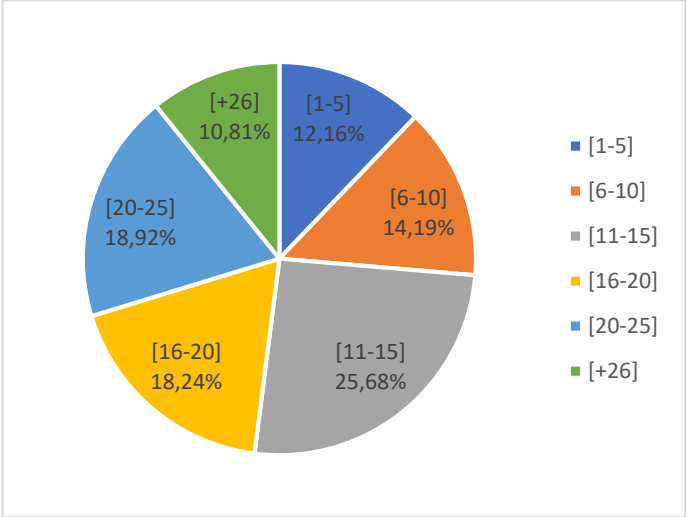

Figure 4. Working experience (in years)

We are also interested in the subjects taught by the teachers. Almost 52 % teach subjects related to Informatics or Technology (see figure 5), followed by Science teachers (12.4 %) and Maths teachers (8.97 %).

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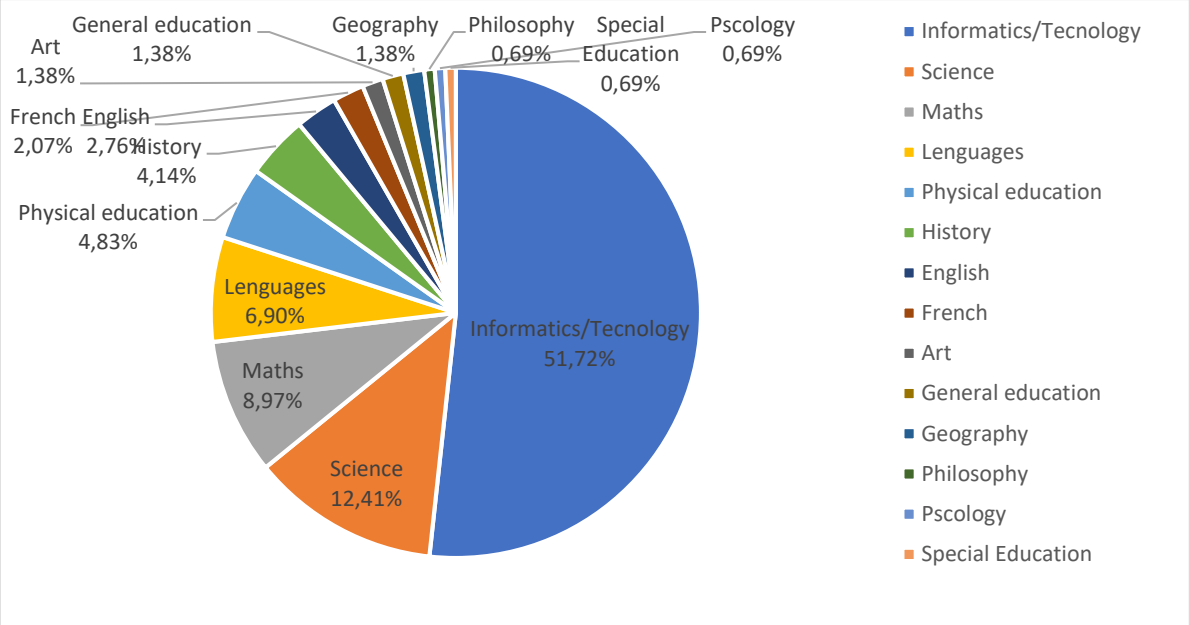

Figure 5. Subjects

The following question is intended to show whether teachers believe that they know how to teach a programming language or not. In figure 6 we can see that 66 % of teachers said "yes" and a 35 % (fairly high percentage) say "no".

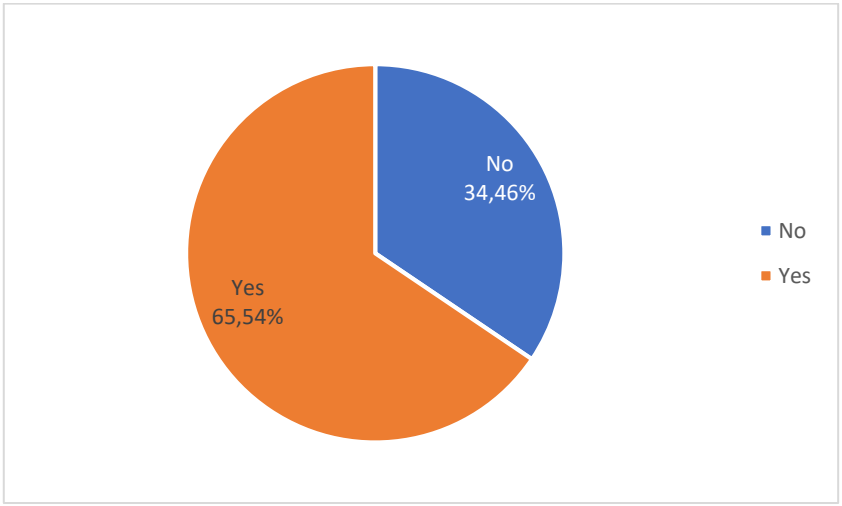

Figure 6. Do you know how to teach a programming language?

