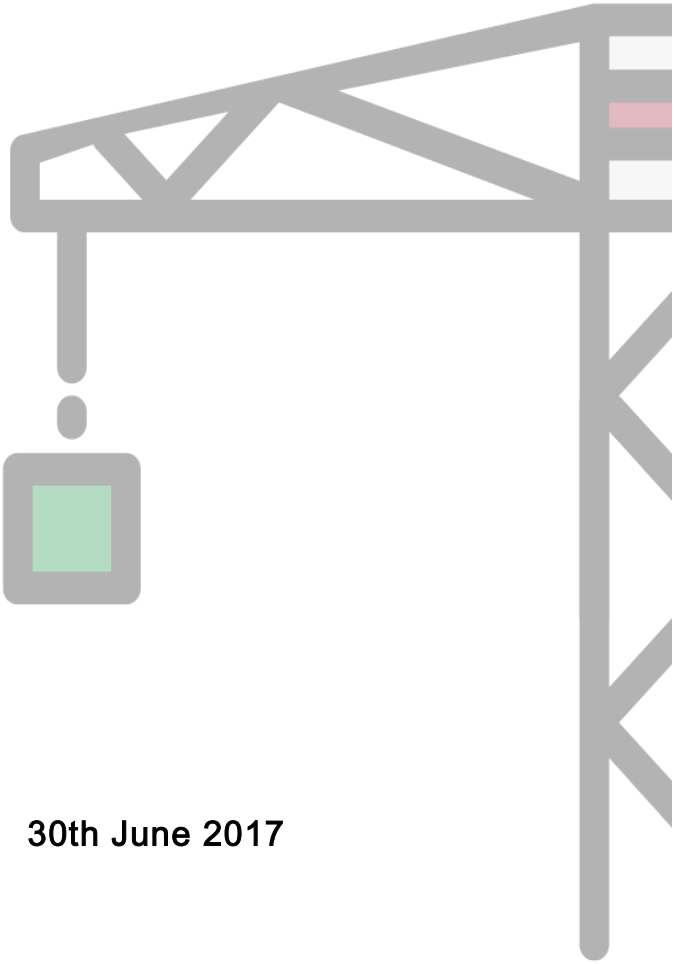
BUILDING UP GREEN SKILLS OF TRAINERS FROM THE CONSTRUCTION INDUSTRY

The construction trainer profile on green skills

Work package 2; Result 3

Report on skills gap (EN)



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- Fundación Laboral de la Construcción (FLC). Spain
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- Institut de Robòtica i de Tecnologies de la Informació i de les Comunicacions (IRTIC). Spain.
- Associazione Nazionale de Costruttori Edili (ANCE). Italy
- Ente per la Formazione e l'addestramento professionale nell'edilizia (FORMEDIL). Italy
- Centro de Formação Profissional da Indústria da Construção Civil e Obras Públicas do Sul (CENFIC). Portugal
- National Laboratory of Energy and Geology (LNEG). Portugal
- Centre for Renewable Energy Sources and Saving (CRES). Greece
- The Small Enterprises' Institute of the Hellenic Confederation of Professionals, Craftsmen and Merchants (IME GSEVEE). Greece
- The Gozo Business Chamber (GBC). Malta
- Malta Intelligent Energy Management Agency (MIEMA). Malta

INDEX

BUS.TRAINERS

BUILDING UP GREEN SKILLS OF TRAINERS FROM THE CONSTRUCTION INDUSTRY

1. EXECUTIVE SUMMARY

This report describes the conception, execution and the main findings for the construction of the trainer profile on Green Skills, in the context of BuS.Trainers project. The project aims to identify Green Skills Gaps of the trainers, who are providing training on EE (Efficiency Energy) and RES (Renewable Energy Sources) in construction industry.

Chapter 2 makes the introduction and indicates the project objectives.

Chapter 3 presents the methodology used to define the Green Skills Gaps: World Café[1], Documentary Analysis and Experimental Analysis (on-line survey and semi-structured interviews).

Chapter 4 presents the results of World Café, Documentary Analysis, Experimental Analysis and a summary of Green Skills Gaps identified.

The Experimental Analysis was structured in on-line survey and semi-structured interviews and within them divided in Conception and execution and Results.

The **on-line survey** was filled by 461 respondents from the 5 countries. The data collected show that for all themes and for all topics, with exception of E6 – Use of Communication Devices and E8 – Assertiveness, there are Green Skills Gaps, some with higher percentages in average than others. It can be concluded that the **Themes A and D are those in which the trainers have more training needs, that is, they have less capacity to give training. On the contrary there are the Themes C and E in which the trainers are more familiar and therefore have lower training needs and greater capacity for teaching.**

The semi-structured interview was completed by 30 respondents. The data collected show that the interviewees agreed with the topics presented in each theme, but that some of them should be deepened and so they gave some suggestions. **They should be considered subtopics to be developed inside the topics for a given theme.**

In addition, some **new topics have emerged in two thematic areas (Theme A and D)**, showing that topics initially presented in Themes A and D of the interview were not fully comprehensive to meet the GAPs of the respondents.

Chapter 5 synthesises the findings and draws conclusions. The results of the questionnaire and interviews clearly show also the importance of trainers becoming aware of sustainability in construction, as well as the need for new teacher attitudes towards the digital revolution.

[1] World Café is a dynamic technique to make joint conclusions in working groups.

Besides, the results obtained meet the objective of this project to produce training content directed towards sustainable construction and training through e-learning / m-learning.

This report together with the report **"Final green skills map and perimeter"** will be used for designing a new European sectorial qualification and associated training contents for VET trainers acting in the construction industry, which will contain skills for the promotion of EE and RES in buildings.

2. INTRODUCTION AND OBJECTIVES

Green skills are considered very important in reduction the climate change, in development of more energy-efficient economies in terms of resources and in growth of employment.

The definition we will use in this report is the one defined by CEDEFOP in 2012 [1], who defined **Green Skills** as "the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource- efficient society".

These skills "will be needed by in all sectors and at all levels in the workforce" and "the greening of the economy requires upgrading skills and adjusting qualification requirements" [1].

Since there was a central need along southern countries of Europe: lack of qualified VET trainers for teaching green competences in the construction industry, in response of this challenge the BuS.Trainers project was drawn up and financed by ERASMUS+ program included in the Sector Skills Alliances in vocational education and training.

This European project started in December 2016 and lasts for 3 years, under the coordination of Fundación Laboral de la Construcción (FLC – Spain). Five European countries are involved: Spain, Greece, Italy, Malta and Portugal.

This report was carried out under the project BuS.Trainers and aims to identify Green Skills Gaps of the trainers, who are providing training on EE (Energy Efficiency) and RES (Renewable Energy Sources) in construction industry. **Skills Gaps** are defined as "a situation in which the level of skills of the currently employed is less than that required performing the job adequately or in which the type of skill does not match the requirements of the job" [2].

This report is the delivery number 3 belonging to WP2, which leading organization is *LNEG - Laboratório Nacional de Energia e Geologia,* of Portugal.

3. METHODOLOGY

The methodology used to outline the existing Green Skills Gaps in Vocational Education Teachers has been the following:

- **World Café** – to start looking for GAPs in the Kick-off meeting a *World Café* was held. The goal of the World Café was to have the contribution of each participant about the concept of Green Skills, Pedagogical Skills and Soft Skills in their countries.

- **Documentary analysis** – consultation by partnership of national status quo and roadmaps produced under the BUS initiative and ongoing BUS pillar II projects, among other relevant documentation.

- **Experimental analysis** – based on the results of documentary analysis and *World Café*, was developed a field study with the aim of the identification and definition of the Green Skills Gaps in the VET (Vocational Education and Training) trainers. This definition was made by two research techniques: an on-line survey, filled in by the Vet trainers in each country, and 5 semi-structured interviews addressed to different profiles per country.

4. RESULTS

4.1. WORLD CAFÉ

As previously indicated the goal of the World Café was to have the contribution of each participant about different core concepts for the project. During the meeting in Madrid, we created three "worlds" to discuss about these topics:

- The "World of Green Skills"
- The "World of Pedagogical Skills"
- The "World of Soft Skills"

The big group was divided in three small ones, and each group spent 10 minutes per world discussing the topic thereof, allowing that way the participation of every person (Photo 1).

Photo 1 - "Green Skills", "Pedagogical Skills" and "Soft Skills" tables for group brainstorming.

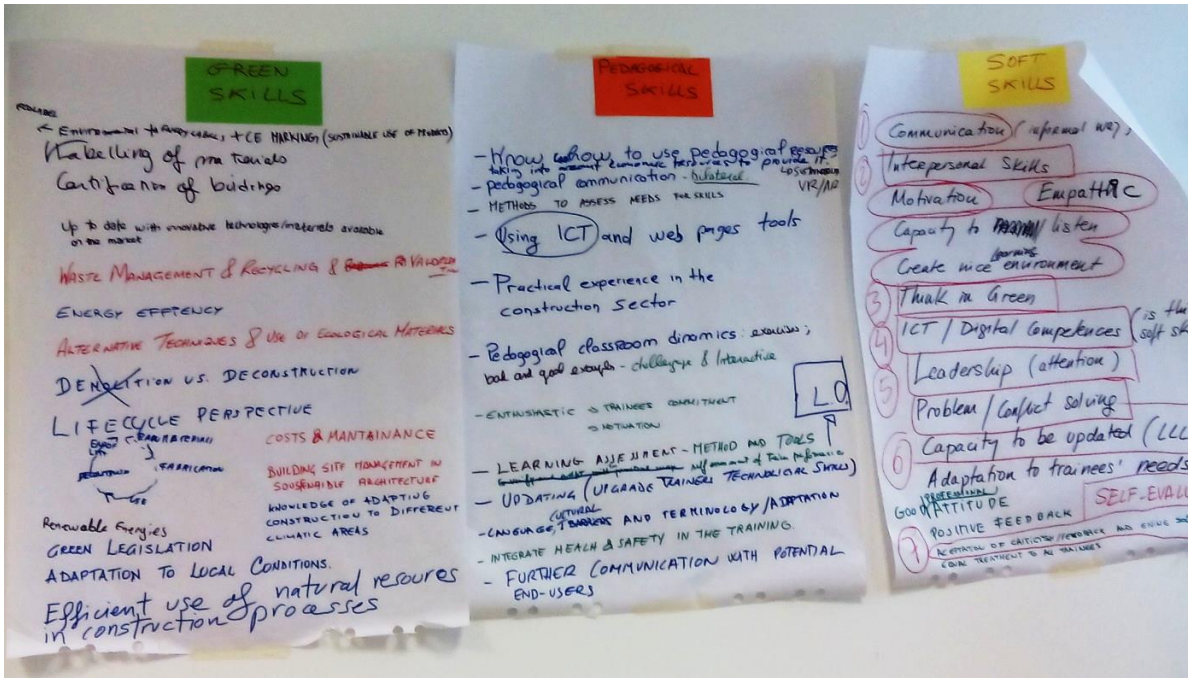

Photo 2 - Main ideas and conclusions of World Café methodology.

The obtained results were listed, analysed and a matrix was performed for the Green Skills (Figure 1, Photo 2).

List of Green Skills:

1. Environmental+ energy label + CE marking
2. Labelling of materials
3. Certification of buildings
4. Up to date with innovative technologies/materials available on the market
5. Waste Management & Recycling &Valorisation
6. Energy Efficiency
7. Alternative techniques & use of ecological material
8. Deconstruction
9. Life Cycle perspective
10. Cost & Maintenance
11. Building site Management
12. Knowledge of adapting construction to different climatic areas
13. Renewable Energies
14. Green Legislation
15. Adaptation to Local Conditions
16. Efficient use of natural resources in construction processes

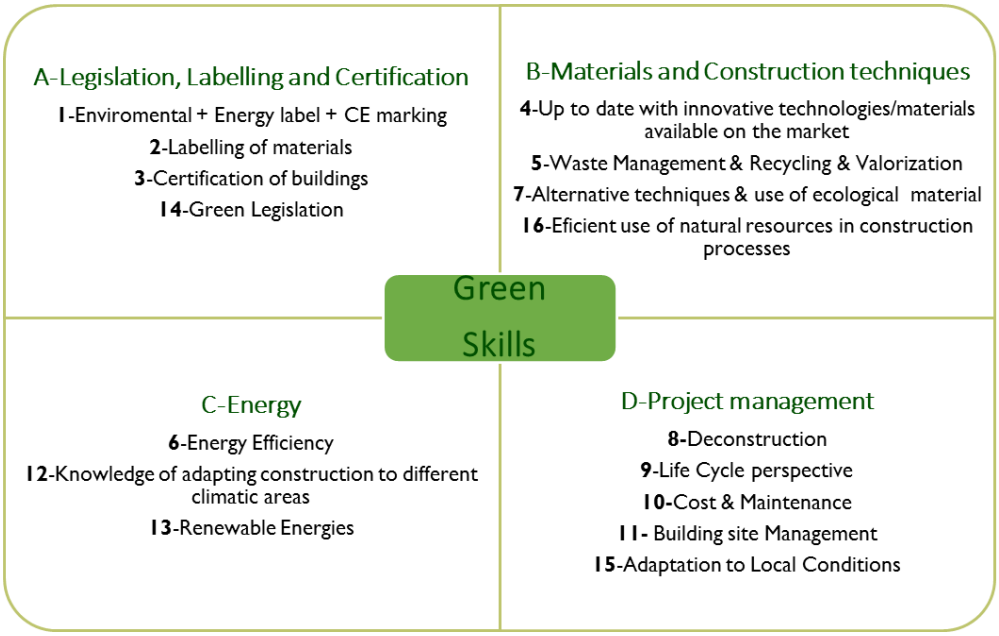

Figure 1 - Matrix with the aggregation of all results for the Green Skills.

For Pedagogical Skills and Soft Skills only a list were made.

List of Pedagogical Skills:

1. Know how to use pedagogical resources
2. Pedagogical communication – bilateral
3. Methods to assess needs for skills
4. Using ICT and web pages tools
5. Practical experience in the construction industry
6. Pedagogical classroom dynamics: exercises, bad and good examples, challenges & Interaction
7. Enthusiastic: Trainees commitment and motivation
8. Learning assessment: Methods and Tools, self-assessment, learning outcomes
9. Updating: upgrade trainers' technological skills
10. Capacity of adaptation of language, cultural barriers and terminology
11. Integrate healthy and safety in the training
12. Further communication with potential end-users

List of Soft Skills:

1. Communication
2. Interpersonal skills: motivation, empathy, capacity to listen, create nice learning environment
3. Think in Green
4. ICT/Digital Competences
5. Leadership (attention), problem/conflict solving, good professional attitude, positive feedback
6. Capacity to be updated
7. Adaptation to trainees' needs

8. Acceptance of criticism
9. Equal treatment to all trainees
10. Self-evaluation

4.2. DOCUMENTARY ANALYSIS

The bibliography consulted for this task takes into account the various BUILD UP skills projects and similar projects in all countries:

- BUILD UP skills Portugal – Analysis of the national status quo (October 2012);
- National Roadmap Portugal (April 2013);
- BUILD UP Skills Spain – Analysis of the national status quo (August 2012);
- National Roadmap Spain – "Construye 2020" (March 2013);
- Results of Italian Build Up Skills - I TOWN project- Training QualificatiOn Workforce In BuildiNg www.bus-itown.eu (September 2014 - August 2017);
- Research Report on Training Needs of Workers on Energy Efficiency and Green Buildings – 2015;
- BUILD UP Skills - Greece (BUS-GR) – Analysis of the national status quo (February 2013);
- National Roadmap Greece – BUS-GR (December 2013);
- Results of BUILD UP Skills MT;
- Results of Training for Renewables and Energy Efficiency in Building Sector project (BUILD UP Skills FORESEE project);
- Results of Vocational Training o Sustainable Building Maintenance and Refurbishment project (FORMAR project) (October 2013 – September 2016);
- Results on the development of training and certification of qualification schemes for 3 professions of the construction industry (insulation technicians, aluminium & metal constructions craftsmen, installers-maintainers of heating systems) – BUILD UP Skills UPSWING project (September 2014 – August 2017).

Also documents were consulted from the *European Centre for the Development of Vocational Training* (CEDEFOP), the EU Directive of Efficient Energy, the EU Directive on the promotion of the use of energy from renewable sources, the EU Directive of Energy Performance of Buildings (recast), the Strategy for the sustainable competitiveness of the construction industry and its enterprises and some National Actions Plans, among others legislative documents.

It should be noted that at EU Skills Panorama [3] a summary of analysis undertaken by BUS projects reveals that "**new approaches to training** have been identified **to meet these requirements** -*workers needing skills upgrading*-, **including**: training for new roles in the building sector (mentors, quality coaches); adapting training content for craftspeople; as well as a **general need to 'train the trainer"**.

Also, the Report Skills for green jobs by CEDEFOP [4] points out: "**the number of trainers and teachers able to teach new techniques and aware of environmental issues is not**

sufficient, and shortages are particularly acute in agriculture and the construction sectors – more emphasis needs to be placed on training the trainers" (page 15); "important efforts in training trainers will be necessary to ensure coordination between different building trades and adaptation of services provided to new practices" (page 92); "the most pressing issue concerns training trainers […] a major obstacle hampering skills development for transition to a green economy" (page 94).

From analysis of all documentation it was found that green skills are becoming important in almost all professions in the construction industry along southern countries. Show **also a common and central need in all of them: the lack of qualified VET trainers for teaching green competencies**.

Based on the bibliographic consultation, the knowledge of all partners experts in energy efficiency and/or training provision within the construction sector and the World Café technique carried out at the kick-off meeting, were defined the broad thematic areas and the topics to be applied in the questionnaire. It was decided by the partnership that a trainer with green skills should also have to have other important competences, as is the case of communication, so one of the thematic areas concerns pedagogical and soft skills.

Finally, **five thematic areas** were defined and within which various topics were identified. The thematic areas are as follows:

- A – Legislation, Labelling and Certification
- B – Materials, Water and Construction Techniques
- C – Energy Efficiency and Renewable Energy Sources
- D – Project Design and Management
- E – Communication and Information & Communication Technology

All topics can be seen in the template of the questionnaire in English (Annex 7.1) and in the following sections.

4.3. EXPERIMENTAL ANALYSIS

4.3.1. On-line survey

A. Conception and execution

The template of the questionnaire was made in English – "*Trainers' questionnaire on green skills*" and subsequently translated into the official languages of the countries participating in the project, namely Spain, Portugal, Italy, Greece and Malta. After translation, invitations to participate were disseminated by partners in each country. The survey, anonymous, was conducted from 20th to 31th March 2017 and having been completed online through the "SurveyMonkey" platform.

The links of each on-line survey are:

- https://es.surveymonkey.com/r/TrainersEN
- https://es.surveymonkey.com/r/FormadoresES
- https://es.surveymonkey.com/r/TRAINERSGR
- https://pt.surveymonkey.com/r/formadoresPT
- https://it.surveymonkey.com/r/formatoriIT

The target audience comprised VET trainers with competences in Energy Efficiency (EE) and Renewable Energy Sources (RES) of the partners' countries of the project (a sample of some 100 VET trainers by country, altogether 500 questionnaires).

In total, 461 respondents completed the questionnaire. Table 1 shows the results by country.

Table 1 – Total number of questionnaires by country.

Country	Number of questionnaires
Portugal	114
Italy	111
Spain	107
Greece	102
Malta	27
Total	**461**

The questionnaire was structured into two distinct parts:

- **Trainer profile**, with basic information about the trainers, namely the country, age, levels of education and labour situation, and type of institutions in which they work;

- **Green Skills**, divided in five thematic areas in which a thematic area concerns pedagogical and soft skills. Each thematic area has various topics to fill.

To simplify the exploitation and treatment of results, the following methodology was adopted in **Green Skills** part of the report concerning the results of the on-line survey:

- **Each thematic area is presented in an aggregated manner and with the designation "theme"**: "Legislation, Labeling and Certification" was designated Theme A; "Materials, Water and Construction Techniques" was designated Theme B; "Energy Efficiency and Renewable Energy Sources" was designated Theme C; "Project design and Management" was designated Theme D and Communication and Information & Communication Technology" was designated Theme E.

- **Each topic will be numbered respecting the order that appears in the questionnaire.**
  Theme A: A1, A2, A3, A4, A5, A6 and A7;
  Theme B: B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, and B15;
  Theme C: C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13 and C14;
  Theme D: D1, D2, D3, D4 and D5;
  Theme E: E1, E2, E3, E4, E5, E6, E7 and E8.

- **Each topic of Themes A, B, C and D, were classified in 5 levels of knowledge:**
  I-Unfamiliar with topic
  II-Understand the concept but cannot teach
  III-Understand the concept and might teach
  IV-Good Knowledge and can teach
  V-Deep Knowledge and teaching skills

- **Each topic of Theme E was classified in 5 levels of application**:
  I-Unfamiliar with topic
  II-Understand the concept but cannot apply
  III-Understand the concept and might apply
  IV-Good Knowledge and can apply
  V-Deep Knowledge and application capacity

In the graphs the values in percentage were rounded to the unit, for a better presentation and visualization.

It should be noted that the numbering of the questions is identical to the numbering of the questions in the questionnaire for a better understanding. The template of the questionnaire in English can be found in Annex 7.1.

The detailed tables with all values for each of the charts (Figures 2 to 9) are in Annex 7.3.

B. Results of the on-line survey

I. General Information on the survey population

The first part of the questionnaire aimed to characterize the Trainer Profile, asking country, age, sex, higher level of education completed, type of institution working, years of experience in the building sector, years of experience in VET within building sector and their labour situation.

The sample consists of 461 trainers who answered the questionnaire and whose answers will be analysed next.

Question 1: Indicate your country.

Portugal was the country with the largest number of answers (24.7 %; 114 questionnaires), followed by Italy (24.1 %; 111 questionnaires), Spain (23.2 %; 107 questionnaires), Greece (22.1 %; 102 questionnaires) and Malta (5.9 %; 27 questionnaires), (Figure 2). This question reached 100% of answers.

This question also makes it possible to conclude that, in terms of number of questionnaires completed, the goal was achieved to majority of countries who obtained more than 100 questionnaires with exception of Malta. However, it should be noted that in the case of Malta the reference value (100 completed questionnaires) has not been reached, because the value for Malta was not well dimensioned at project proposal. Malta has reached 27 completed questionnaires, what considering their total population is even higher achievement than the rest of countries (Malta - 418 670 inhabitants in 2015; Portugal - 10 349 803 inhabitants in 2015; Greece – 10 954 617 inhabitants in 2015; Spain – 46 121 699 inhabitants in 2015; Italy – 59 797 685 inhabitants in 2015 [5]).

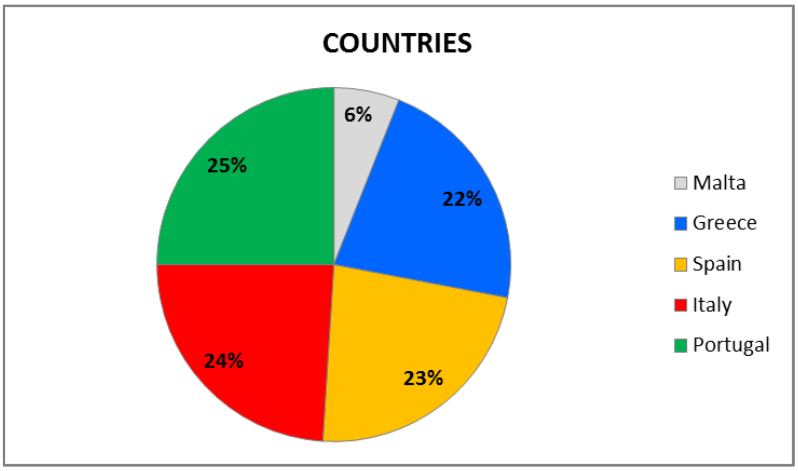

Figure 2 - Percentage of answers by country.

Question 2: Indicate your age.

Regarding this question, the great majority of answers (Figure 3) come from the age group of 40-49 years corresponding to 38.8 % of the sample (179 answers), followed by the age group of 50-59 (28.2 %; 130 answers) and 30-39 years (23.0 %; 106 answers). The others groups correspond only a 10% of the respondents, respectively 25-29 years with 29 answers and ≥60 years with 17 answers.

This question reached 100% of answers.

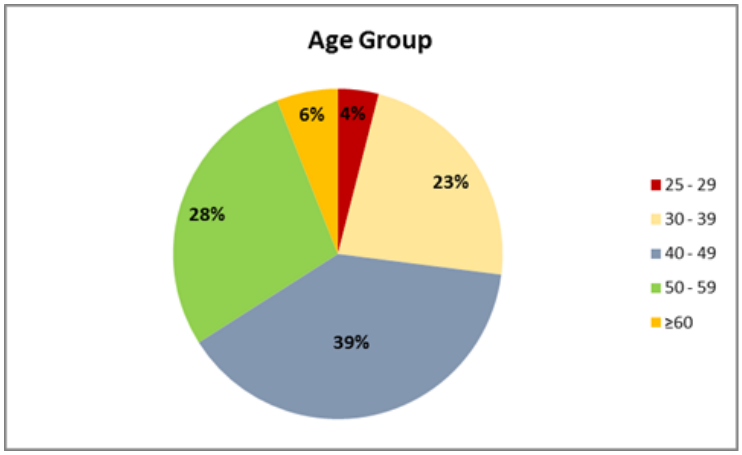

Figure 3 - Percentage of answers relative to the age group.

Question 3: Indicate your sex.

Figure 4 shows that the most of respondents are male, 370 answers, which corresponds to 80.3 % of the sample. Females only reach 19.7 % (91 answers).

This question reached 100% of answers.

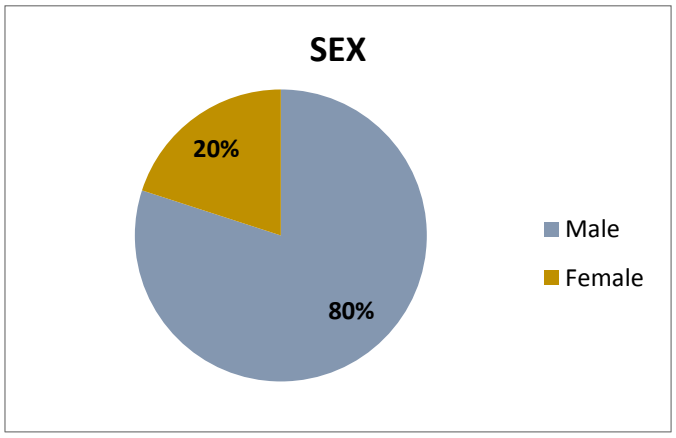

Figure 4 - Percentage of answers relative to the sex of the trainers.

Question 4: What is the highest level of studies you have completed?

For this question 383 respondents answered that they have a higher education and postgraduate education (PhD, Master and higher VET) corresponding to 83.1 % of the sample (Figure 5). The lowest value relates to trainers with primary education (5 answers and 1.1%).

This question reached 100% of answers.

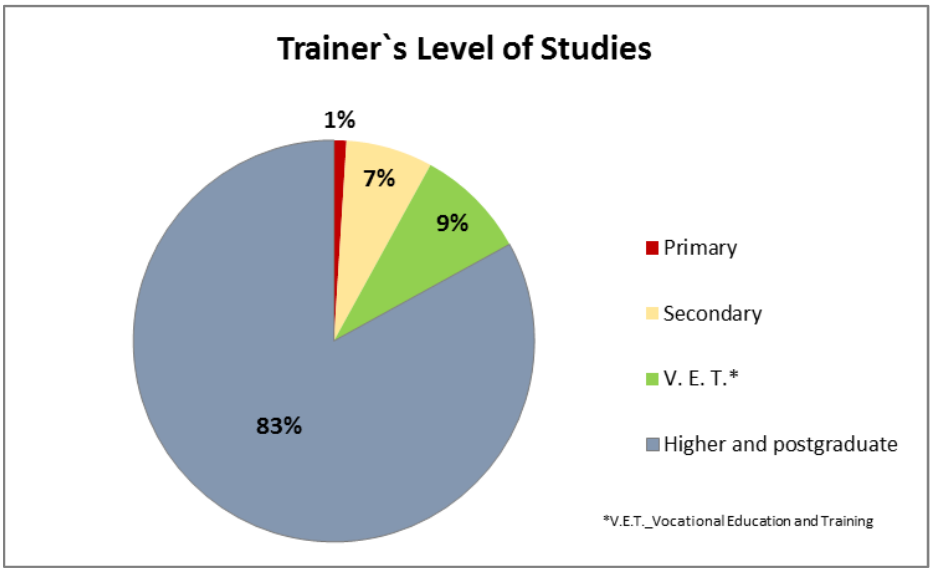

Figure 5 - Percentage of answers relative to the level of studies.

Question 5: What institution are you working for? (Check all the options applicable)

In this question multiple answers were allowed because the trainers can give training in more than one type of institution. The results (see Figure 6) show that although other training entities have the largest number of answers (189 answers corresponding a 41% of the sample), meaning that we do not cover all possibilities in this questionnaire, a significant number of trainers carry out functions in Vocational Training Centres (private and public), respectively with 182 (40 %) and 111 answers (24 %). The lowest value relates to trainers working in National and Regional employment services with 32 of answers (7%).

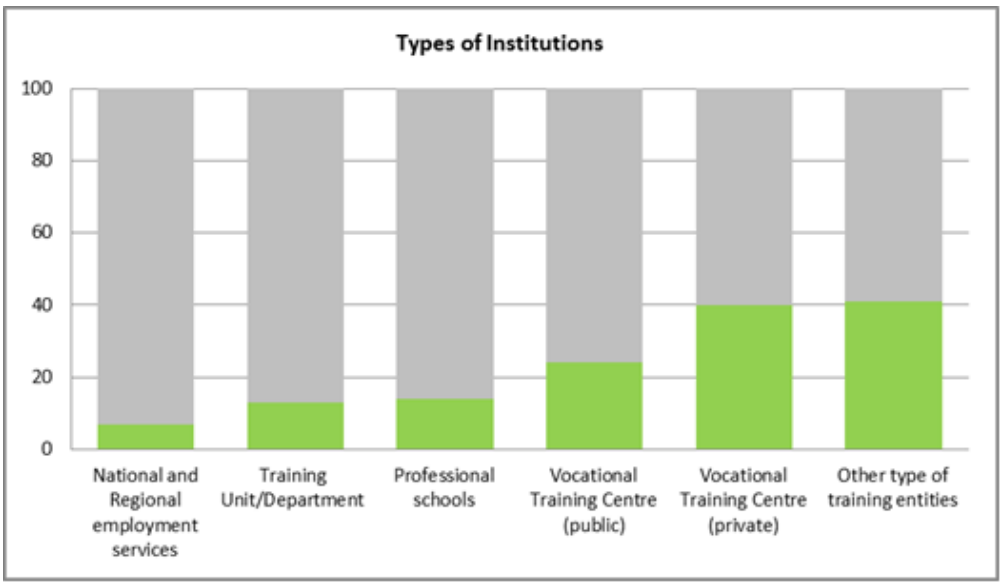

Figure 6 - Percentage of answers relative to the type of institutions in which trainers carry out their work.

Question 6 – Indicate the years of experience in the building sector.

Figure 7, shows that most trainers have more than 15 years of experience in the building sector, 223 answers, which corresponds 48.4 % of the sample. The lowest value refers to trainers with values less than 5 years of experience (69 answers and 15.0%).

These results allow observing that the majority of the trainers who filled out the questionnaires have great experience in the building sector (about 50% of the sample).

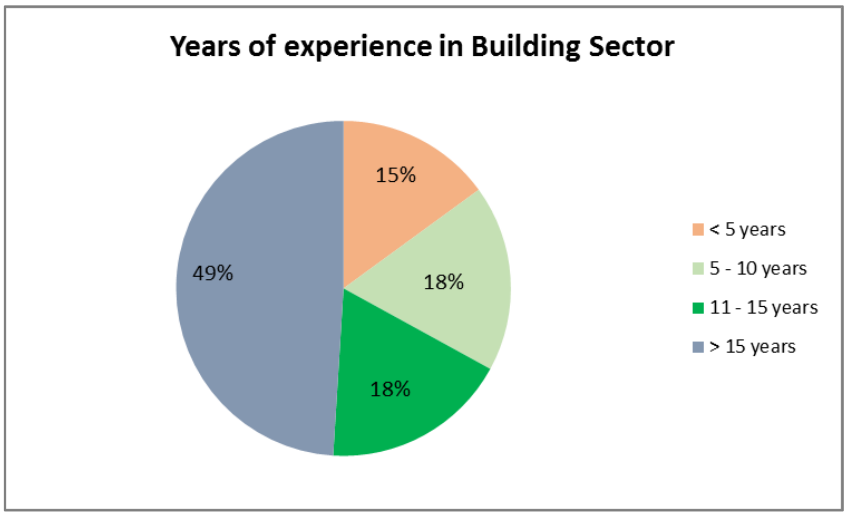

Figure 7 - Percentage of answers relative to the years of experience in building sector.

Question 7 – Indicate the years of experience in Vocational Education and Training within the building sector.

The analysis of the answers relates to years of experience in vocational education and training in the building sector (Figure 8) show that the highest value relates to trainers with less of 5 years of experience in VET, 142 answers and 30.8% of sample, followed by the trainers with 5-10 years and more of 15 years, respectively 128 answers (27.8%) and 126 answers (27.3%).

In general it can be observed that although the trainers, who answered the questionnaire (the sample) have many years of experience in the building sector (Figure 7), the majority have less of 15 years of experience as VET trainers, 72.7% of the sample (Figure 8).

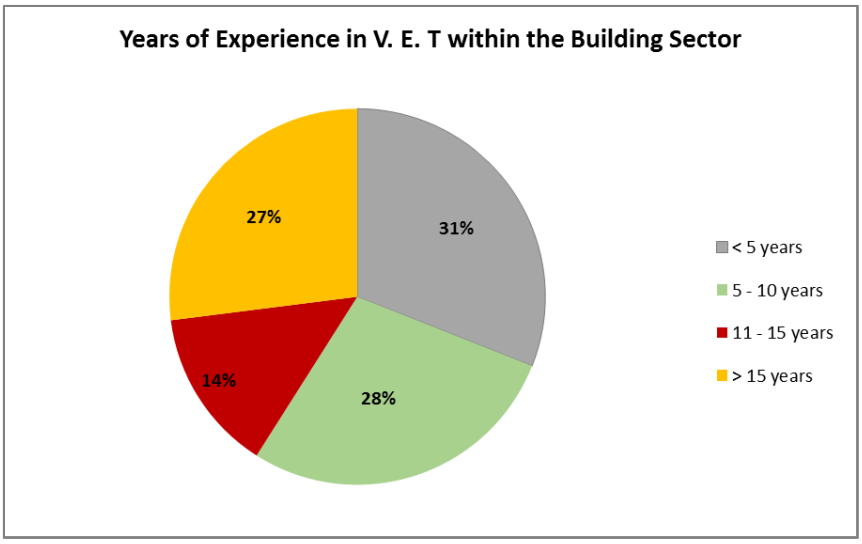

Figure 8 - Percentage of answers relative to the years of experience in VET within the building sector.

Question 8 – Indicate your current labour situation.

In relation to the labour situation the Figure 9 shows that about 96% of the trainers are employed whether employed (286 answers and 62.0%) or self-employed (157 answers and 34.1%). The unemployed trainers have a low value (16 answers and 3.5%).

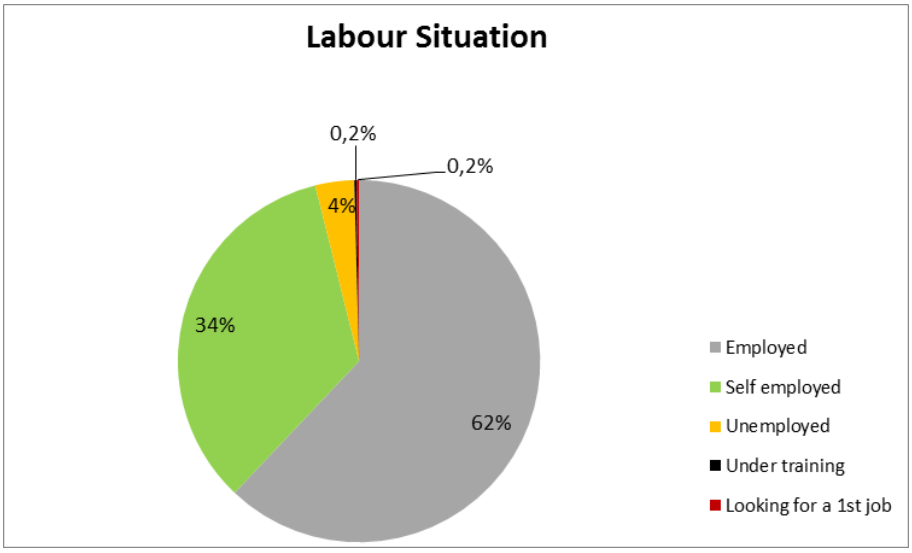

Figure 9 - Percentage of answers relative to labour situation.

Based on the information obtained in the questionnaire, a typical trainer profile can be shaped, as indicated in Table 2.

Table 2 - Typical trainer profile that completed the questionnaire.

Characteristics	
Age	40-49 years
Sex	Male
Level of Studies	Superior
Type of institutions	Work in different types of training entities
Years of experience in the building sector	>15 years
Years of experience in VET within building sector	<15 years
Labour situation	Employee

II. GREEN SKILLS GAPS

As indicated before, this part of Green Skills is divided in five thematic areas, being one of them about pedagogical and soft skills. Each thematic area, designated in the report by themes, has various topics to fill and each topic can be classified by a scale either with 5 levels of knowledge or with 5 levels of application.

The themes are:

A – Legislation, Labelling and Certification
B – Materials, Water and Construction Techniques
C – Energy Efficiency and Renewable Energy Sources
D – Project Design and Management
E – Communication and Information & Communication Technology

Each topic of thematic area A, B, C and D, was classified in 5 levels of knowledge as follows:

I.- Unfamiliar with topic
II.- Understand the concept but cannot teach
III.- Understand the concept and might teach
IV.- Good knowledge and can teach
V.- Deep knowledge and teaching skills

Each topic of thematic area E was classified in 5 levels of application as follows:

I.- Unfamiliar with topic
II.- Understand the concept but cannot apply
III.- Understand the concept and might apply
IV.- Good knowledge and can apply
V.- Deep knowledge and application capacity

For each theme, 4 types of charts were performed:

- Column chart vertical with frequency curves - In this graph the height of the bars is proportional to the frequency (y-axis), and shows the changes in the data along the levels of knowledge or application (x-axis). Frequency curves allows to see the different forms that the frequencies present and helps the analysis [6], such as: Symmetrical or bell-shaped (normal curve), tilted to the right (positive asymmetry), tilted to the left (negative asymmetry), inverted U-shape, bimodal (with two maxima);

- Radar - This graph connects all values of the same series (in this case the levels). It allows you to compare different values and also check which series covers most of the area and see its symmetry;

- Stacked bar chart – Stacked bar chart shows the relationship of individual items to the whole;

- Pie - It is a circle divided into sectors. Shows the proportional size of items that make up a data series to the sum of the items. It is useful when the analysis of ratios is more important than the actual value.

The detailed tables with all values for each of the charts (Figures 10 to 34) are in Annex 7.3.

Theme A – Legislation, Labelling and Certification

Question 9 – Please, evaluate to what extent you master the green skills concerning the topics below:

- A1 -European Environmental and Energy Legislation
- A2 -National Environmental and Energy legislation and Action Plans
- A3 -Sustainable Construction Standardization
- A4 -Sustainable Building Certification Systems
- A5 -Voluntary Environmental Labelling
- A6 - Mandatory Energy Labelling
- A7 - Mandatory Products Labelling.

For the Theme A-Legislation, Labelling and Certification, 435 valid answers were considered in the universe of 461 questionnaires, corresponding to 94.4% of the total sample. Figure 10 compiles the results for theme A - Legislation, Labelling and Certification in terms of number of answers for each topic.

The analysis of Figure 10 shows the following [6]:

- Topics A1, A2 and A7 are the topics that present the greatest symmetry near the normal curve, that is, level III in the scale of classification is the one with the highest number of answers - Understand the concept and might teach;

- For the A3 and A6 topics the form of the distribution of knowledge levels shows a slight positive asymmetry (tilted to the right), and A4 and A5 topics show a typical positive asymmetry that is, the most frequent responses were at level II - Understand the concept but cannot teach.

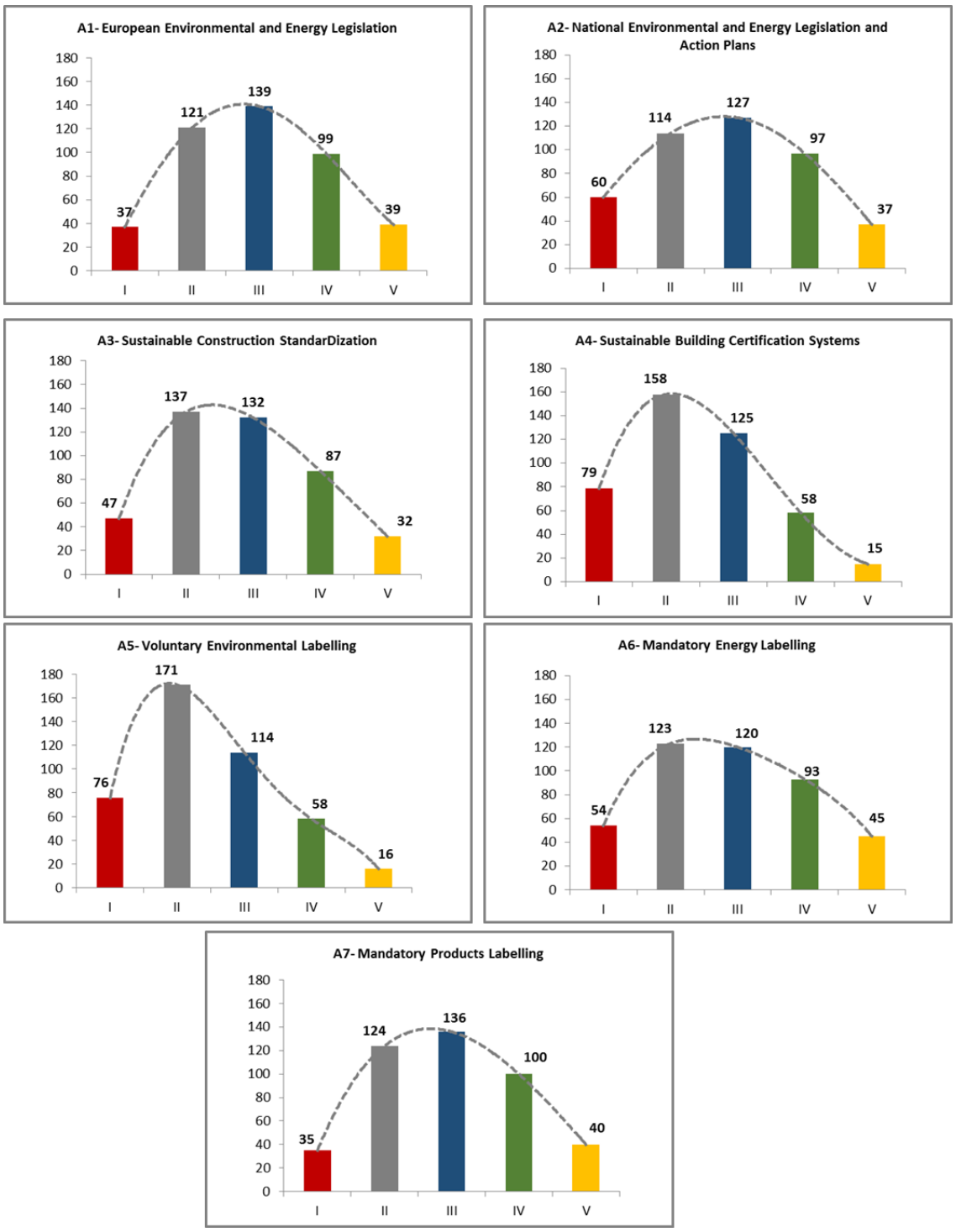

Figure 10 - Results for theme A - Legislation, Labelling and Certification in terms of number of answers for each topic, classified by levels of knowledge.