Previous Experience

The second content block shows results related to the programming languages known by teachers, the applications or programs developed, their opinion about programming, whether they think programming is fun or not , the way they feel after programming

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(satisfaction, tension, nervousness or frustration) and if they think it is easy to teach programming languages.

Figure 7 shows the answer to the first question: “Which programming languages do you know?” Teachers can write all the languages they know freely. Results show that the languages with more than 10 % of votes are C#, PHP and Javascript, and languages with votes from 5 to 10 % are Visual Basic, C, Java, HTML and C++.

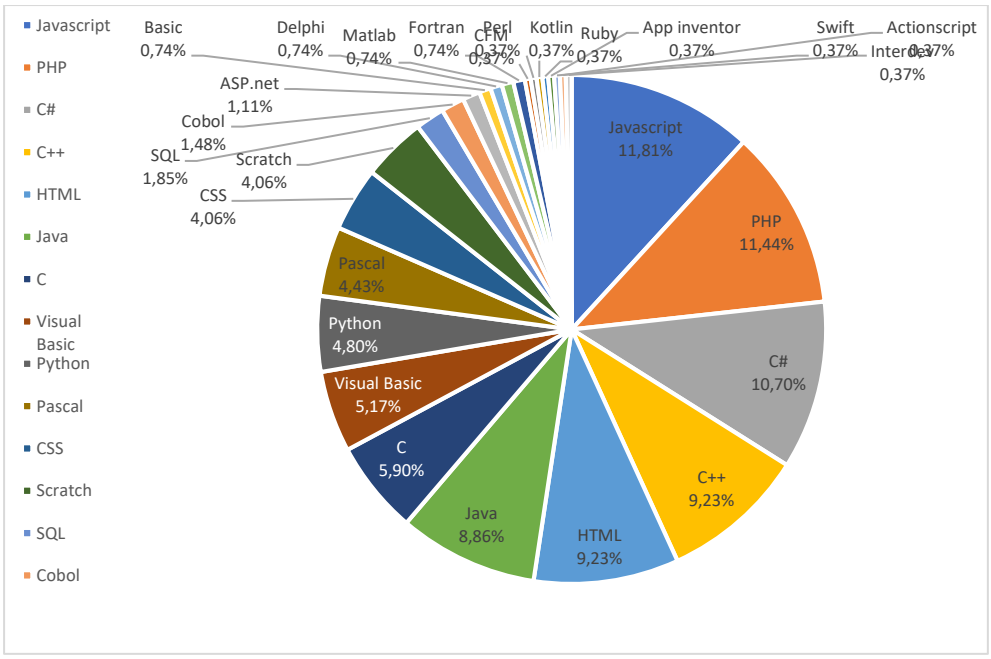

Figure 7. Which programming languages do you know?

Now, we are interested in knowing if teachers have ever developed a program or an app (figure 8) and which languages have been used (figure 9). More than the half (55.75 %) said “yes” and the most used languages were PHP, HTML and Javascript (remember, the best-known languages were C#, PHP and Javascript) followed by Java, C# and Pascal.

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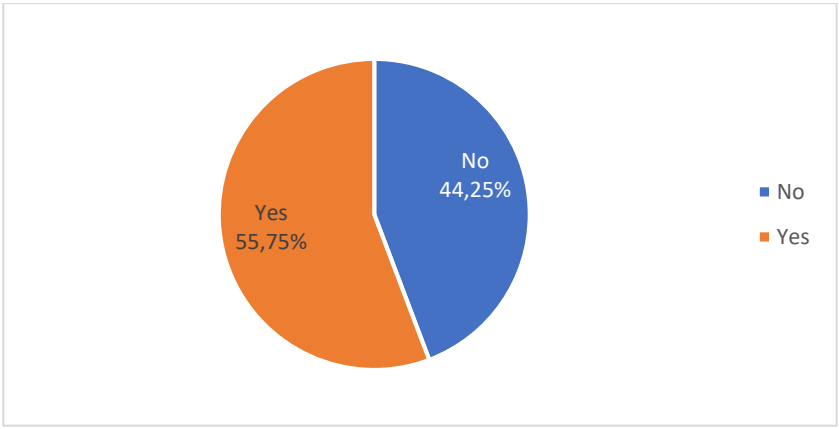

Figure 8. Have you developed any programs or app?