An analysis of Figure 11 and Figure 12 in relation to all topics of theme A showed that the topics A4-Sustainable Building Certification Systems and A5-Voluntary Environmental Labelling presented the greatest number of answers in levels I and II of the scale,

respectively with a total percentage of 54.5% and 56.8%, and therefore those in which the respondents are less familiar in theme A.

On the contrary the topics A7 - Mandatory Products Labelling, followed by A1 - European Environmental and energy legislation and A6 - Mandatory Energy Labelling present the highest number of responses in levels IV and V, respectively with a total percentage of 32.2%, 31.8% and 31,7%, and therefore those in which the respondents are more familiar in theme A

In addition, Figure 11 shows that it is level II that covers a larger area of the graphic; therefore the one that presents a greater number of answers (948 answers).

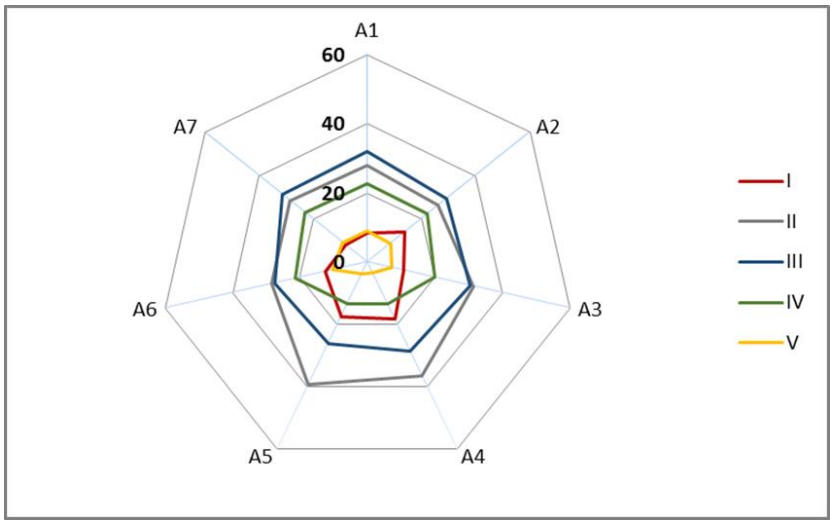

Figure 11— Percentage of answers by levels of knowledge for the theme A.

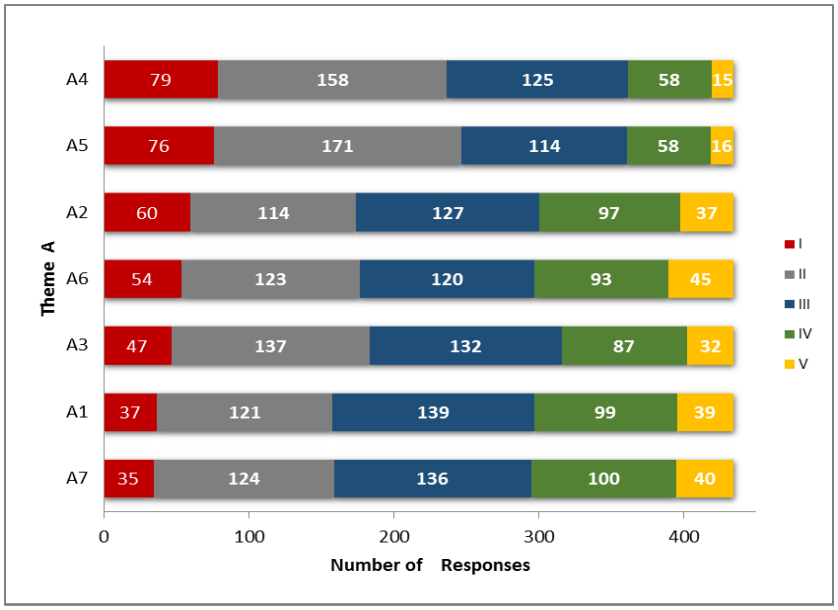

Figure 12—Number of answers by levels of knowledge for the theme A, ordered by increasing values of level I.

To determine in each topic, within each theme, whether it can be considered “GAPs” or “No GAPs” two different pie graphs were performed.

The first one allows comparing the percentage of level III in relation to the other levels. In these graphs levels I and II were considered as “GAPs” without levels of uncertainty associated with responses (certainly “GAP”) and levels IV and V “No GAPs” without levels of uncertainty associated with responses (certainly “No GAP”).

The level III of knowledge is a level with a high degree of uncertainty and can include trainers, who may or may not train on these topics, i.e. can be included in the “GAP” or in the “No GAP”.

So Figure 13 shows the percentages of responses according to this classification.

The other graph is the result of the consensus reached by the partnership, which considers that the trainers who answered at level III do not have the necessary knowledge to give training and therefore it is considered as a “GAP” level. Therefore, it was assumed that the answers given to the levels I, II and III are levels at which the trainers are not able to train, and therefore there are GAPs in their knowledge. On the other hand, the answers for levels IV and V in the scale are levels at which the trainers are able to train and there are no GAPs.

Consequently, in the Figure 14, levels I, II and III are designated as "GAP" and levels IV and V are deemed as "No GAP".

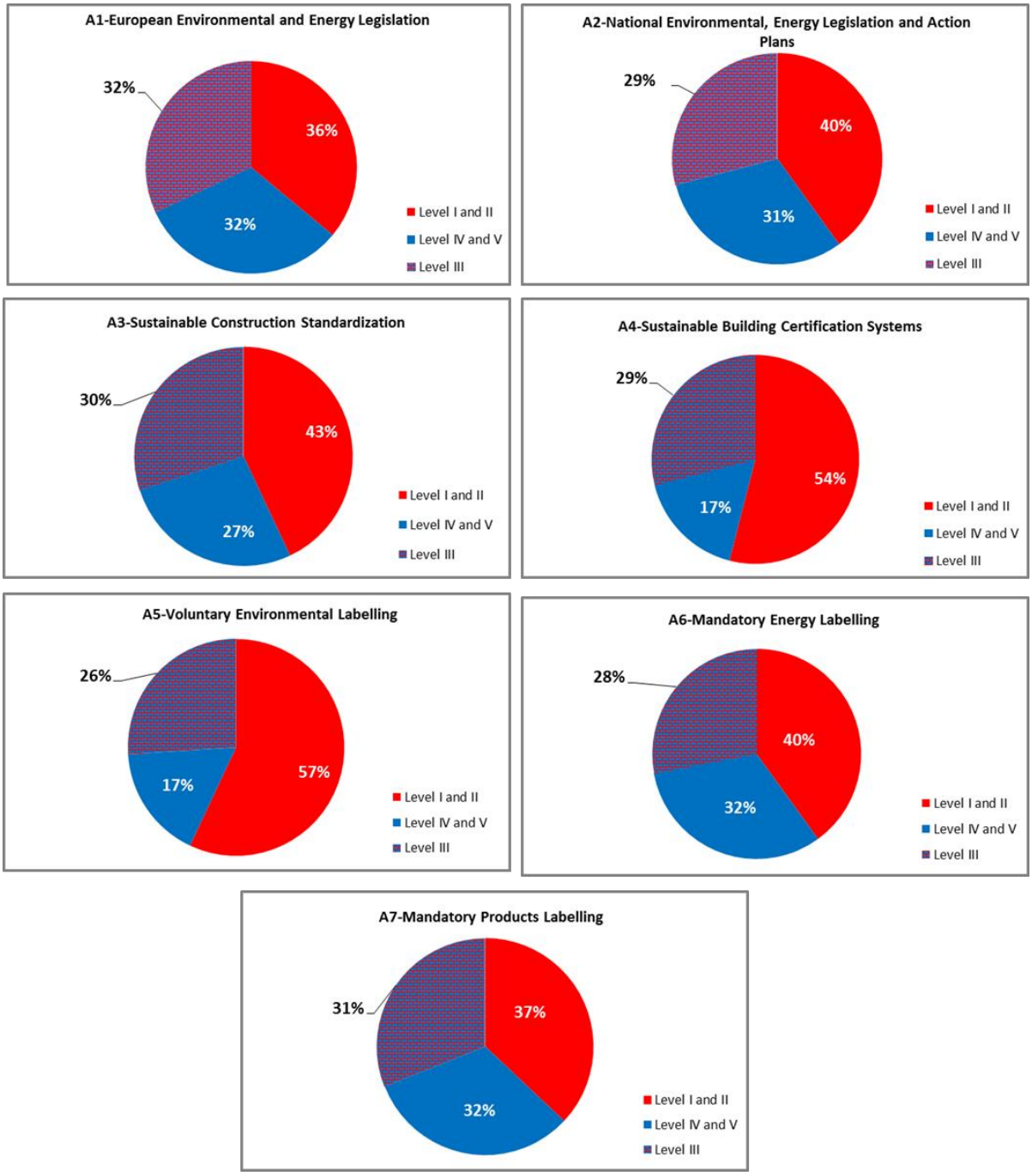

Figure 13 - Theme A - "Legislation, Labelling and Certification"
percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

In the analysis of the results, the average of the values in percentage was considered for the combined levels I and II, IV and V, and level III.

The following results were obtained:

Level III ranged from a maximum of 32% (A1 - European Environmental and Energy Legislation) to a minimum of 26% (A5 - Voluntary Environmental Labelling), with an **average of 29%** representing more than a quarter of the total in all graphs (Figure 13).

The **levels I and II combined** (certainly "GAP**"**) presented higher values with an **average of 43.8%**, between 36% and 57%, respectively A1 - European Environmental and energy legislation and A5 – Voluntary Environmental Labelling.

The **levels IV and V combined** (certainly "No GAP") presented the lowest values in **average (26.8%)**, between a minimum of 17%, respectively A4 - Sustainable Building Certification Systems and A5 - Voluntary Environmental Labelling and maximum of 32%, respectively A1 - European Environmental and Energy Legislation, A6 – Mandatory Energy Labelling and A7 – Mandatory Products Labelling.

The analysis of Figure 14, that presents the "GAPs" and "No GAPs", indicated that the "GAP" of topics for the theme A differs between a minimum of 68% (A1 - European Environmental and energy legislation and A6 – Mandatory Energy Labelling) and maximum of 83% (A4 Sustainable Building Certification Systems and A5 - Voluntary Environmental Labelling).

All the topics of this thematic area can be considered "GAP". **The "GAP" average of topics for theme A is around 73%, that is, about 318 respondents, in a sample of 435, consider that they cannot give training in this theme.**

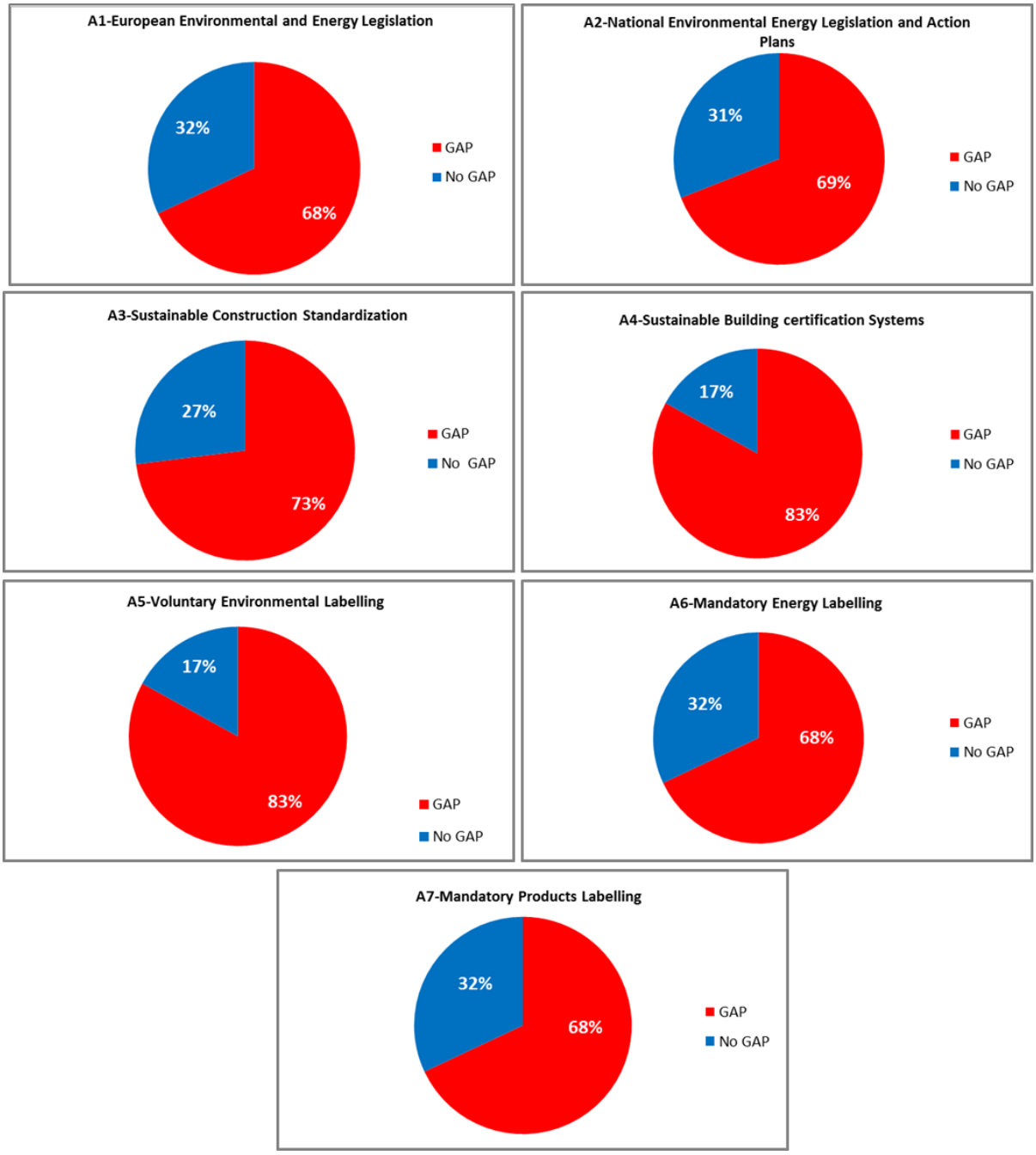

Figure 14 - Theme A - "Legislation, Labelling and Certification" percentages of "GAP" and "No GAP" by topics.

Theme B – Materials, Water and Construction Techniques

Question 10 – Please, evaluate to what extent you master the green skills concerning the topics below:

- B1 - Traditional Construction
- B2 - Local Materials
- B3 - New and Innovative Materials
- B4 - Low Environmental Impact Materials
- B5 - Selection of Construction Materials and Products in Terms of Sustainability
- B6 - Influence of Material, Products and Equipment in the Building Performance
- B7 - Ecological Insulation Materials
- B8 – Sustainable Construction Techniques
- B9 – Building Envelope and Thermal inertia
- B10 – Emerging Technologies
- B11 – New Technologies Applied to Building Maintenance and Refurbishment
- B12 – Water Efficiency
- B13 – Prevention of Construction and Demolition Waste (CDW)
- B14 – Reuse and Recycling of CDW
- B15 - Deconstruction

For the Theme B- Materials, Water and Construction Techniques, 424 valid answers were considered in the universe of 461 questionnaires, corresponding to 92 % of the total sample. Figure 15 compiles the number of answers to the topics in theme B classified by the scale with 5 levels of knowledge.

In Figure 15, it can be evidenced that the distribution curves referring to the levels of knowledge of theme B present some degree of symmetry, that is, graphically the curve is bell-shaped, with concavity turned downward between the inflection points of the curve.

Their analysis shows the following [6]:

- The number of answers were lower in the extreme classification levels, I (Unfamiliar with topic) and V (Deep knowledge and teaching skills);

- Topics B1, B2, B5, B7, B11 and B12 are the topics that present the greatest symmetry, that is, level III in the scale of classification is the one with the highest number of answers - Understand the concept and might teach;

- For B13 topic the form of the distribution of knowledge levels shows a slight positive asymmetry (tilted to the right), and for B10, B14 and B15 topics show a typical positive asymmetry, that is, the most frequent responses were at level II - Understand the concept but cannot teach. Topic B4 can also be inserted in this type of distribution curve, but level II and III have equal values;

- For topics B3, B8 and B9 there is an inverted U-shaped distribution, that is, the number of answers are at levels II (Understand the concept but cannot teach), III (Understand the concept and might teach) and IV (Good knowledge and can teach) are highest and similar;

- In topic B6 the form of the distribution of knowledge levels shows a slight negative asymmetry (tilted to the left), that is, the most frequent responses were at level IV - Good knowledge and can teach.

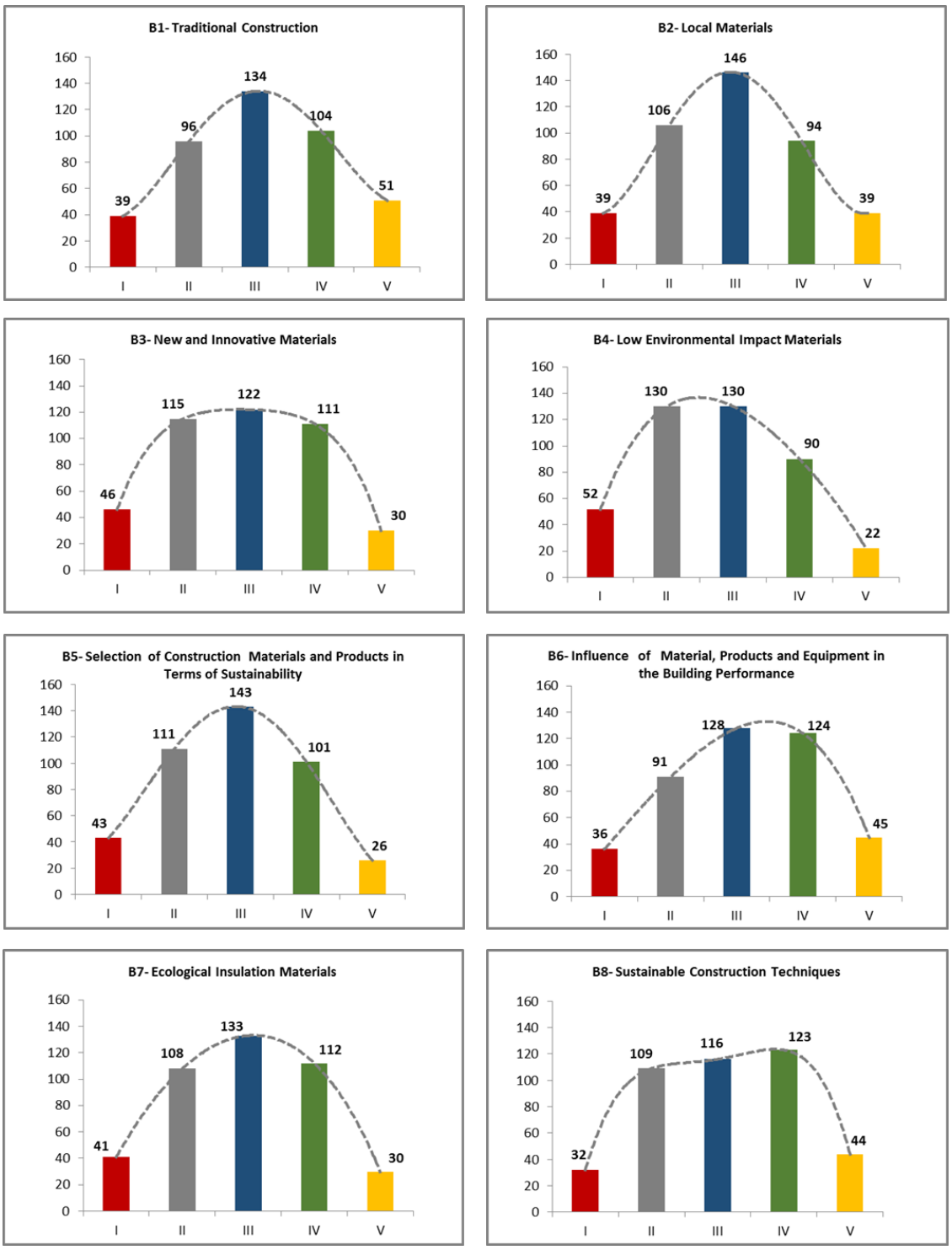

Figure 15 - Results for theme B - Materials, Water and Construction Techniques in terms of number of answers for each topic classified by levels of knowledge.

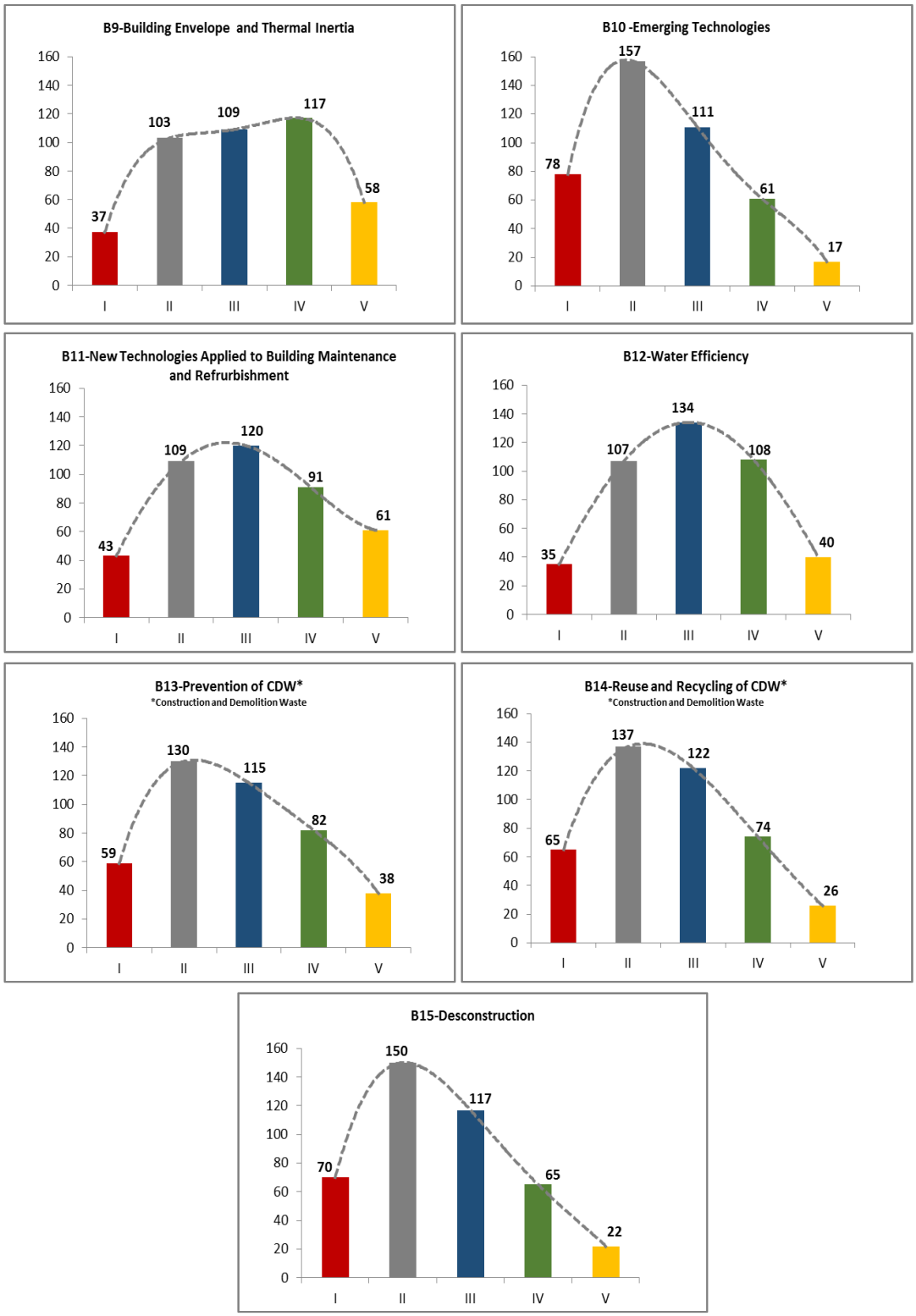

Figure 15 (cont.) - Results for theme B - Materials, Water and Construction Techniques in terms of number of answers for each topic classified by levels of knowledge.

Figure 16 shows the distribution in percentage of knowledge levels for the various topics of theme B and the Figure 17 the number of answers by levels of knowledge for the theme B, ordered by increasing values of Level I.

From the analysis of Figure 15 and Figure 16 can be seen:

- For all topics in this theme are the levels II and III that cover the largest area in the graphic and therefore are those that present greater number of responses. The level III is what presents a more even distribution, (Figure16).

- For topics B10 - Emerging Technologies and B15 - Deconstruction the highest number of responses is at levels I and II (Figure 16), respectively with a total percentage of 55.4% and 51.9%. They will therefore those in which the respondents are less familiar in theme B.

- The topic B8 - Sustainable Construction Techniques presented the most uniform distribution (almost the same number of responses) at levels III, IV and V, (Figure 17).

- Topic B6 - Influence of Material, Products and Equipment in the Building Performance was the one that presented cumulatively greater number of responses (70%) in levels III, IV and V, (Figure 17).

- It is also noted that the topic B11- New Technologies Applied to Building Maintenance and Refurbishment, followed by B9 - Building Envelope and Thermal Inertia and B1 - Traditional Construction present the highest number of answers in level V, and should be those in which respondents have greater knowledge, (Figure 17).

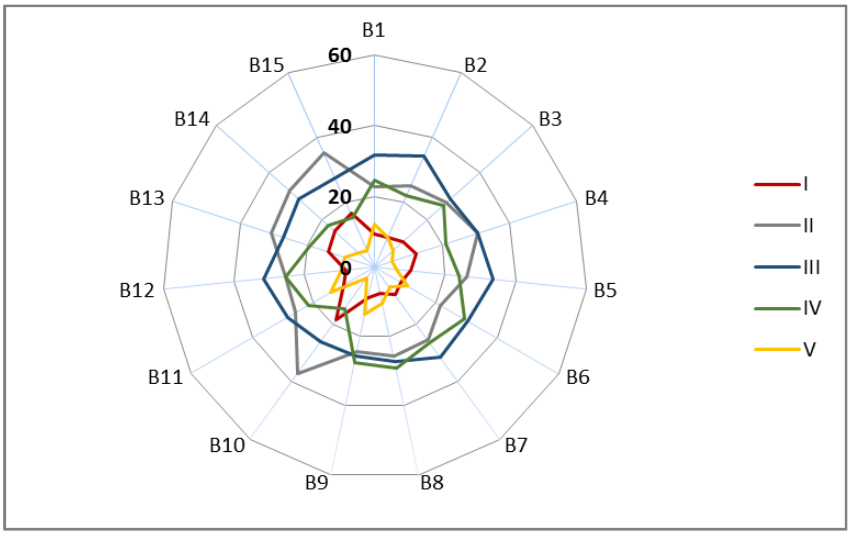

Figure 16 — Percentage of answers by levels of knowledge for the theme B.

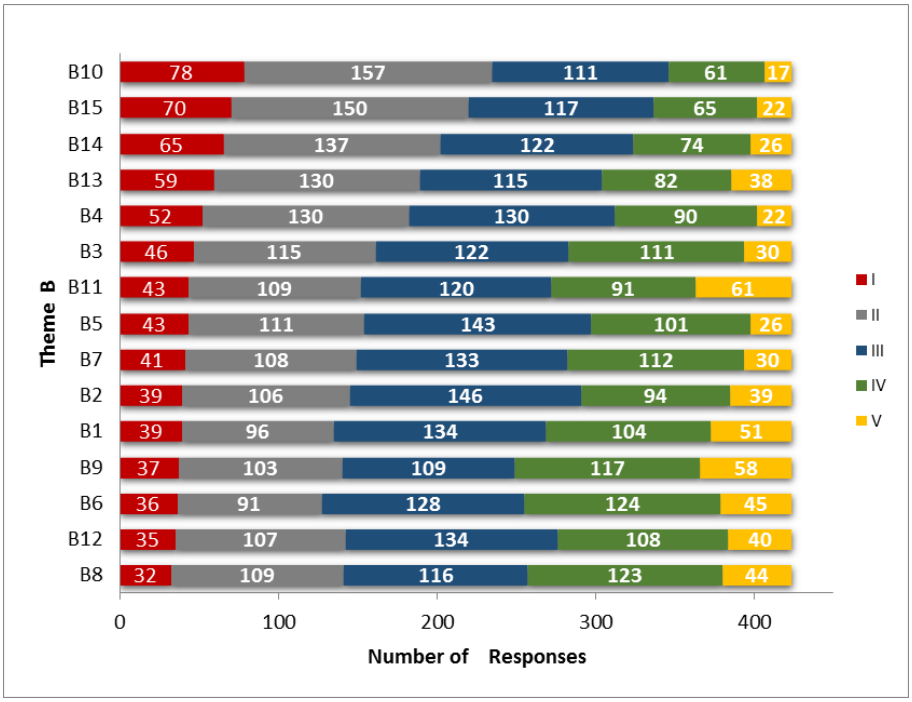

Figure 17 - Number of answers by levels of knowledge for the theme B, ordered by increasing values of Level I.

As previously defined, in case of theme B **level III** ranged from a minimum of 26% (B9 – Building Envelope and Thermal Inertia and B10 – Emerging Technologies) to a maximum of 35% (B2 – Local Materials), with an **average of 29.6%** representing more than a quarter of the total in all graphs but the lowest value in average (Figure 18).

The **levels I and II combined** (certainly "GAP") presented the higher values with an **average of 38.9%,** between a minimum of 30% and a maximum of 55%, respectively B6 – Influence of Materials, products and Equipment in the Building Performance and B10 – Emerging Technologies.

The **levels IV and V combined** (certainly "No GAP") presented an **average of 31.4%,** between a minimum of 19%, in B10 – Emerging Technologies and a maximum of 41%, in B9 – Building Envelope and Thermal Inertia.

The analysis of Figure 19, that presents the "GAPs" and "No GAPs", indicated that the "GAP" of topics for the theme B differ between a minimum of 59% (B9 - Building Envelope and Thermal Inertia) and maximum of 81% (B10 – Emerging Technologies).

All the topics of this thematic area can be considered "GAP". **The "GAP" average of topics for theme B is around 68.6%, that is, about 291 respondents, in a sample of 424, consider that they cannot give training in this theme.**

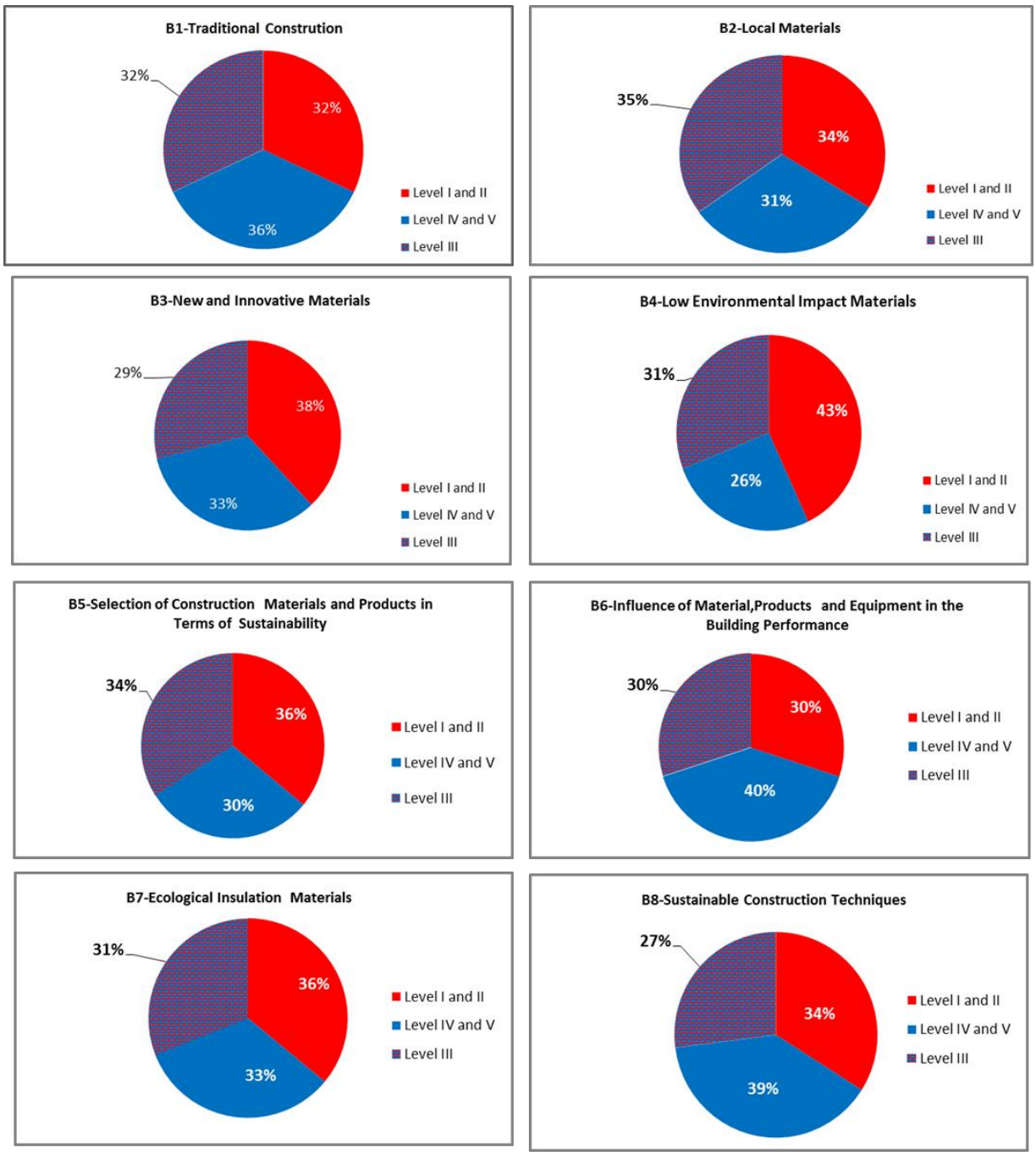

Figure 18 - Theme B - "Materials, Water and Construction Techniques" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

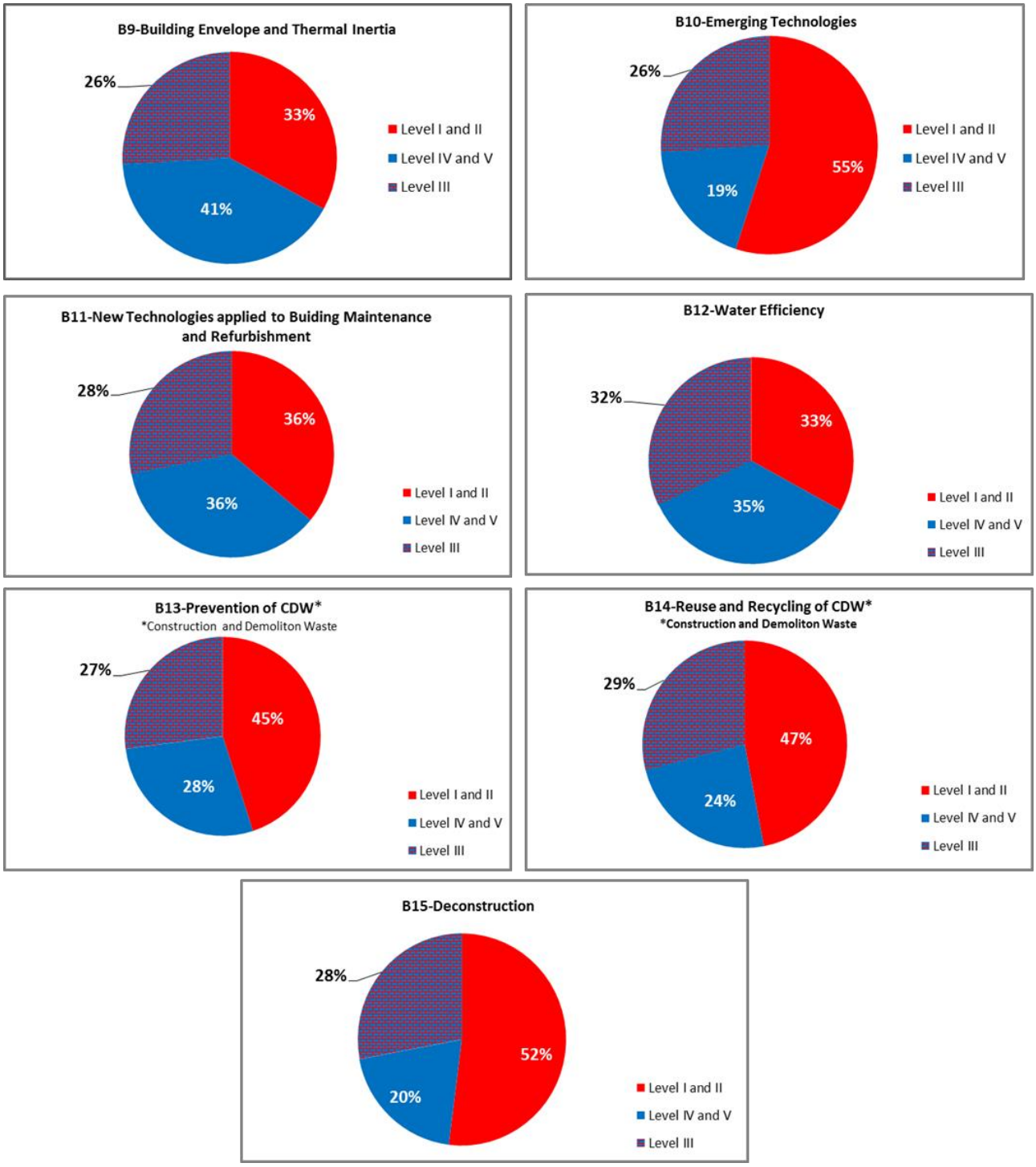

Figure 18 (cont.) - Theme B - "Materials, Water and Construction Techniques" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

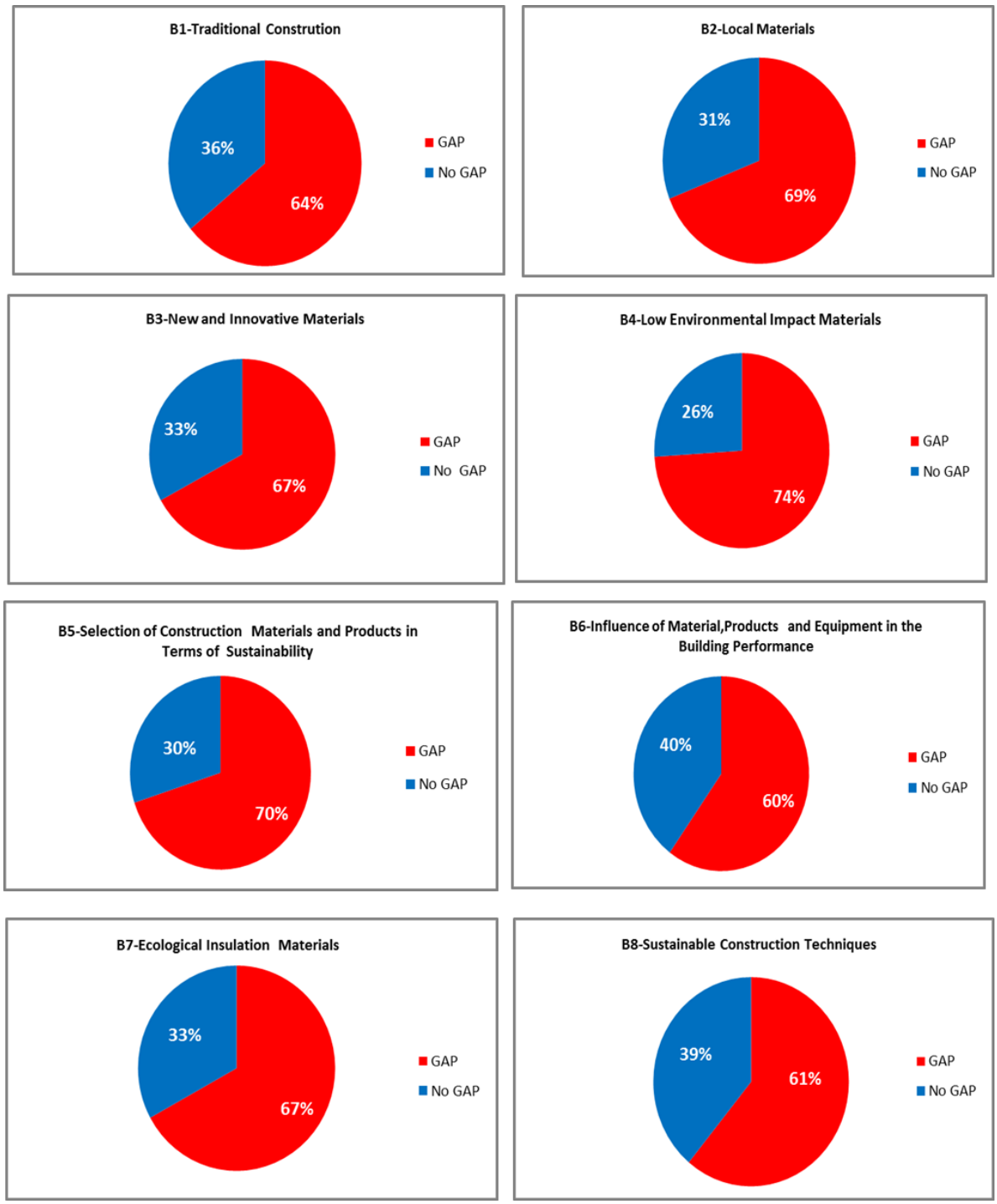

Figure 19 - Theme B - "Materials, Water and Construction Techniques"" percentages of "GAP" and "No GAP" by topics.

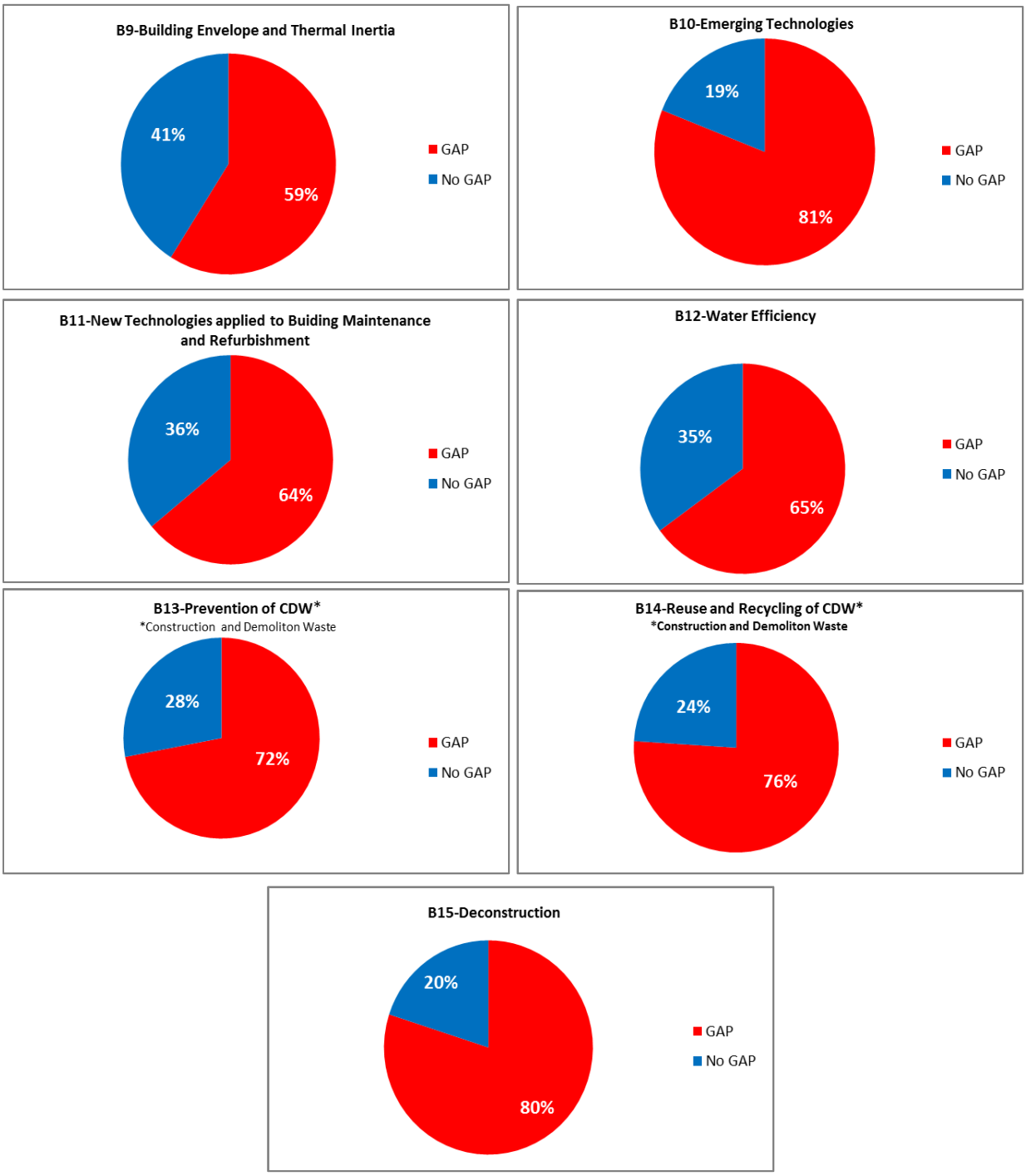

Figure 19 (cont.) - Theme B - "Materials, Water and Construction Techniques" percentages of "GAP" and "No GAP" by topics.