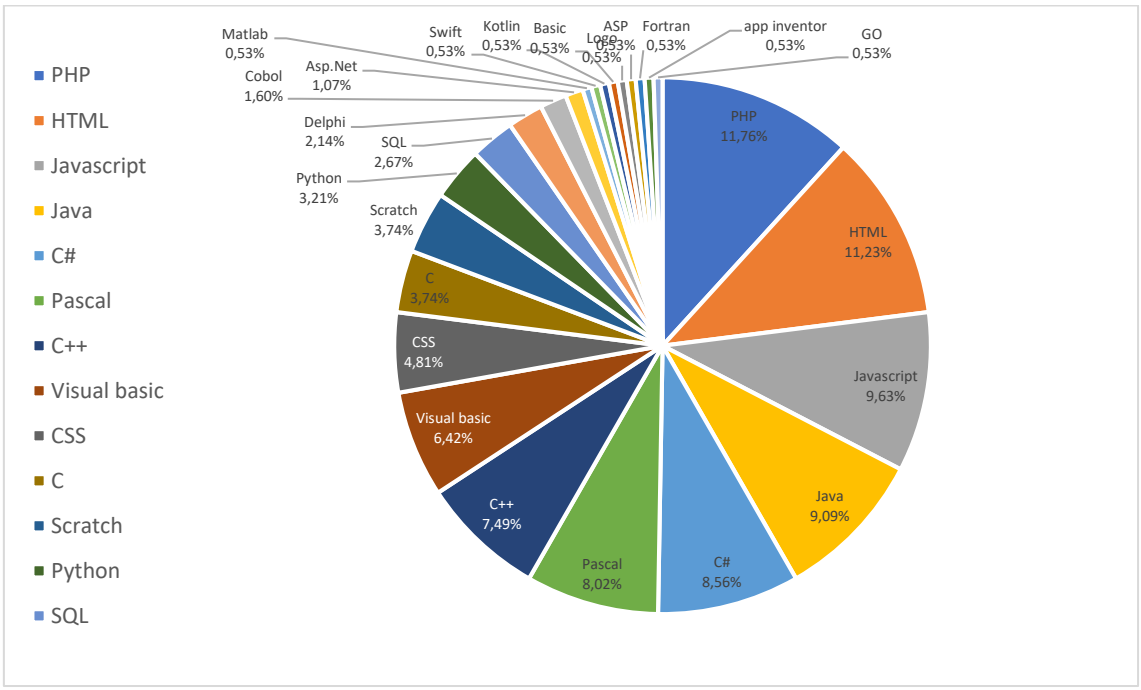

Figure 9. Which programming language have you used?

In order to learn the feelings of teachers towards teaching programming. We asked them if they thought that teaching programming was fun, and only 8.55 % of teachers answered categorically “no”(see figure 10).

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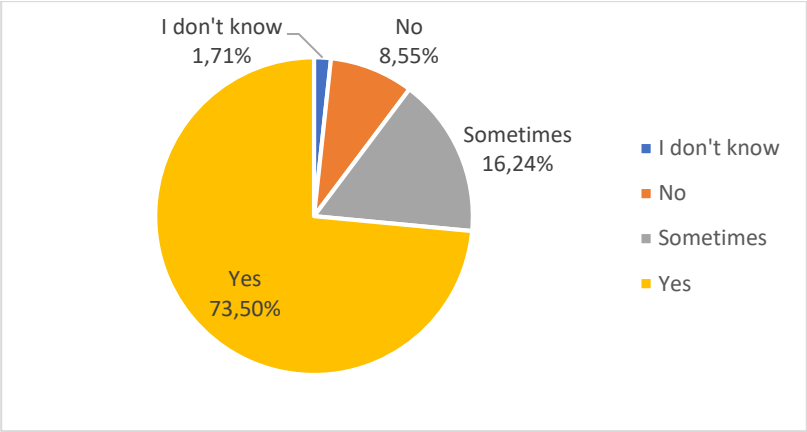

Figure 10. I think teaching programming is fun.

Figure 11 shows the results for the question " How do teachers feel about teaching programming?" More than 75 % of teachers feel satisfied after their programming class but the rest (almost a 25 %) do not feel satisfied (i.e. they feel nervous, tense or frustrated after their programming class).

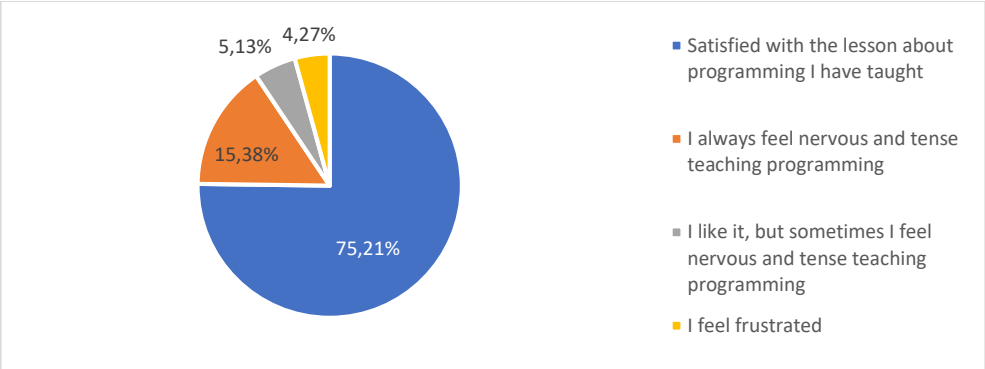

Figure 11. When I teach programming I feel…

The next question was related to the extent to which they found it easy to teach some of the programming languages that appear in the list. This list was composed of eleven programming languages and teachers had to fill out: "yes", "no" or "I don't know" (figure 12). The easiest language for the teachers to teach appeared to be HTML followed by CSS and Javascript. The most difficult languages were listed as PHP, Java and C++ . It's interesting to see that the rate of "I dont know" answers is very high for some programming languages. (Go, Swift, Matlab or Python).