Theme C – Energy Efficiency and Renewable Energy Sources

Question 11 – Please, evaluate to what extent you master the green skills concerning the topics below:

- C1 –Renewable Energy Sources in Buildings in General
- C2 – Nearly Zero Energy Building (nZEB)
- C3 – Country Energy Mix
- C4 – Efficient Insulation
- C5 - Efficient Windows
- C6 – Efficient Lighting
- C7 – Solar Thermal System for Water Heating
- C8 – Solar Photovoltaic System for Building Self-consumption
- C9 - Micro-Wind systems for Building Self-consumption
- C10 – Biomass for Water Heating
- C11 – Biomass for Space Heating
- C12 – Heat Pumps for Efficient Heating and Cooling
- C13 – Emerging Technologies
- C14 – Building User Behaviour

For the Theme C – Energy Efficiency and Renewable Energy Sources, 417 valid answers were considered in the universe of 461 questionnaires, corresponding to 90 % of the total sample. Figure 20 compiles the number of answers to the topics in theme C classified by the scale with 5 levels of knowledge.

The analysis of Figure 20 shows the following [6]:

- The number of answers were lower in the extreme classification levels, I (Unfamiliar with topic) and V (Deep knowledge and teaching skills);

- Topics C2, C4 and C5 are the topics that present the greatest symmetry, that is, level III in the scale of classification is the one with the highest number of answers - Understand the concept and might teach;

- For the C6, C9, C10, C11 and C13 topics the form of the distribution of knowledge levels shows a slight positive asymmetry (tilted to the right), that is, the most frequent responses were at level II - Understand the concept but cannot teach;

- For the C1, C7 and C12 topics the form of the distribution of knowledge levels shows a slight negative asymmetry (tilted to the left), that is, the most frequent responses were at level IV - Good knowledge and can teach.

- For topics C3 and C8 there is an inverted U-shaped distribution, that is, the highest number of answers are at levels II (Understand the concept but cannot teach), III (Understand the concept and might teach) and IV (Good knowledge and can teach);

- The C14 topic presents a different distribution of the other topics since it has a shape close to the bimodal curve, presenting two maxima: one in the level II (Understand the concept but cannot teach), and another one in the level IV (Good knowledge and can teach). This curve shows that there is a division between respondents, between who understand but cannot teach and trainers with good knowledge and who can teach.

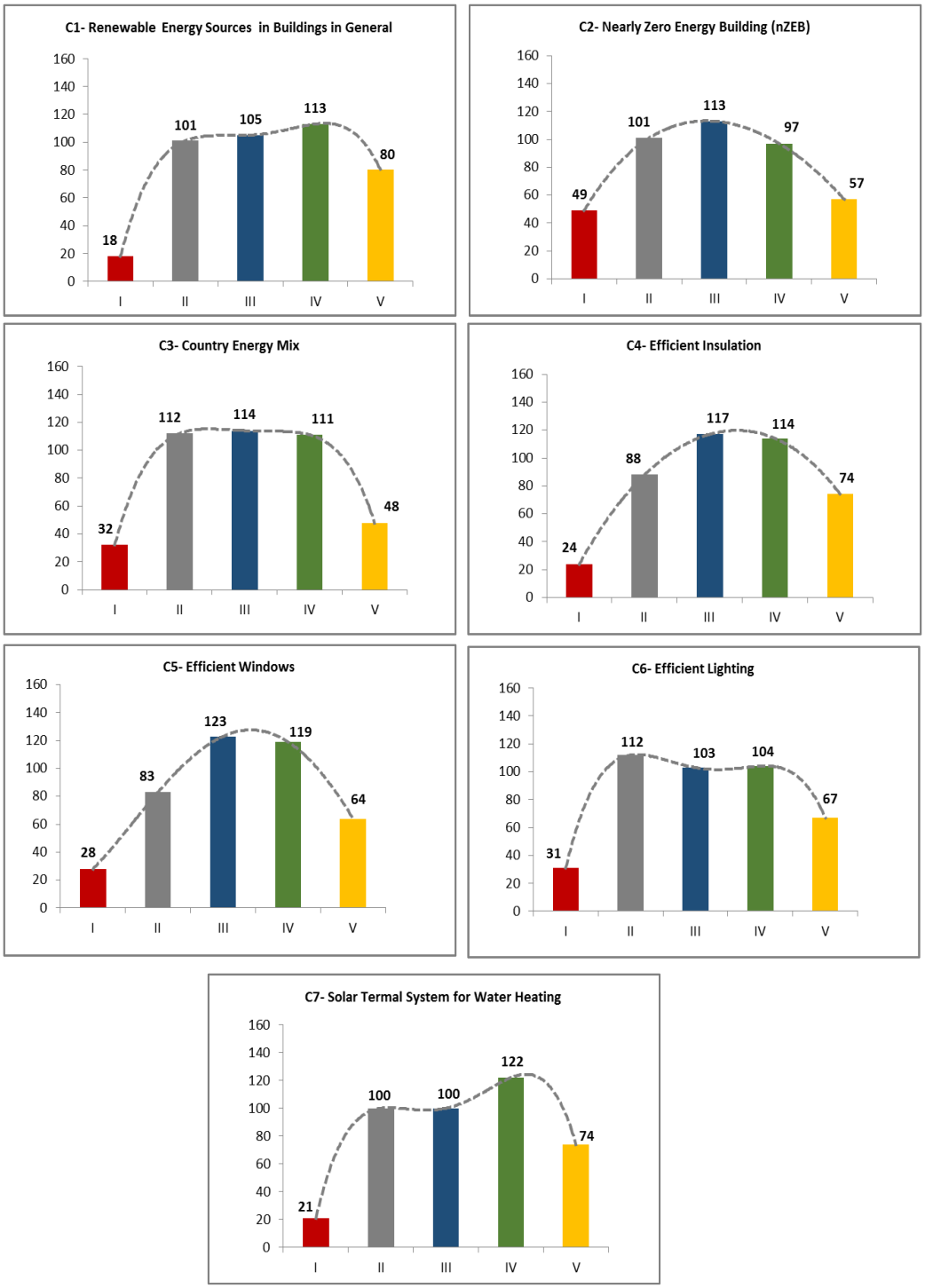

Figure 20 - Results for theme C - Energy Efficiency and Renewable Energy Sources in terms of number of answers for each topic classified by levels of knowledge.

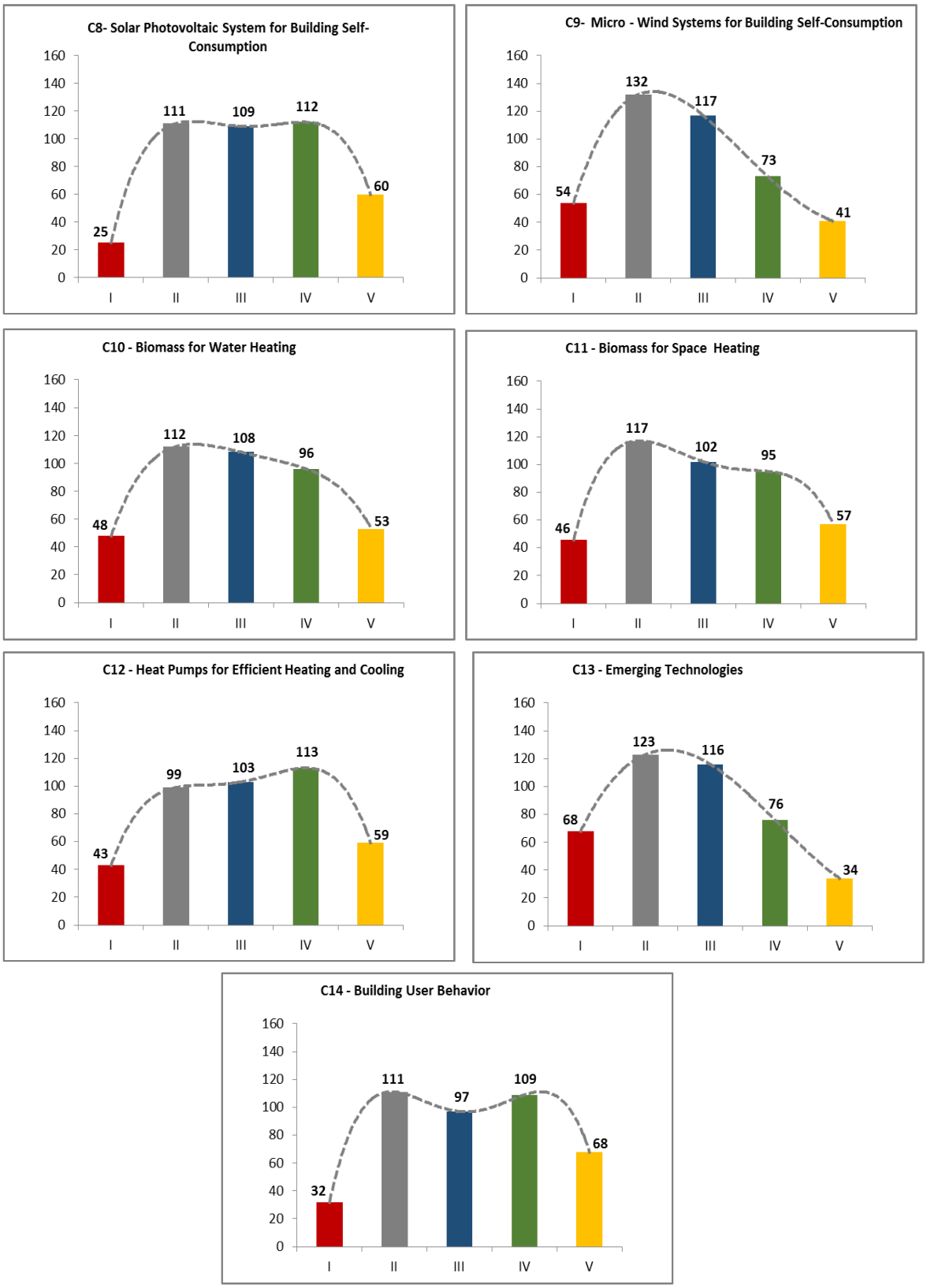

Figure 20 (cont.) - Results for theme C - Energy Efficiency and Renewable Energy Sources in terms of number of answers for each topic classified by levels of knowledge

From the analysis of Figure 21 and Figure 22 can be seen:

- For all topics in this theme are the levels II and III that cover the largest area in the graphic and therefore are those that present greater number of responses. The level III is what presents a more even distribution, (Figure 21).

- For topics C13 - Emerging Technologies and C9 - Micro-Wind Systems for Building Self-consumption have the highest value of responses for levels I and II (Figure 21 and Figure 22), respectively with a total percentage of 45.8% and 44.6%. They will therefore those in which the respondents are less familiar in theme C.

- The topics C3 - Country Energy Mix and C8 - Solar Photovoltaic System for Building Self-Consumption presented the most uniform distribution (almost the same number of responses) at levels II, III and V, (Figure 21 and Figure 22).

- Topics C5 - Efficient Windows and C4 - Efficient Insulation, followed by topics C1 - Renewable energy sources in buildings in general and C7 - Solar thermal System for Water Heating are those that presented cumulatively greater number of responses (respectively 73.4%, 73.1%, 71.5% and 71%) in levels III, IV and V, (Figure 22).

- It is also noted that the topic C 1- Renewable Energy Sources in Buildings in General, followed by C4 - Efficient Insulation and C7 - Solar Thermal System for Water Heating present the highest number of answers in level V, and should be those in which respondents have greater knowledge, (Figure 21 and Figure 22).

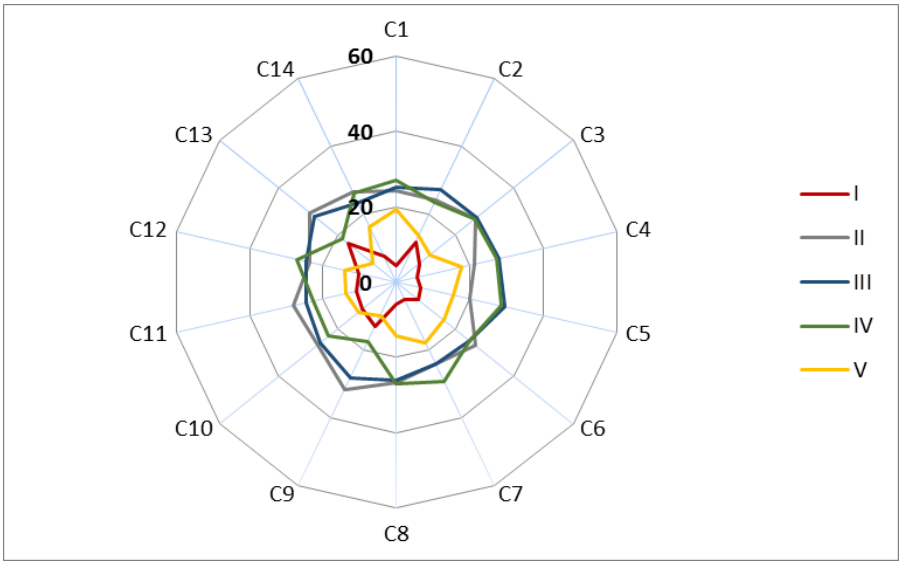

Figure 21 — Percentage of answers by levels of knowledge for the theme C.

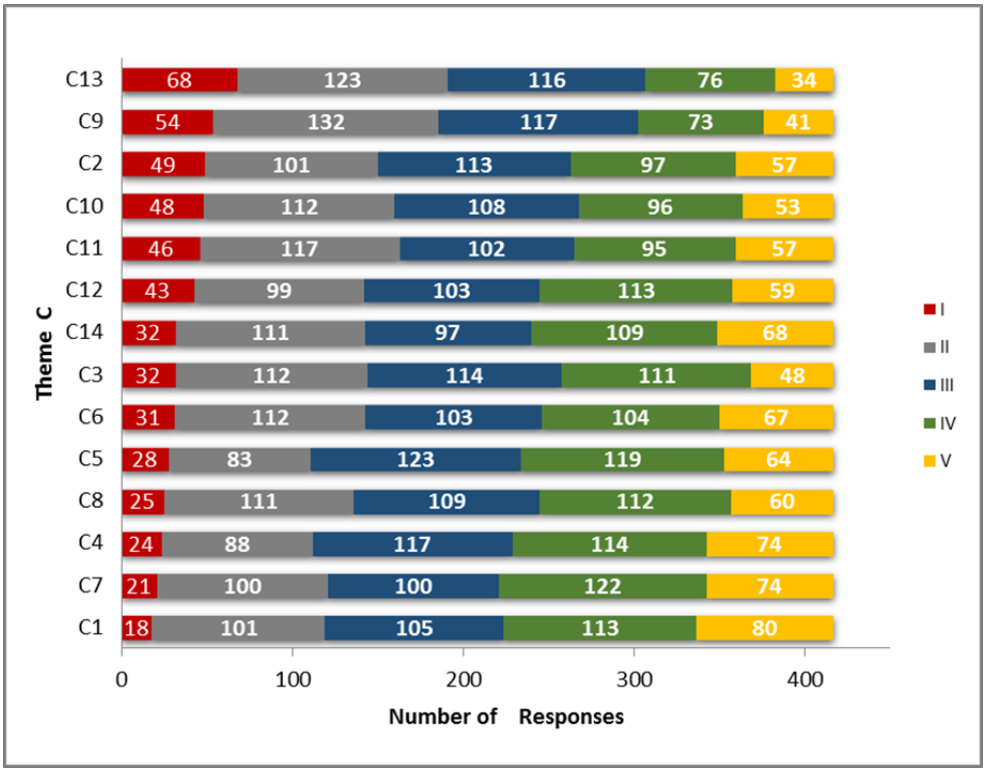

Figure 22 - Number of answers by levels of knowledge for the theme C, ordered by increasing values of Level I.

As previously defined, in case of theme C **level III** ranged from a minimum of 23% (C14 – Building User Behavior) to a maximum of 30% (C5 – Efficient Windows), with an **average of 26.1%** representing almost a quarter of the total in all graphs but the lowest value in average (Figure 23).

The **levels I and II combined** (certainly "GAP") presented higher values than level III with **an average of 34.7%,** between a minimum of 27%, respectively in C4 – Efficient Insulation and C5 – Efficient Windows, and a maximum of 46%, in C13 – Emerging Technologies.

The **levels IV and V combined** (certainly "No GAP") presented an **average of 39.0%,** the highest value, between a minimum of 26%, in C13 - Emerging Technologies and a maximum of 47%, in C7 – Solar Thermal System for Water Heating.

The analysis of Figure 24, that presents the "GAPs" and "No GAPs", indicated that the "GAP" of topics for the Theme C differ between a minimum of 53% (C7 - Solar Thermal System for Water Heating) and maximum of 74% (C13 – Emerging Technologies).

All the topics of this thematic area can be considered "GAP". **The "GAP" average of topics for theme C is around 61.0%, that is, about 254 respondents, in a sample of 417, consider that they cannot give training in this theme.**

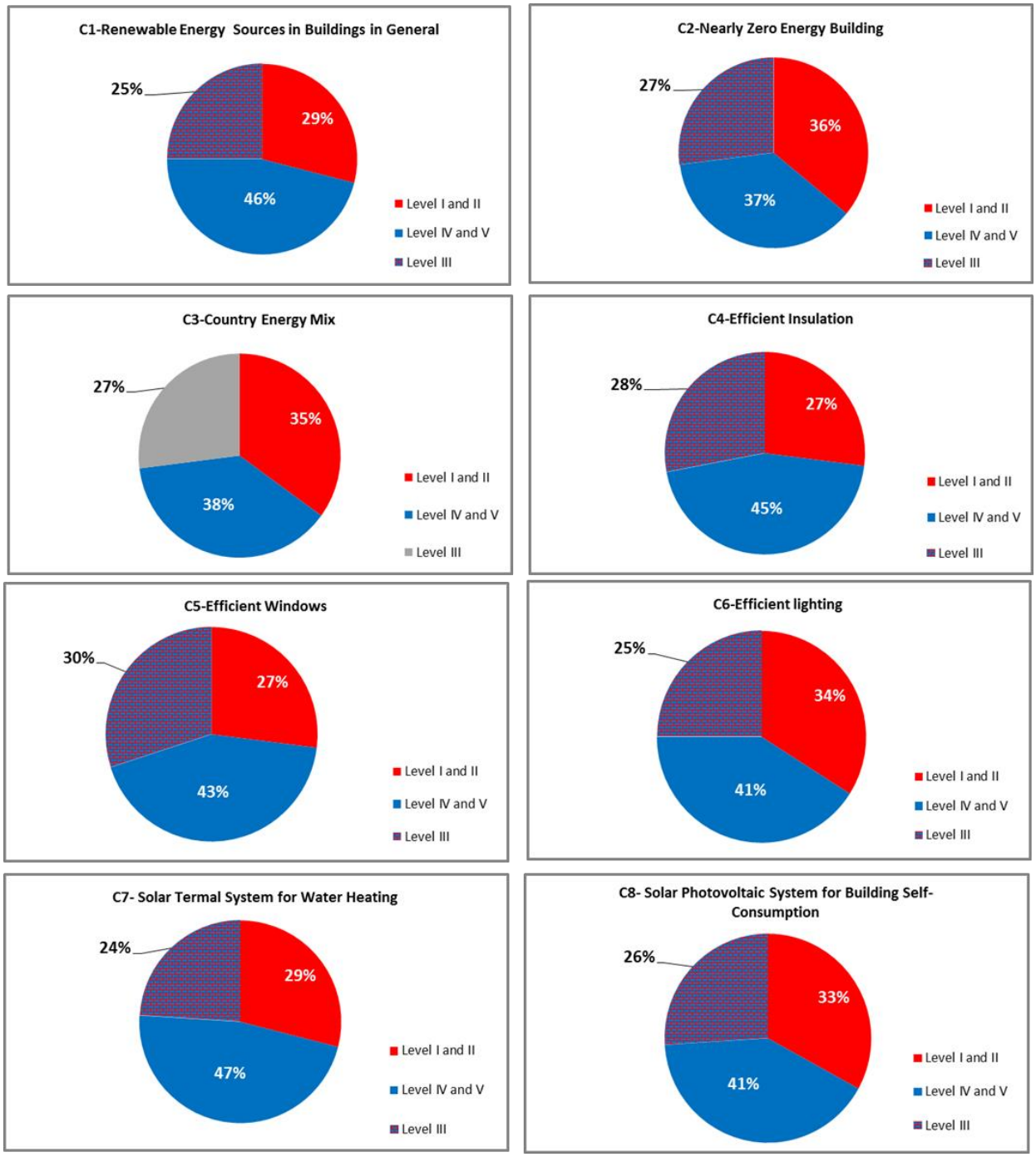

Figure 23 - Theme C - "Energy Efficiency and Renewable Energy Sources" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

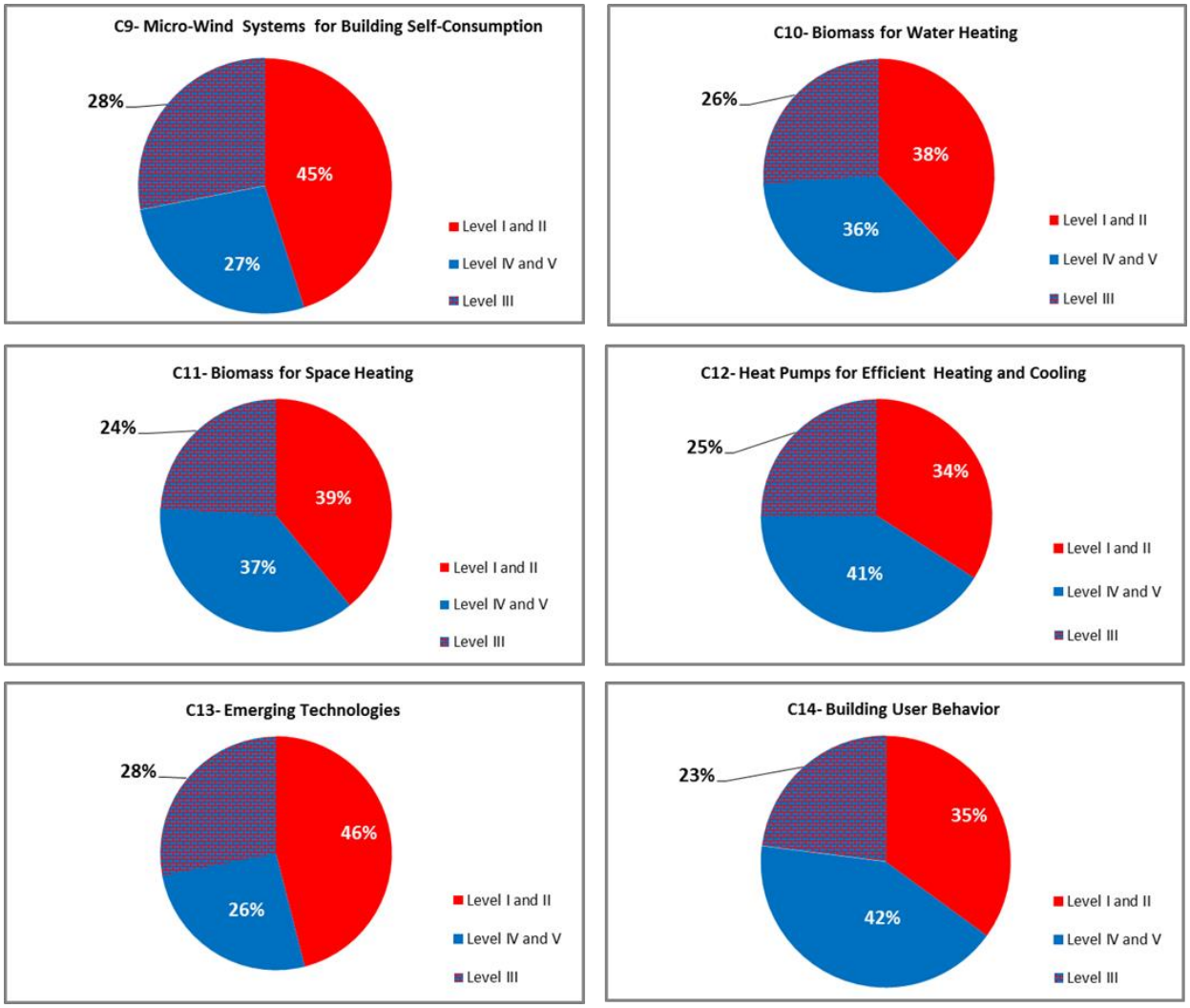

Figure 23 (cont.) - Theme C - "Energy Efficiency and Renewable Energy Sources" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

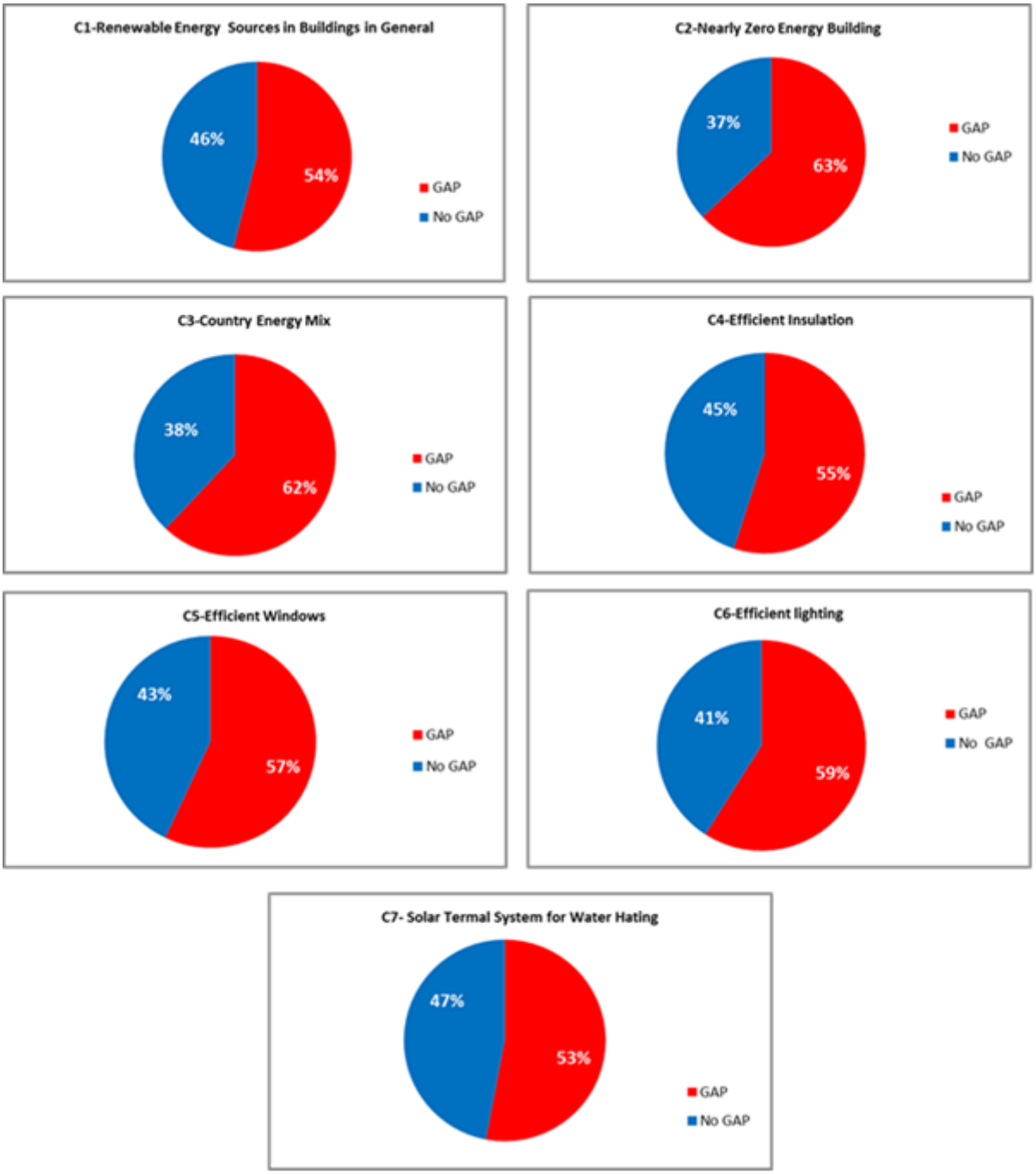

Figure 24- Theme C - "Energy Efficiency and Renewable Energy Sources" percentages of "GAP" and "No GAP" by topics.

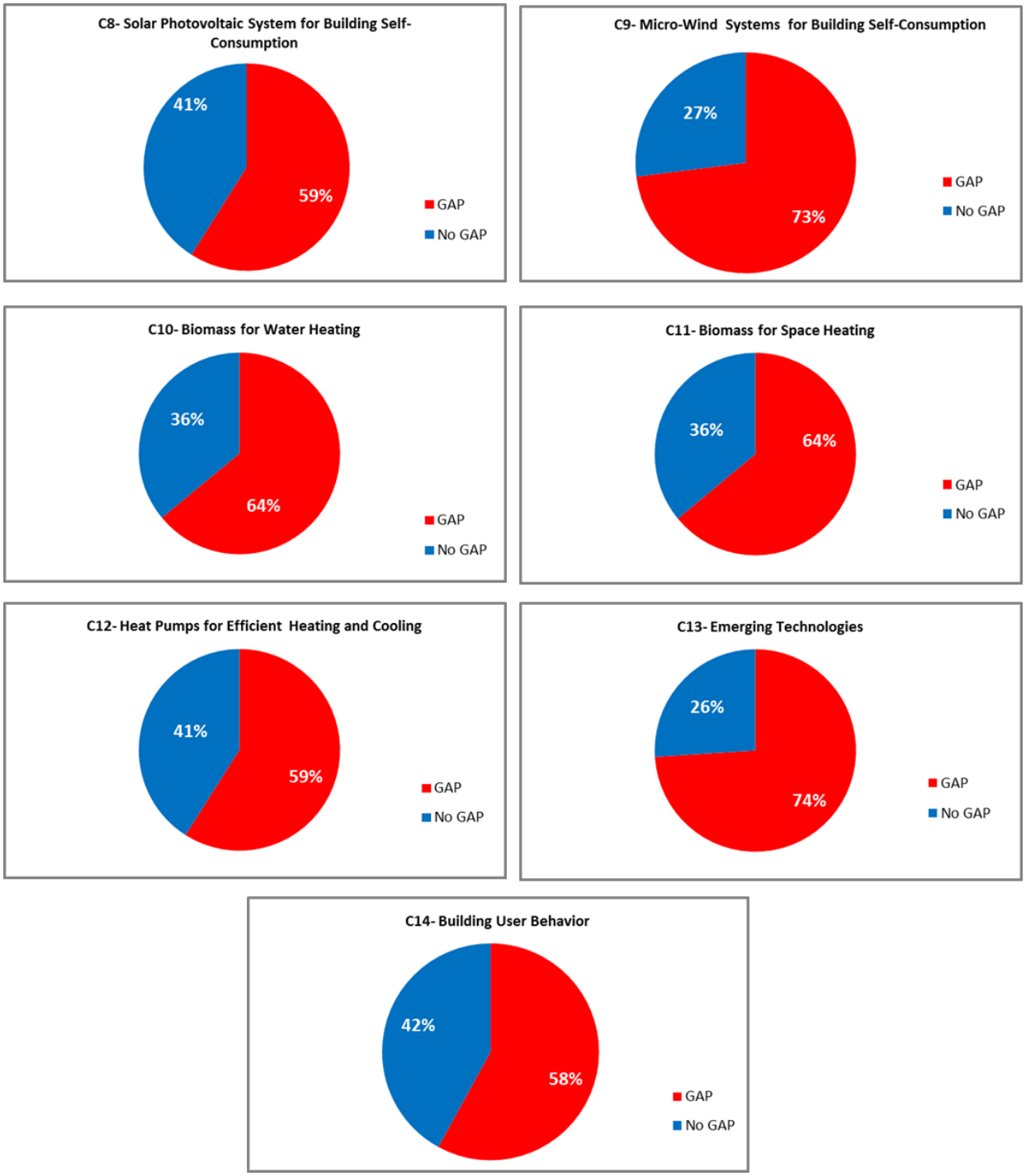

Figure 24 (cont) - Theme C - "Energy Efficiency and Renewable Energy Sources" percentages of "GAP" and "No GAP" by topics.

Theme D – Project Design and Management

Question 12 – Please, evaluate to what extent you master the green skills concerning the topics below:

- D1 – Life Cycle Perspective
- D2 – Life Cycle Costs
- D3 – Integration of Environmental/Sustainable Criteria in Design Process
- D4 – Systems of Economic Incentives for Efficient Energy and Renewable Energy Sources
- D5 – Building Management

For the Theme D – Project Design and Management, 417 valid answers were considered in the universe of 461 questionnaires, corresponding to 90 % of the total sample. Figure 25 compiles the number of answers to the topics in theme D classified by the scale with 5 levels of knowledge.

The analysis of Figure 25 shows the following [6]:

- The number of answers was lower in the extreme classification levels, I (Unfamiliar with topic) and V (Deep knowledge and teaching skills);

- Topic D1 is the topic that presents the greatest symmetry, that is, level III in the scale of classification is the one with the highest number of answers - Understand the concept and might teach;

- For the D2, D3, D4 and D5 topics the form of the distribution of knowledge levels shows a slight positive asymmetry (tilted to the right), that is, the most frequent responses were at level II - Understand the concept but cannot teach.

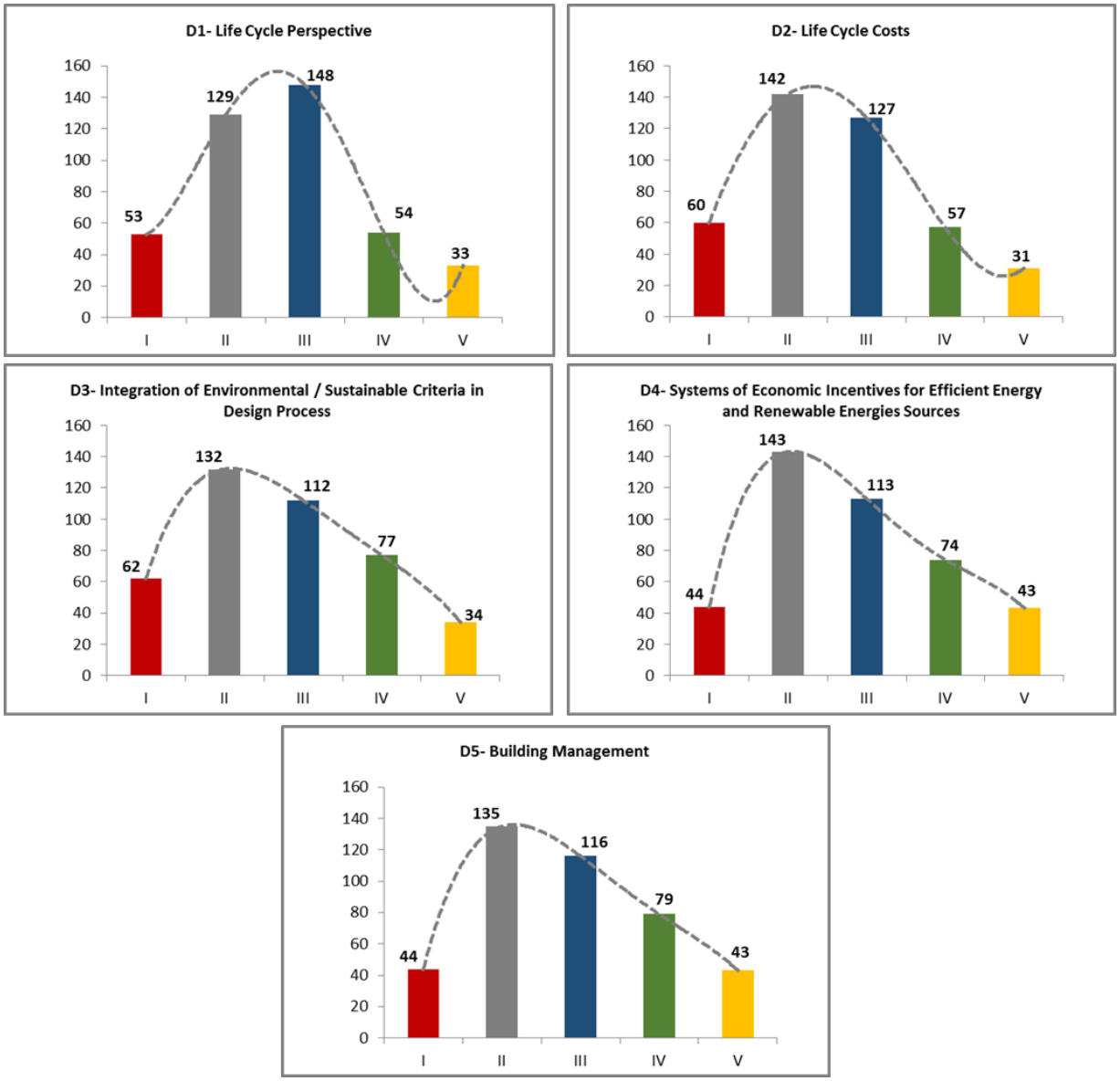

Figure 25 - Results for theme D - Project Design and Management in terms of number of answers for each topic classified by levels of knowledge.

From the analysis of Figure 26 and Figure 27 can be seen:

- For all topics in this theme, it is level II the series that covers the most of the area of the graphic, followed by level III. Level V is what presents a more even distribution, (Figure 26).

- For topics D2 - Life Cycle Costs and D3 - – Integration of environmental/sustainable criteria in design process have the highest value of responses for levels I and II (Figure 26 and Figure 27), respectively with a total percentage of 48.4% and 46.5%. They will therefore those in which the respondents are less familiar in theme D.

- Topics D5 - Building Management, D1 - Life Cycle perspective followed by topic D4 - Systems of economic incentives for efficient energy and renewable energy sources, are those that presented cumulatively greater number of responses (respectively 57.1%, 56.3% and 55.1%) in levels III, IV and V, (Figure 27).

- It is also noted that the topics D5- Building Management and D4 - Systems of economic incentives for efficient energy and renewable energy sources present the highest number of answers in level V, and should be those in which respondents have greater knowledge, (Figure 26 and Figure 27).

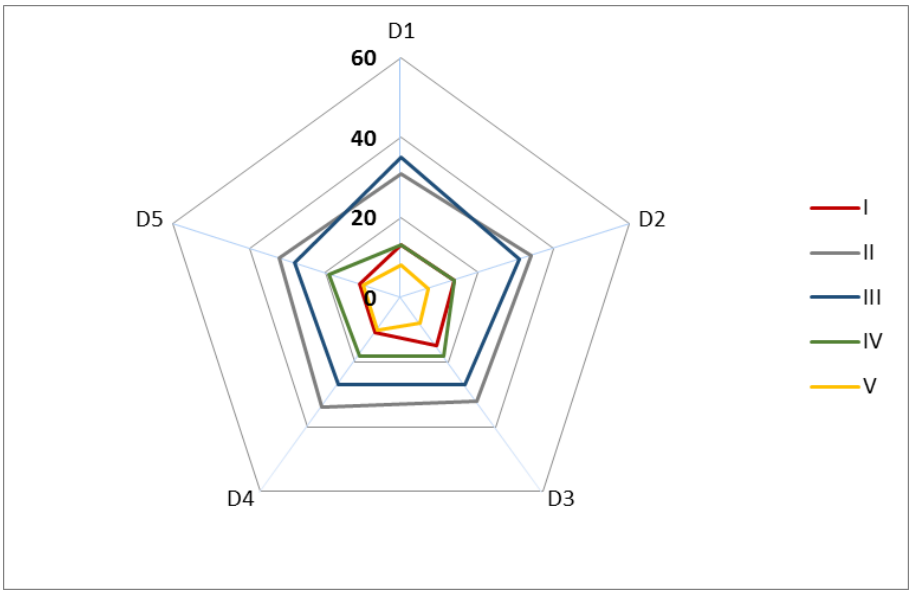

Figure 26 - Percentage of answers by levels of knowledge for the theme D.

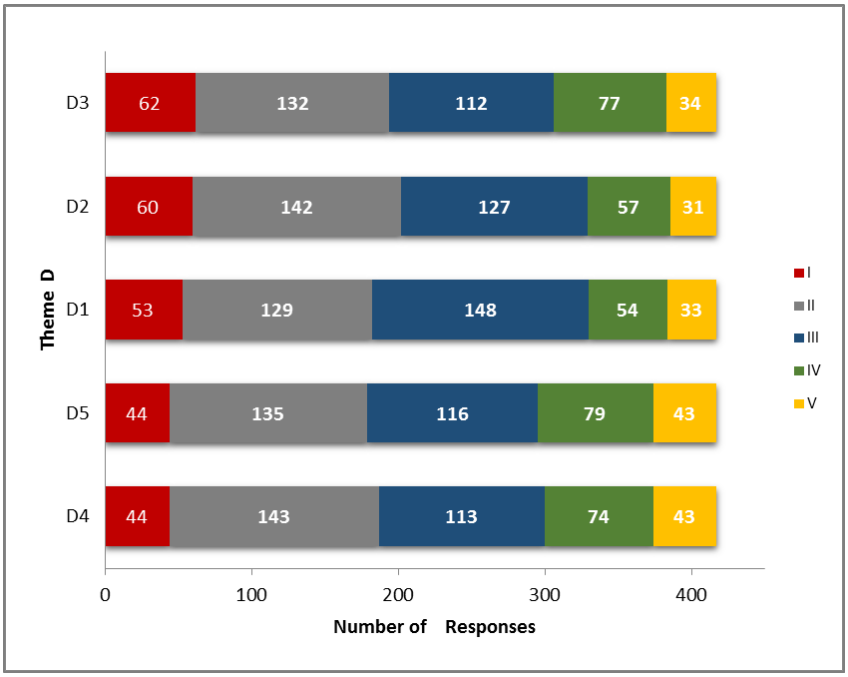

Figure 27 - Number of answers by levels of knowledge for the theme D, ordered by increasing values of Level I.