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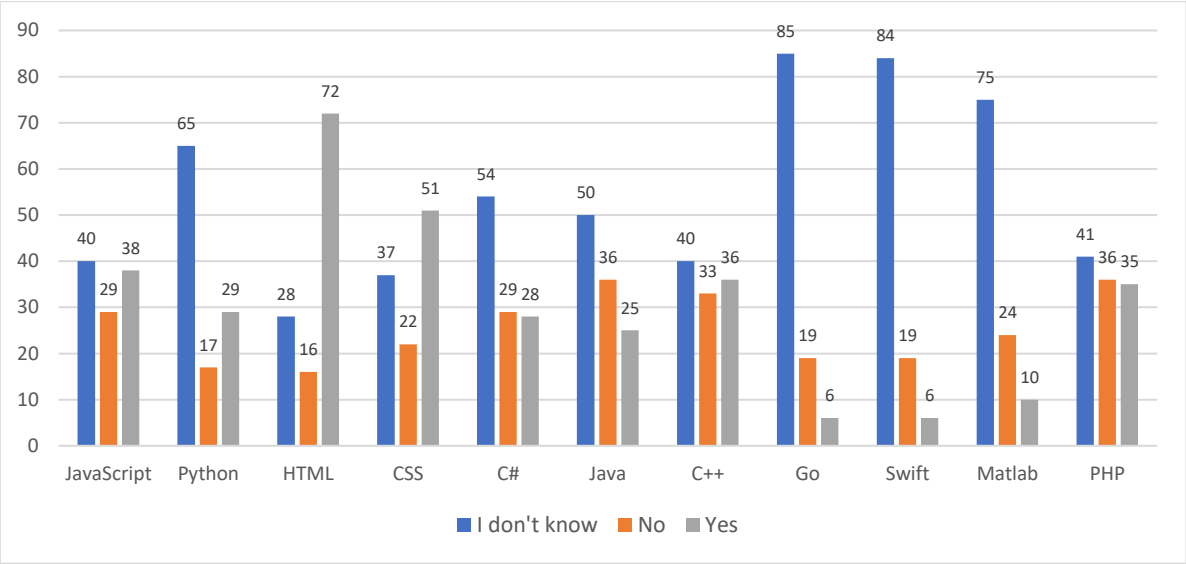

Figure 12. Do you find it easy to teach the following programming languages?

Classroom environment

In this section we are interested in knowing which devices teachers normally use in class, if teachers would like to be involved in new and innovative educational methodologies (project-based learning, collaborative learning, gamification, flipped learning, etc.) and if they would like to organize after-school activities related to programming and coding (hackathon, hour of code, programming competition, etc.).

Figure 13 shows the devices typically used in the classroom. The answer of desktop computers is followed by laptops and tablets. Only 5.2 % use innovative platforms as Arduino (a microcontroller motherboard and simple computer that can run one program at a time, over and over again) and only 1.95 % use Raspberry Pi (a general-purpose computer, usually with a Linux operating system, and the ability to run multiple programs. More complicated to use than an Arduino).

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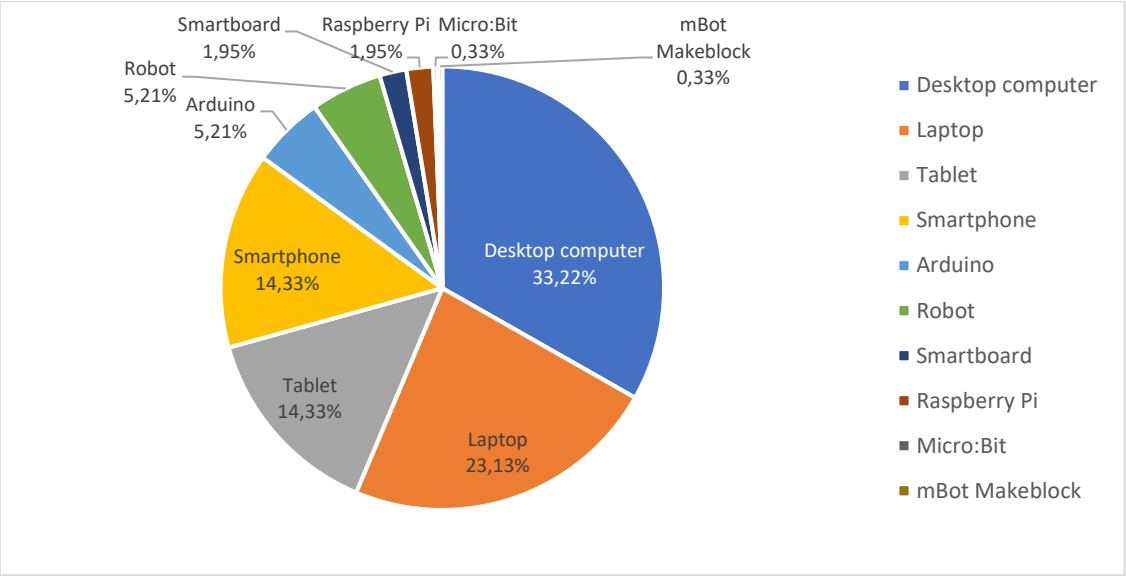

Figure 13. Which devices do you use in the classroom?

Figure 14 shows the answers to the question: "Would you like to get involved in new and innovative educational methodologies? (Project-based learning, collaborative learning, gamification, etc.)". The 83 % of teachers said "yes" (118 votes) and 4 % "I don't know" (6 votes). Only 13% said "no".

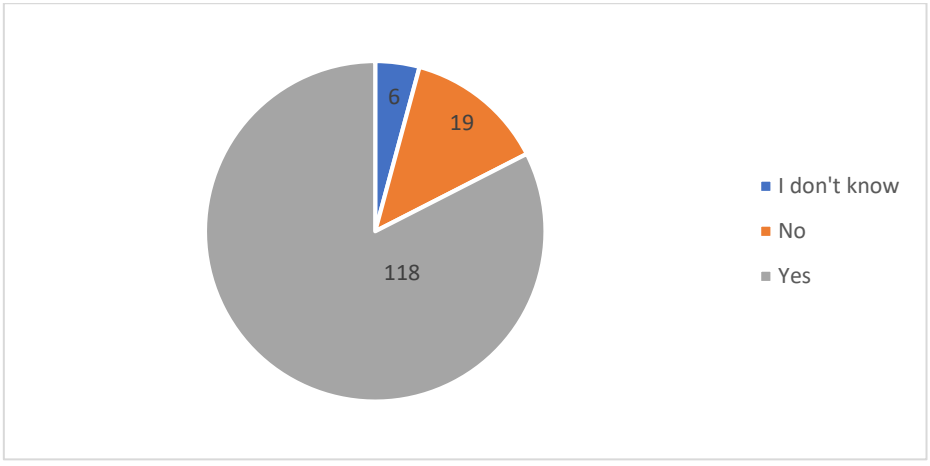

Figure 14. Would you like to get involved in new and innovative educational methodologies?

Figure 15 shows the responses to the question to determine the willingness to organize extra-curricular activities related to programming.Almost 63 % of teachers would like to organize activities related to programming but 37 % would not want to do after-school activities related to programming.

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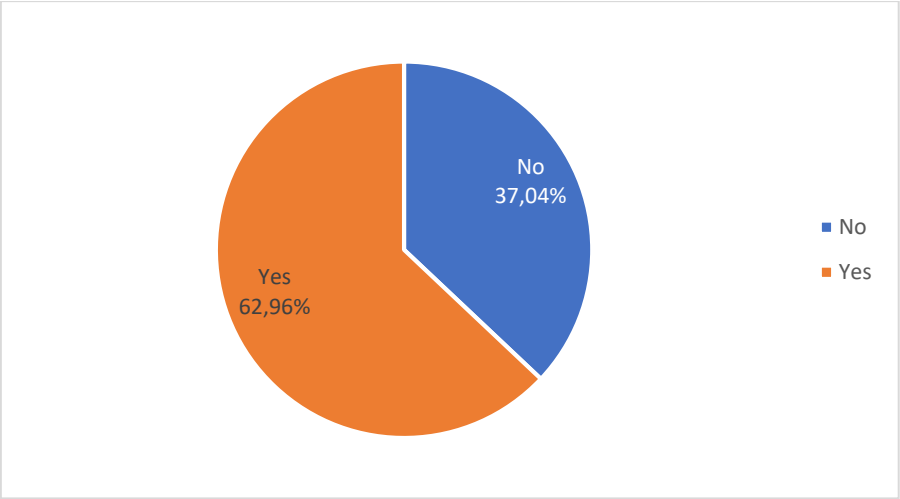

Figure 15. Would you like to organize after-school activities related to programming?

Programming Perception

In this section the focus was to determine whether it was the teachers' self intention to include programming classes because they know it is very important, they think programming is useful for their teaching work, they can improve their professional career by teaching programming, or was it just the imposition of the institution.

Figure 16 shows results on whether the institute forces teachers to teach programming classes. 65.56 % of teachers said "no".

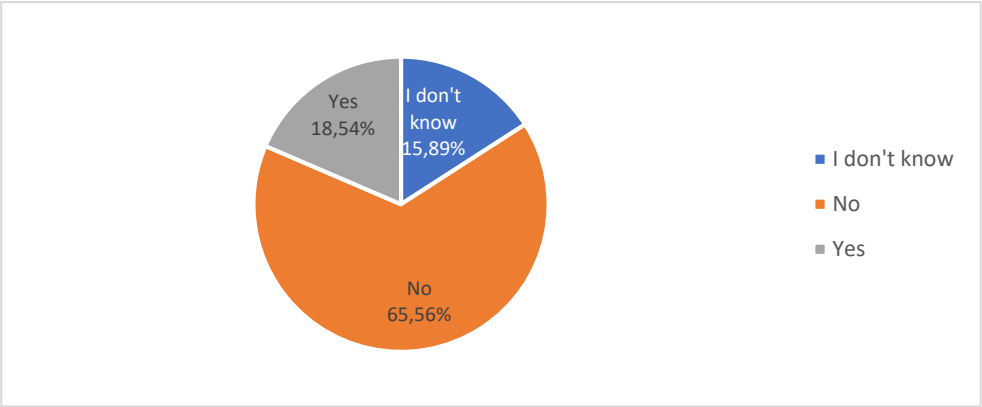

Figure 16. In my institution, they impose me to include programming classes

Figure 17 shows the number of teachers including programming in their classes (about 56 %) because they think it is a very important subject. 24 % of teachers said "no".

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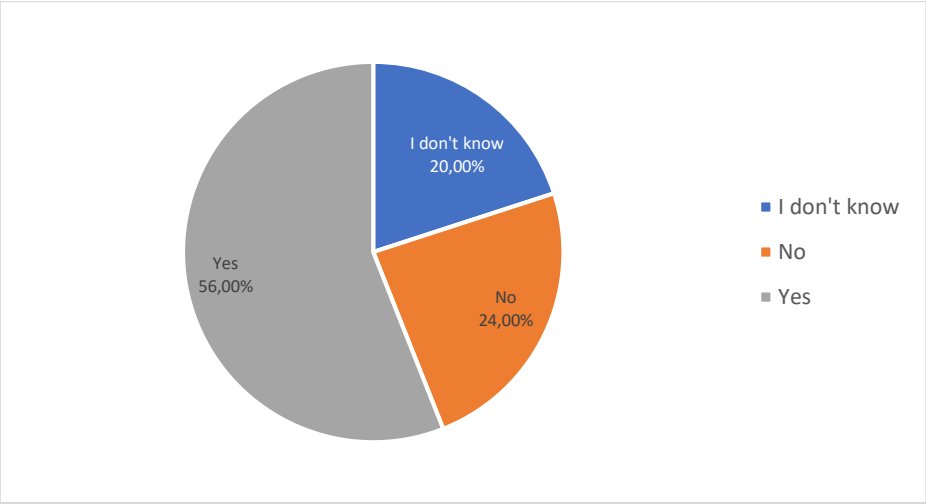

Figure 17. I have made the decision myself (or I will make the decision) to incorporate programming into the classes because I know it is very important.