As previously defined, in case of theme D **level III** ranged from a minimum of 27% (D3 – Integration of Environmental/Sustainable Criteria in Design Process and D4 – Systems of Economic Incentives for Efficient Energy and Renewable Energy Sources) to a maximum of 35% (D1 – Life Cycle Perspective), with an **average of 29.6%** representing more than a quarter of the total in all graphs but the lowest value in average (Figure 28).

The **levels I and II combined** (certainly "GAP") presented the higher values with an **average of 45.4%,** between a minimum of 43%, in D5 –Building Management, and a maximum of 48%, in D2 – Life Cycle Costs.

The **levels IV and V combined** (certainly "No GAP") presented an **average of 25.0%**, the lowest value, between a minimum of 21%, in D1 - Life Cycle Perspective and D2 - Life Cycle Costs, and a maximum of 29%, in D5 – Building Management.

The analysis of Figure 29, that presents the "GAPs" and "No GAPs", indicated that the "GAP" of topics for the theme D differ between a minimum of 71% (D5 – Building Management) and maximum of 79% (D1 – Life Cycle Perspective and D2 – Life Cycle Costs).

All the topics of this thematic area can be considered "GAP". **The "GAP" average of topics for theme D is around 75.0%, that is, about 313 respondents, in a sample of 417, consider that they cannot give training in this theme.**

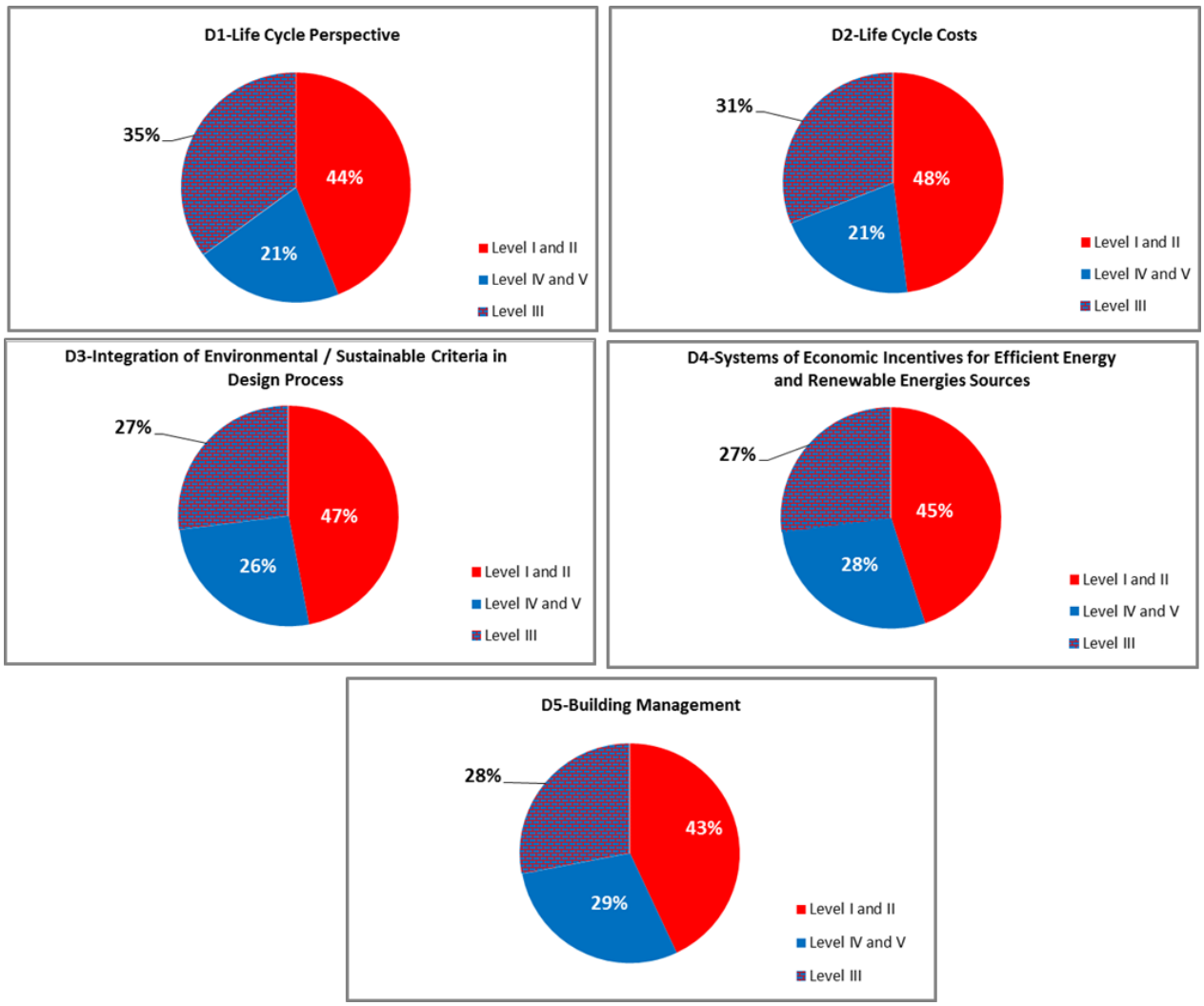

Figure 28 - Theme D - "Project Design and Management" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

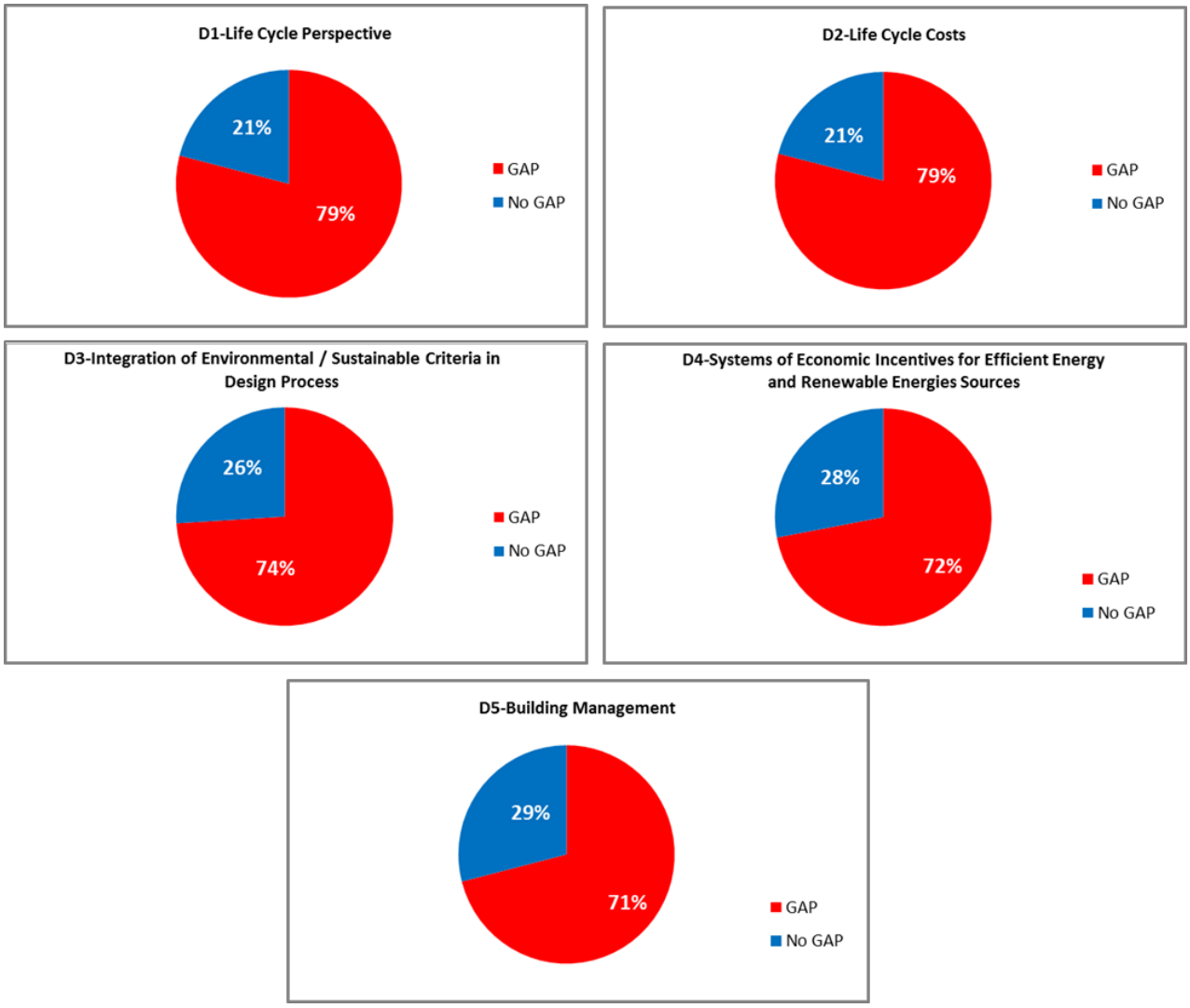

Figure 29 - Theme D - "Project Design and Management" percentages of "GAP" and "No GAP" by topics.

Theme E – Communication and Information & Communication Technology skills

Question 13 – Find below a set of communication and Information & Communication Technology skills. Please, evaluate to what extent you master them:

- E1 – Communication strategies
- E2 – Conflict resolution and mediation skills
- E3 – Motivation strategies
- E4 – Problem solving
- E5 – Practice training
- E6 – Use of communications devices
- E7 – Self-improvement

- E8 - Assertiveness

For the Theme E – Communication and Information & Communication Technology skills, 405 valid answers were considered in the universe of 461 questionnaires, corresponding to 87.8% of the total sample. Figure 30 compiles the number of answers to the topics in theme E classified by the scale with 5 levels of application.

The analysis of Figure 30 shows the following [6]:

- The number of answers was lower in the extreme classification levels in majority of topics, I (Unfamiliar with topic) and V (Deep knowledge and application capacity).

- In topics E6 - Use of communications devices and E8 - Assertiveness, it was verified that level V (Deep knowledge and teaching skills) was superior to level II (Understand the concept but cannot teach), fact that did not happen in any other topic or theme;

- Topics E1, E2, E3, E4 and E7 are the topics that present the greatest symmetry, that is, level III in the scale of classification is the one with the highest number of answers - Understand the concept and might apply;

- For the E5 topic the form of the distribution of knowledge levels shows a slight negative asymmetry (tilted to the left), and E6 and E8 topics show a typical negative asymmetry that is, the most frequent responses were at level IV - Good knowledge and can apply.

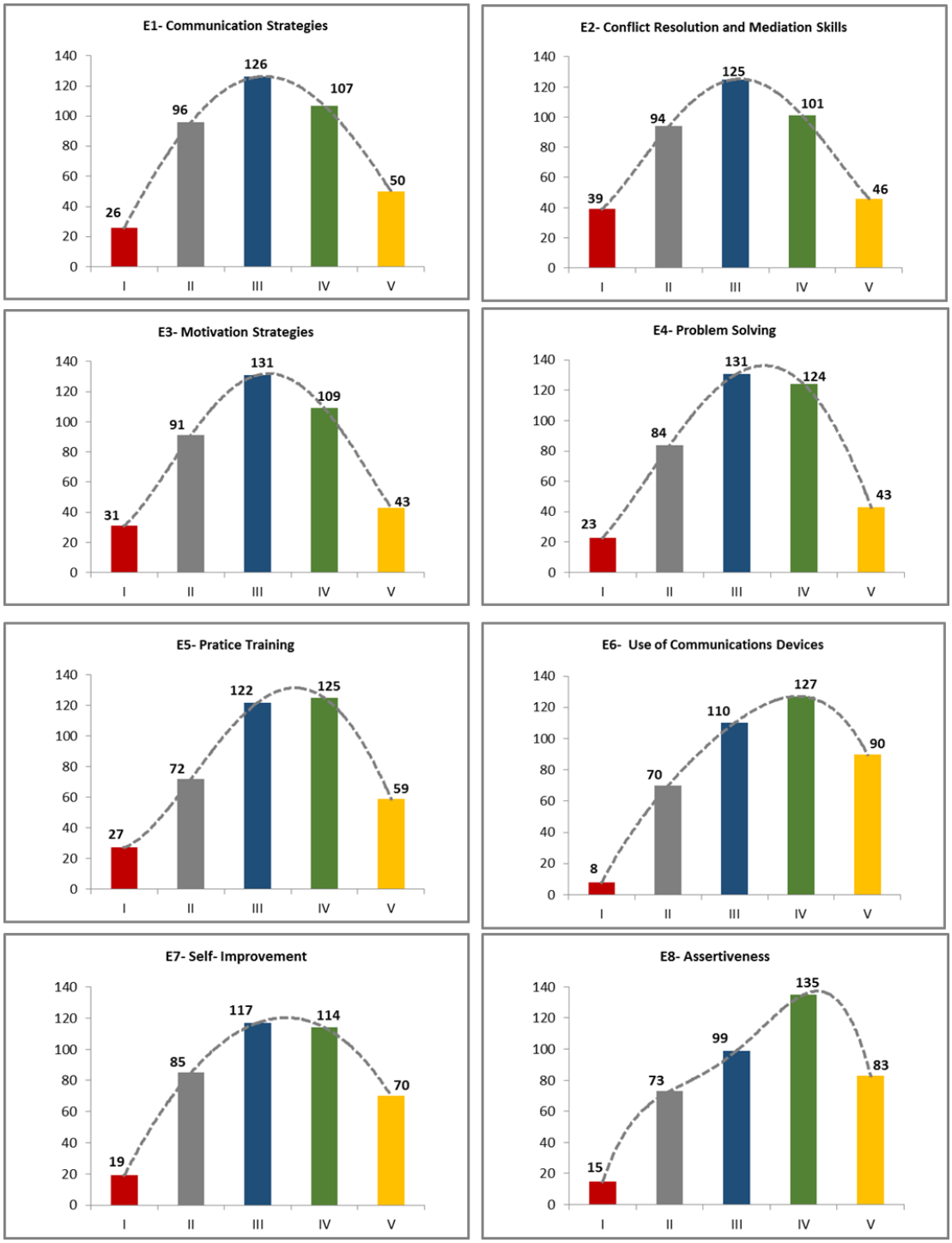

Figure 30 - Results for theme E - Communication and Information & Communication Technology skills in terms of number of answers for each topic classified by levels of application.

From the analysis of Figure 31 and Figure 32 can be seen:

- For all topics in this theme are the levels III and IV that cover the largest area in the graphic and therefore are those that present greater number of responses. The level II is what presents a more even distribution, (Figure 31).

- For topics E2 - Conflict resolution and mediation skills, E3 - Motivation strategies and E1 - Communication strategies have the highest value of responses for levels I and II (Figure 31 and Figure 32), respectively with a total percentage of 32.8% and 30.1%. They will therefore those in which the respondents are less familiar in theme E.

- Topics E6 - Use of communications devices, E8 - Assertiveness followed by topic E5 - Practice training and E7 - Self-improvement, are those that presented cumulatively greater number of responses (respectively 80.7%, 78.3% , 75.5% and 74.3%) in levels III, IV and V, (Figure 32).

- It is also noted that the topics E6 - Use of communications devices and E8 - Assertiveness present the highest number of answers in level V, and should be those in which respondents have greater knowledge, (Figure 32).

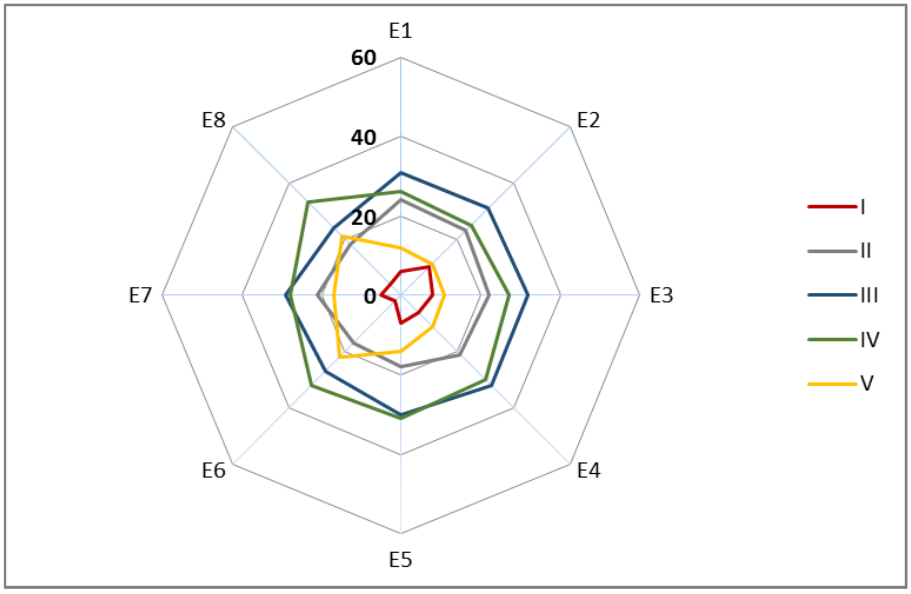

Figure 31 - Percentage of answers by levels of application for the theme E.

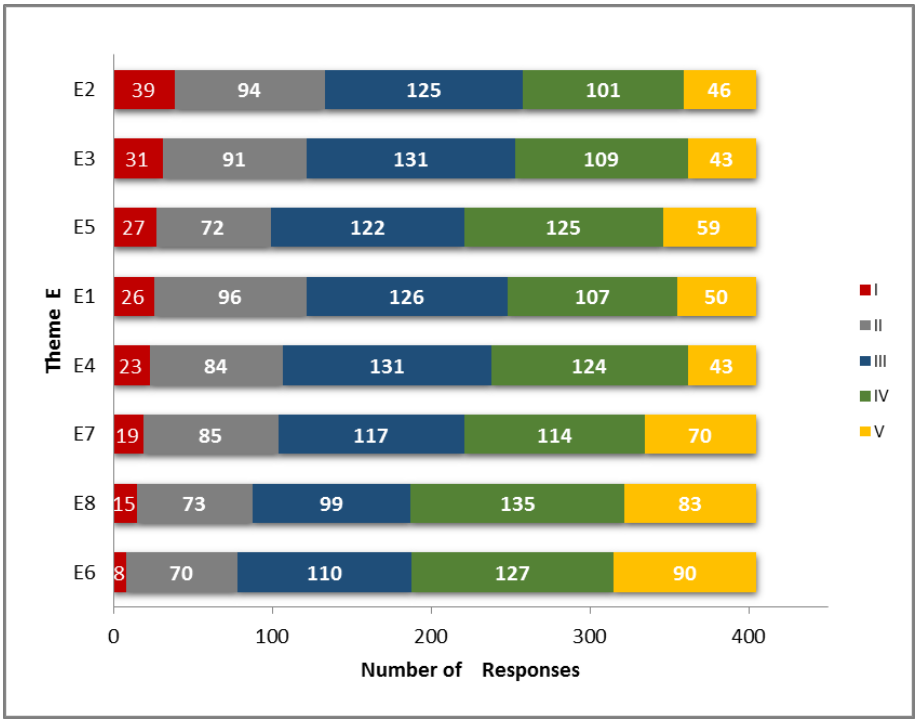

Figure 32 - Number of answers by levels of application for the theme E, ordered by increasing values of Level I.

As previously defined, in case of theme E **level III** ranged from a minimum of 24% (E8 – Assertiveness) to a maximum of 32% (E3 – Motivation Strategies and E4- Problem Solving), with an **average of 29.5%** representing more than a quarter of the total in all graphs (Figure 33).

The **levels I and II combined** (certainly "GAP") presented an **average of 26.6%,** more highest than level III, between a minimum of 19%, in E6 – Use of Communication Devices, and a maximum of 33%, in E2 – Conflict Resolution and Mediation Skills.

The **levels IV and V combined** (certainly "No GAP") presented an **average of 43.8%**, the highest value, between a minimum of 38%, in E1 – Communication Strategies and E3 – Motivation Strategies, and a maximum of 54%, in E6 – Use of Communication Devices and E8 - Assertiveness.

The analysis of Figure 34, that presents the "GAPs" and "No GAPs", indicated that the "GAP" of topics for the theme E differ between a minimum of 46% (E6 – Use of Communications Devices and E8 – Assertiveness) and maximum of 64% (E4 – Conflict Resolution and Mediation Skills). It should be noted that topics E6 and E8 are the only ones that can be considered in "No GAP" because they are values of percentage below of 50%.