Figure 18 shows the answers related to the perception of usefulness of the programming classes. 72 % of teachers think programming is useful, while only a 14 % of teachers said “no”.

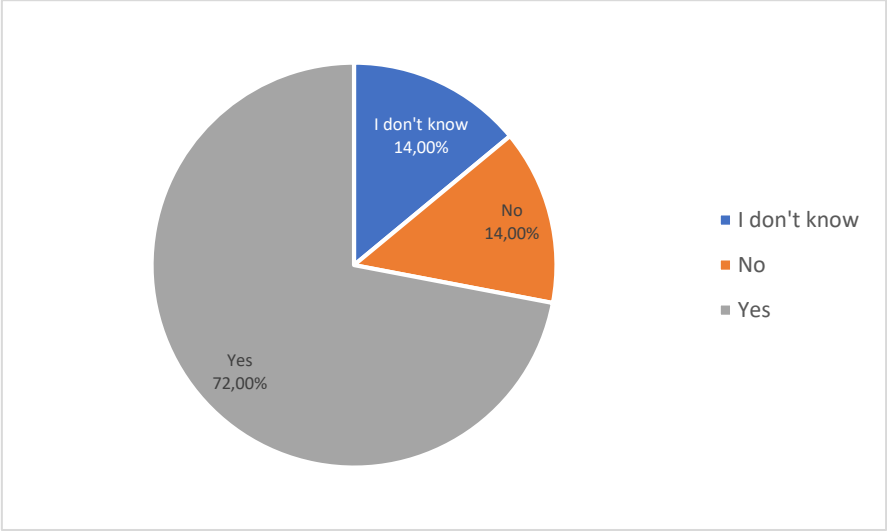

Figure 18. I think programming is useful for my teaching work.

Figure 19 shows the results obtained with regard to the improvement of the professional career of teacher thanks to the teaching programming.

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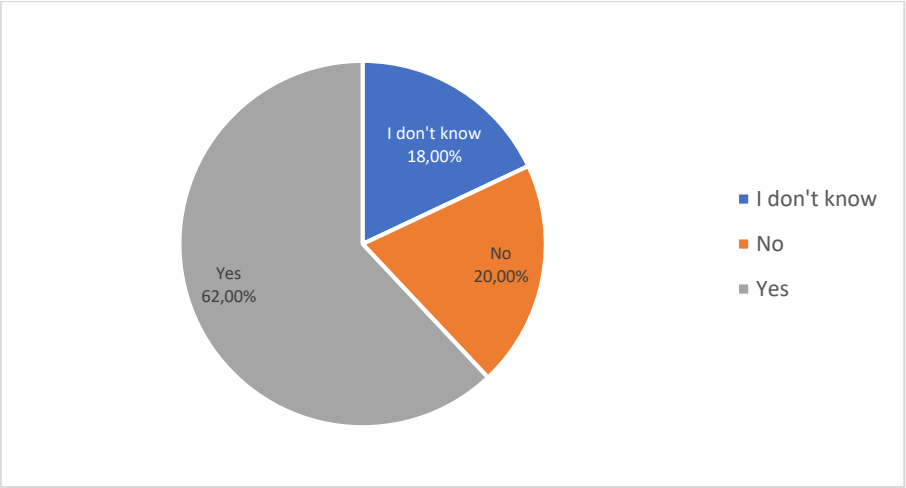

Figure 19. I think I can improve my professional career by teaching programming

In figure 20 teachers show their opinion about whether teaching programming to their students will enable them to implement applications and programs that may improve our society. Almost 61 % of teachers said “yes” but 16 % of teachers answered “no”.

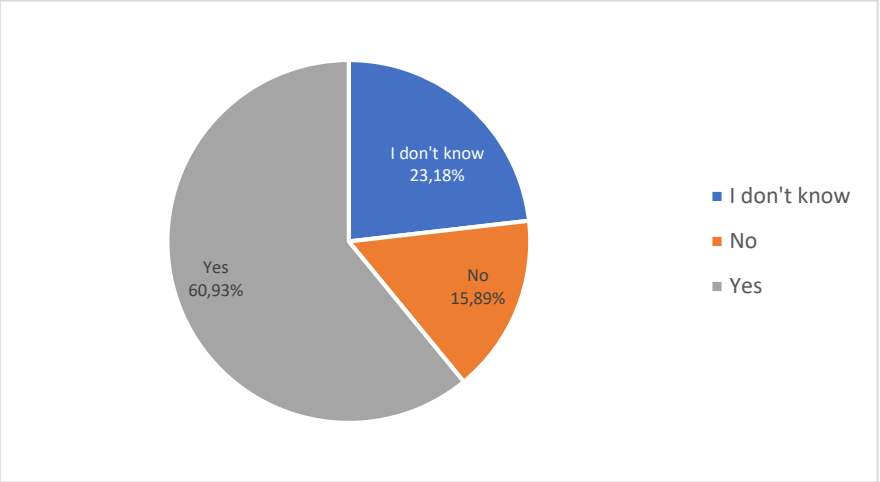

Figure 20. I feel that I can improve society by teaching something new like programming

Figure 21 shows interesting data. 65 % of teachers think that programming is a very useful skill/competence for students, but there's still a 15 % of teachers who think it's not.

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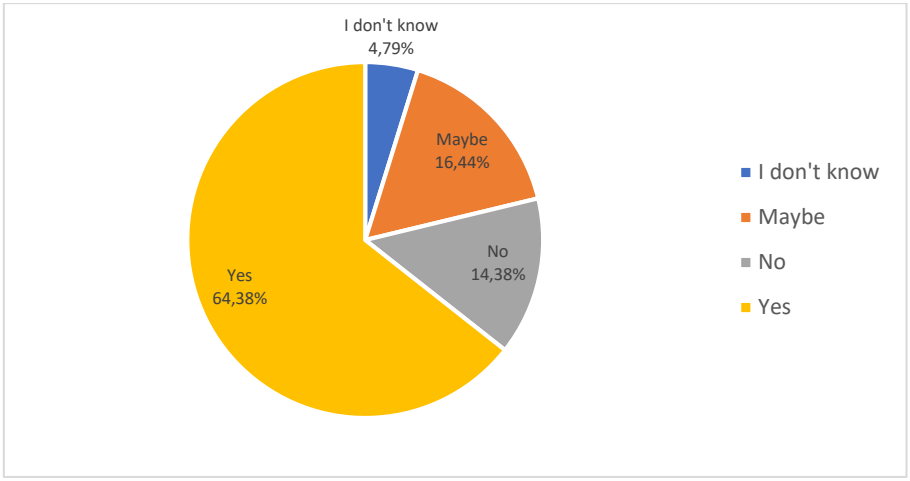

Figure 21. I think the ability to program is a very useful skill/competence for students

Programming Languages

In this section we want to know the real knowledge that teachers have on programming languages.

I n the following figure we can see the results of the programming languages known by the teachers, the unknown languages, and those of whom have never heard. The most known are HTML, CSS and Java. The most unknown are Go, Swift and Matlab. But they're hearing languages like Python, Swift and Go for the first time.

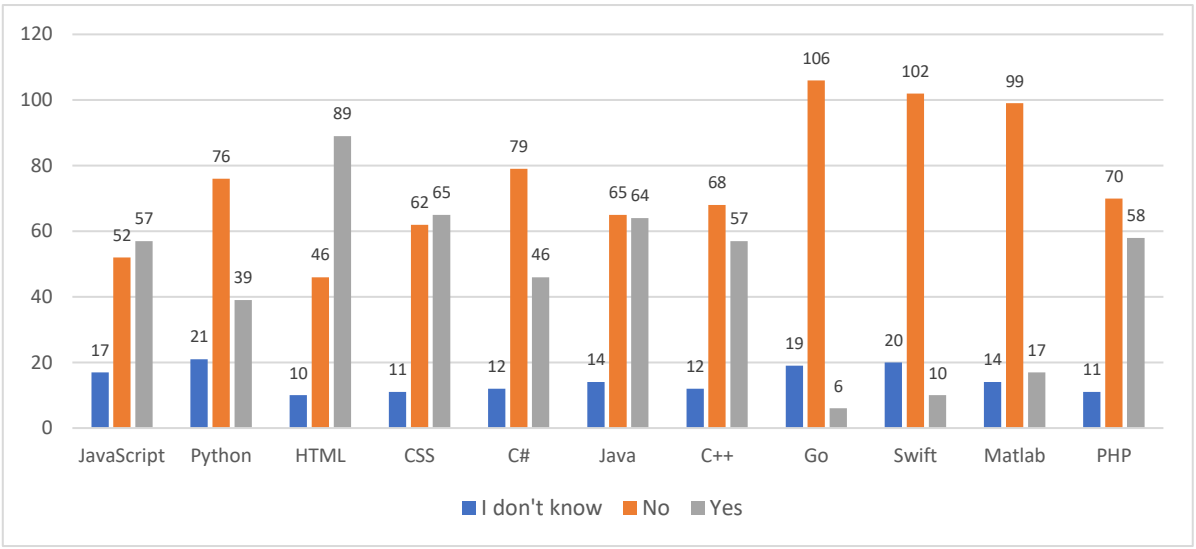

Figure 22. Do you know the following programming languages?

Figure 23 shows personal opinions about the most demanded languages by companies

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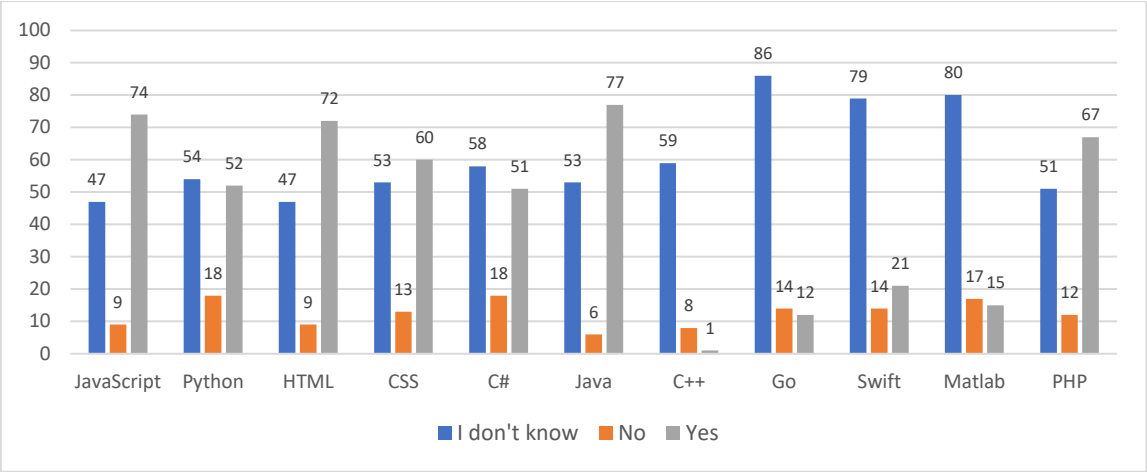

Figure 23. Which programming languages do you think are the most demanded by companies?

Java, Javascript and HTML seem to be the most important programming languages for companies according to the teachers.

Figure 24 shows the results about whether teachers would like to incorporate programming in their classes. 65 % of teachers said “yes” but 14.3 % of them said “no”.

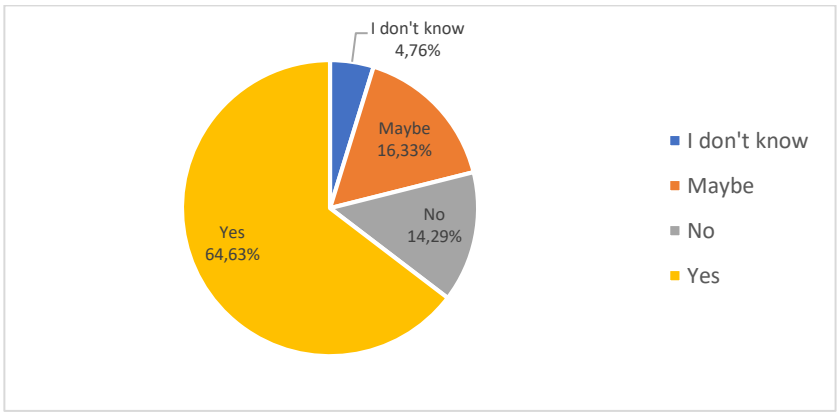

Figure 24. Would you like to incorporate programming into your classes?

Finally, figure 25 shows the number of questionnaires by country. There are 175 respondents in total. Italy, Poland, Portugal and UK have completed more than 30 questionnaires. Turkey has 27 teachers’ questionnaires, Hungary has 15 and Spain 10.

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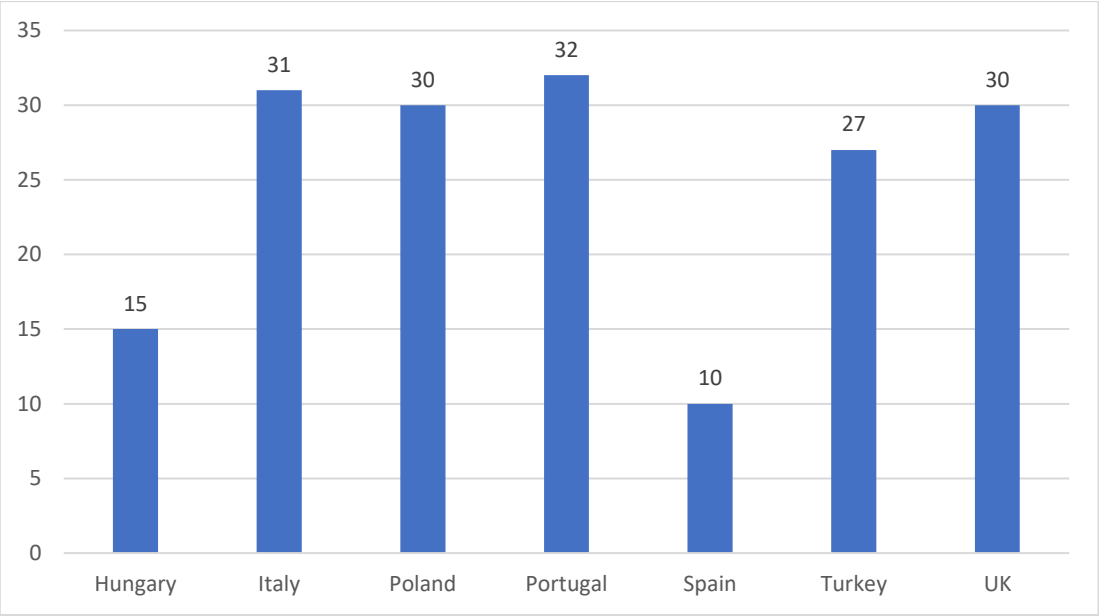

Figure 25. Total number of respondents for these questionnaires: 175

Conclusions

Now, we show some interesting conclusions by sections.

Preliminary data

- Teachers of Informatics/Technology: 52 %.
- Around 50 % male/female.
- Around 66 % know how to teach programming languages.

Previous experience

- Around 56 % have developed a program or an app.
- The most used languages: PHP, HTML and JavaScript.
- The rate of Teachers who think programming is fun: 73.5 %.
- The rate of teachers who are satisfied with their programming classes: 75.21 %.
- The easiest programming languages to teach: HTML, CSS and Javascript.
- The most difficult programming languages to teach: PHP, Java and C#.

Classroom environment

- Used devices: Desktop Computers, Laptop, Tablet and Smartphones.
- They would like:
    - To be involved in new education methodologies: 83 % yes.

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- To organize after-school programming activities? 63 % yes.

Programming perception

- Programming classes by imposition: 18.5% yes.
- Programming classes by my own initiative: 56 % yes.
- Programming is important for my teaching work: 72 % yes.
- Programming improves my professional career: 62 % yes.
- Teaching programming could improve our society: 61 % yes.
- Programming is a very important skill for students: 65 % yes.

Programming languages

- Most known programming languages: Java, JavaScript and HTML.
- Least known programming languages: Go, Swift and Matlab.
- Most demanded programming languages in companies: Java, Javascript and HTML.
- The rate of teachers who Would like to incorporate programming into classes: 65 %

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