All the topics, with exception of E6 - Use of Communications Devices and E8 - Assertiveness, of this thematic area can be considered "GAP". **The "GAP" average of topics for theme E is around 56.1%, that is, about 227 respondents, in a sample of 405, consider that they cannot give training in this theme.**

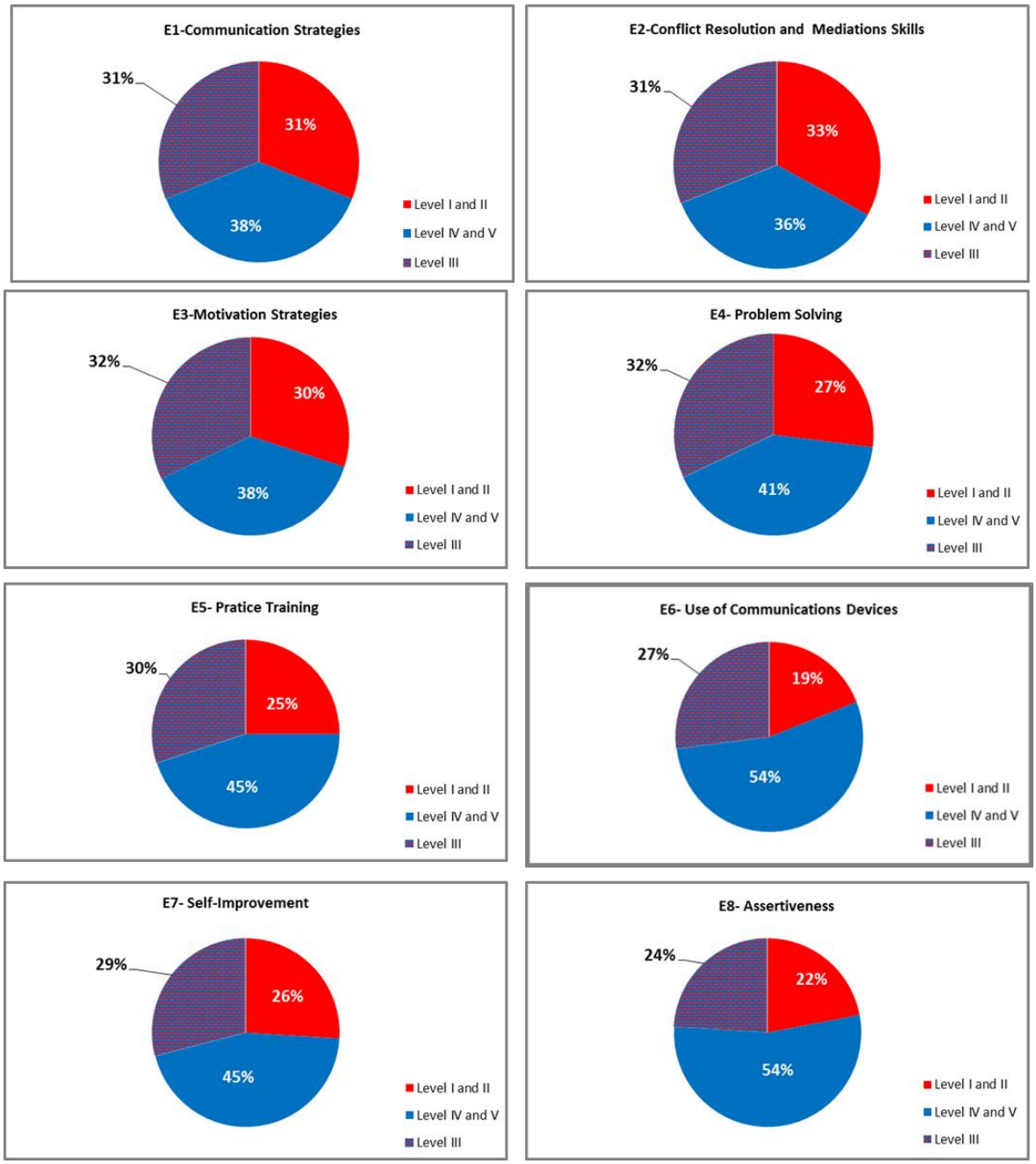

Figure 33 - Theme E - "Communication and Information & Communication Technology skills" percentages of levels I and II combined, levels IV and V combined, and level III alone by topics.

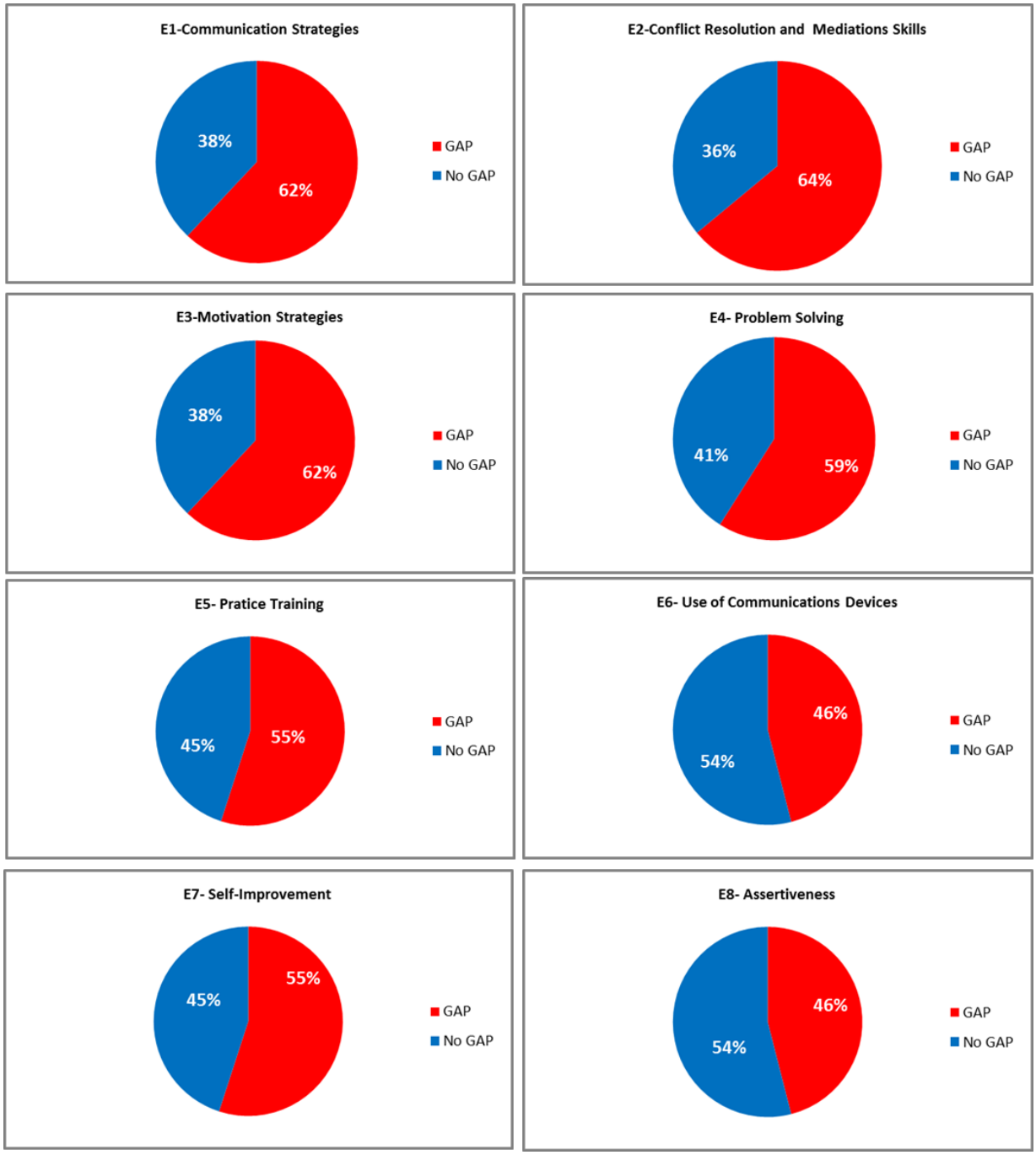

Figure 34 - Theme E - "Communication and Information & Communication Skills" percentages of "GAP" and "No GAP" by topics.

4.3.2. Semi-structured Interviews

A. Conception and Execution

The semi-structured interview was divided into three distinct parts:

- **Interviewee profile**, with basic information about the experts;
- **Green Skills**, divided in five thematic areas as the questionnaire:

  A – Legislation, Labelling and Certification

  B – Materials, Water and Construction Techniques

  C – Energy Efficiency and Renewable Energy Sources

  D – Project Design and Management

  E – Communication and Information & Communication Technology

- **General Questions.**

The template for the semi-structured interview was made in English – "Experts' interview on green skills" and subsequently translated into the official languages of the countries participating in the project, namely Spain, Portugal, Italy, Greece and Malta. After translation personal invitations to participate were made by the partners in each country.

Each country has to do 5 interviews (with a total of 25 interviews) and the interviews can be done online, by phone or face to face. In some cases can be mixed, this is sent to the specialist to be completed online and then finished in person or by phone or on the contrary, the call was first made and only after the interview was sent.

The profiles of experts to be interviewed were (being possible to repeat several of them and/or propose a different profile) the following:

- Training coordinator
- Head of studies
- Trainer of trainers
- Energy and environment agencies technicians
- Energy Business Associations
- In-company tutors
- Trainers experts in EE

In order to have a similar record of each country, LNEG proposed that the **summary of each interview in English** be made according to a template with the structure below, which is a **Content Analysis Matrix:**

- **Conclusions or GAPs in the interviews** - It concerns the conclusions drawn from the analysis of one or more sentences. For example: "Trainers have an interest in training on Green Skills".

- **Registration units** – Phrase(s) or parts of phrase(s) taken from the interview(s) that lead to the previous conclusion (there may be more than one phrase for each conclusion for the same or different interviews). For example: "…… is an opportunity for trainers to specialize in sustainable construction".

- **Interview code** - As the interview is confidential it is necessary to assign each interview a code, so that, in case of doubts, one can easily know which interview it concerns. So, each interview must be designated by a code: A, B, C… The same code should always be placed in all different phrases for each conclusion/GAP relating to the same interview.

In terms of the treatment of results, the following methodology was adopted in **Green Skills** part of the report concerning the results of the interviews:

- All GAPs/conclusions identified in all countries are placed in the same table taking into account each thematic area, and question;

- Some GAPs/conclusions were not exactly placed in the thematic areas to which they related and the answers were reoriented to the right thematic area;

- Then in the same table the GAPs/conclusions are aggregated according to their similarity, when possible (column designated by Citation Counting). In the aggregation of responses a name was given and that name was assigned in the report by subject;

- The GAPs/conclusions are after sorted in descending order;

- The GAPs/conclusions with the highest score are brown in all tables.

The semi-structured interviews were carried out from 17th to 28th April 2017 and the completion of the summary of the interviews with the answers by country in English – Content Analysis Matrix - was conclude and sent to LNEG until 9 of May 2017.

The confidentiality of data was guaranteed.

It should be noted that the numbering of the questions is identical to the numbering of the questions in the interview for a better understanding. The template of the semi-structured interview in English can be found in Annex 7.2.

B. Results of the Semi-structured Interviews

I. General Information on the population interviewed

In total, 30 respondents completed the semi-structured interview (Table 3). Table 3 summarizes the number of interviews and Figure 35 presents the total number of answers by type of expert profile in all countries.

Table 3 – Total number of interviews by country

Country	Number of Interviews
Portugal	5
Italy	7
Spain	5
Greece	5
Malta	8
Total	**30**

In terms of expert profiles the Training coordinator and Business Owners responded in greater numbers to the interviews, followed by Architects and University Teachers/Professors, Figure 35.

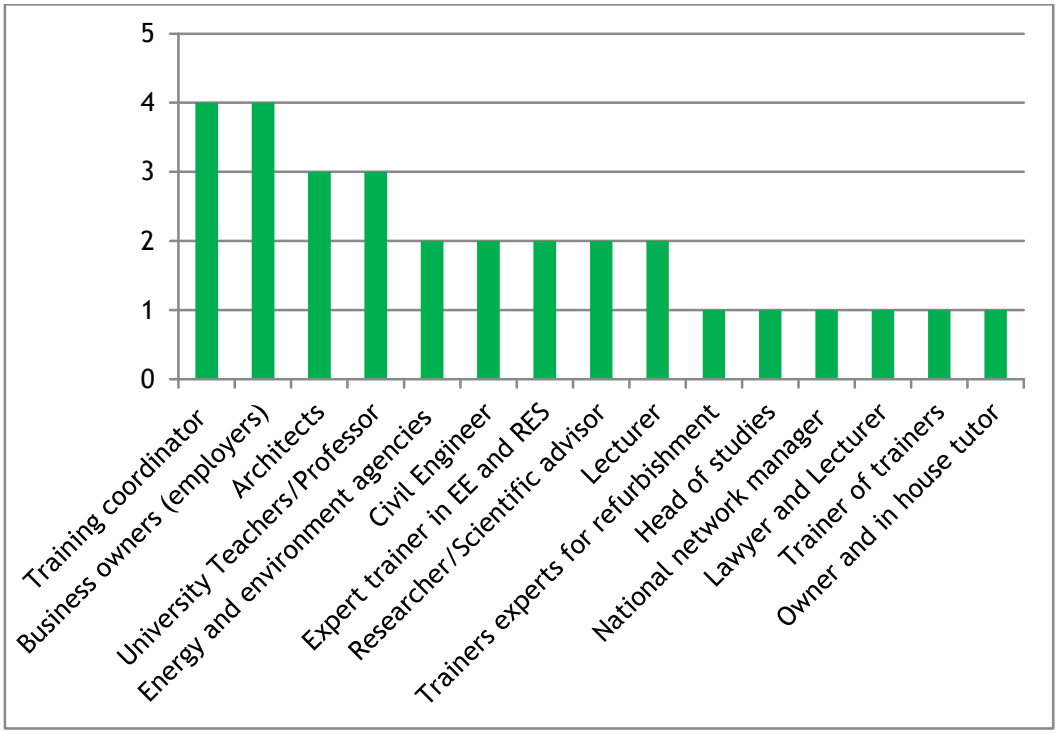

Figure 35 - Total number of answers by type of expert profile in all countries.

II. GREEN SKILLS GAPS

As indicated, the interview itself was divided into two main parts: Green Skills and General Questions.

Also, as in the questionnaire, the presentation of the results has been divided by the 5 thematic areas and within these, through the answers to the questions posed. The results of the general questions are presented lastly.

Theme A – Legislation, Labelling and Certification

a) European Environmental and Energy Legislation
b) National Environmental and Energy legislation and Action Plans
c) Sustainable Construction Standardization
d) Sustainable Building Certification Systems
e) Voluntary and/or Mandatory Labelling
f) Mandatory Products Labelling

Question 1.1 - Can you identify other topics within this thematic area that were not indicated above?

Table 4 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Legislation: Legal schemes of protection of the final consumer in the acquisition of buildings derived from renewable recast directive. National legislation of Thermal comfort and incompatibilities within the national legislation of each country. Legislation, letters and recommendations, international and national about the built heritage. Legislation on Health and Safety.	4
Management systems: Environmental and Energy Management System (ISO 50001 and 14001, EMAS, Ecolabel).	3
Verification and Validation: Management and quality control in work to verify that labelling and certification standards are being accomplished. Legislation, Marking and Verification Certification. Validation methods for the authenticity of certification of raw materials and products.	3
Installers' certification: Registry for certified constructors and installation technicians Competence certification for installer enterprise and professionals.	2
Labelling: Energy labeling for construction products. CE labeling.	2
Other GAPs or conclusions:	
National Regulation, Evolution in terms of Innovation, Monitor and Control.	1
Energy Performance certification for dwellings (residential and no-residential).	1

From the analysis of Table 4 it is verified that many respondents agreed with the topics presented in this thematic area, pointing out three subjects: **"Legislation"**, **"Management Systems"** and **"Verification and Validation"** as priority ones.

The only subject that appeared as a new GAP is the "Management Systems", because the others subjects are already included in the topics of the questionnaire. So "Legislation" and "Verification and Validation" should be considered subtopics to be developed inside the correspondent topics of this thematic area.

It is to explain that management systems are tools related to the organization and are aimed at improving the performance of this organization, be it in environmental, energy or other terms, so it can be considered a topic to be added and a GAP.

Question 2.1 - What gaps regarding Green Skills do you think exist in current vocational education program in terms of Legal Framework, Labeling and Certification Systems?

Table 5 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Certification and labelling: Training must deepen certification and labelling (voluntary and compulsory). Training in Sustainable Building Certification Schemes. Legislation and labeling systems are not explained in enough depth during vocational training courses. Labeling identification and evaluation. Capacity of comparative evaluation of labeling. Green labelling of construction materials and its applicability. Connection of quality assurance controls of services – constructions and materials with the certified performances and the commissioning procedures.	**8**
Standardization: Free access to standardization by training entities. Standardize contents. Standards and standardized procedures. How to implement in practice: National legislation for the implementation of energy upgrading related technical standards; International legislation on materials' real energy performance (ISO 10456); International legislation on the selection of materials for energy upgrading per construction component, based on the declared performance (DIN 4108-10).	**4**
Legislation: It is not always clear what is required by law and what is optional. Lack of well-informed trainers on European legislation. Learning methods and sources to access existing legislation. How to implement in practice: National legislation for interventions in existing buildings.	**4**
Energy certification: Practical knowledge of energy certification and Reception of products on site. Lack of knowledge about the applicability of EE and the EERR, energy certification is perceived as a bureaucratic requirement.	**2**

Table 5 (cont.) - Presents and systematizes all the answers related to this question for all interviews.

Other GAPs or conclusions:	
Existing (applicable) legislation in a concentrated form.	1
These topics need to be updated regularly in the different training modules.	1
Need for more coordination between different training institutions in order to provide adequate training at all levels.	1
Energy performance certification and labeling courses are offered by the Building regulation office. Such courses are expensive and open only for architects and engineers.	1
GAP between local legislation and labeling system and other standardization used in the EU as BREEAM and LEED.	1

Table 5 presents and systematizes all the answers related to all interviews concerning GAPs regarding Green Skills in current vocational education program in terms of Legal Framework, Labeling and Certification Systems. From its analysis it is verified that "**Certification and Labeling**", followed by "Standardization" and "Legislation" are the main GAPs identified in the vocational education programs in this thematic area. The others subjects have fewer responses.

Theme B – Materials, Water and Construction Techniques

a) Traditional Construction
b) Local Materials
c) New and Innovative Materials
d) Low Environmental Impact Materials
e) Selection of Construction Materials and Products in terms of Sustainability
f) Influence of Construction Materials and Products in terms of Sustainability
g) Ecological insulation Materials
h) Sustainable Construction Techniques
i) Building envelope and Thermal Inertia
j) Emerging Technologies
k) New Technologies applied to Building Maintenance and Refurbishment
l) Water Efficiency
m) Prevention of Construction and Demolition Waste (CDW)
n) Reuse and Recycling of CDW
o) Deconstruction

Question 3.1 - Can you identify other topics within this thematic area that were not indicated above?

Table 6 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Management of CDW: Waste from construction, landfills; Use of recycled materials and cost/environmental benefits or materials; Materials' recycling – recycling collectors; Harvesting and recycling. Solid and liquid waste management. Circular economy principles (waste to feed). Energy from Waste.	**7**
Techniques and Technologies: Techniques to eliminate condensation. Technology, insulation, heat recuperators, panels, pumps… Low cost construction techniques. Adequate installation of materials. Constructive systems and their importance.	**5**
Bioclimatic Architecture: Mediterranean climate. Bioclimatic architecture principles. Basic elements for the determination of the area's microclimate. Adaptation of performance and characteristics of materials and systems to environmental/climatic conditions.	**4**
Sustainable Materials: Green construction materials. Methods of environmental valuation of materials. Basic principles of sustainable development, with emphasis on raw materials and constructions.	**3**
Water Management: Methods of economic evaluation of water (water resources) and raw materials; Rainwater collection. Water supply.	**3**
Energy Footprint of Products: Estimation of the product's energy footprint.	**2**
Maintenance and Refurbishment: Application to Refurbishment. Storage, Treatment and Rehabilitation, Maintenance of Systems, Constructive Solutions and Tests.	**2**
Other GAPs or conclusions:	
Health and safety of building users and the public road (noise and visual impact of reflective or absorbers facades).	**1**
Lack of cross border competence between installer and masonry work.	**1**
Product Life Cycle Analysis	**1**
Evaluation of the result ex post.	**1**

From the analysis of Table 6 it is verified "**Management of CDW**" is a major concern, since it presents great number of responses, followed by "Techniques and Technologies" and "Bioclimatic Architecture". It should be noted that all are subjects included within the topics already presented. So they should be considered subtopics to be developed inside the correspondent topics of this thematic area and cannot be considered GAPs.

Question 4.1 - What gaps regarding Green Skills do you think exist in current vocational education program in terms of on Ecological Materials, Water Efficiency and Sustainable Construction Techniques?

Table 7 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Selection, application and installation of materials and products in terms of sustainability: Selection of sustainability materials and products; Selection of building materials and products in terms of their real energy performance as a heat-moisture sacrificial layer; Selection of thermal insulation and building materials to achieve parallel functional characteristics (fire protection, sound insulation, passive ventilation). Characteristics of the efficient materials and its proper placement in the constructive process. Resolving building pathology problems prior to the energy upgrading interventions. Access to materials and implementation methods. Knowing how to handle the minimum requirements for declared properties of thermal insulation materials by type of structural element. Application / installation of products.	**8**
New materials and technologies: Specific training for new technologies and material. Technology (Spain). Specific training/Innovation.	**3**
Traditional construction: Lack of knowledge of the traditional building systems and techniques of popular and vernacular architecture.	**2**
Impact of building materials/products: Impact of building materials on the aspects of noise and visual impact. Indoor air quality.	**2**
Other GAPs or conclusions:	
Lack on managing construction building site, on water efficiency.	**1**
Training in sustainable buildings or "Nearly zero energy buildings (nZEB)".	**1**
Knowledge of use of metering devices and instruments: Multiple performance materials and techniques that include also energy efficiency but are not classified as such (e.g. safety and security / comfort/sound insulation).	**1**
Only few of the green skills are included in the present syllabus (Malta).	**1**

Table 7 presents and systematizes all the answers related to all interviews concerning GAPs regarding Green Skills in current vocational education program in terms of Ecological Materials, Water Efficiency and Sustainable Construction Techniques. From its analysis it is verified that **"Selection, application and installation of materials and products in terms of sustainability"**, followed by **"New Materials and technologies"** are the main GAPs identified in the vocational education programs in this thematic area. The others subjects have fewer responses.

Theme C – Energy Efficiency and Renewable Energy Sources

a) Renewable Energy Sources in Buildings in General
b) Nearly Zero Energy Building (nZEB)
c) Country Energy Mix
d) Efficient Insulation
e) Efficient Windows
f) Efficient Lighting
g) Solar Thermal System for Water Heating
h) Solar PV system for Building Self-Consumption
i) Micro-wind systems for Building Self-Consumption
j) Biomass for Water Heating,
k) Biomass for Space Heating
l) Heat pumps for efficient heating and cooling
m) Emerging Technologies
n) Building User Behavior

Question 5.1 - Can you identify other topics within this thematic area that were not indicated above?

Table 8 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Climatic strategies: Efficient solar protection, Efficient Paint Systems and Efficient coverage. Solar shades. Solar Passive Design. Passive building solutions (bioclimatic). External parameters to the building actively influencing the energy rating, such as orientations, natural and constructive solar protections, design, ventilations, etc. Microclimate and building orientation. Adaptive wraps.	**7**
Energy consumption: Systems of continuous monitoring of the thermal behavior of buildings; Energy consumption management devices for buildings. Building automation. Remote control of systems. The costs and savings of the EE. Interventions to improve energy efficiency.	**6**
Renewable Energy Sources: Internal energy of the earth. Shallow geothermal systems. Wind power. Small hydroelectric.	**4**
Energy management: Energy Management Systems, Calculation, Intelligent energy counting systems tools and Centralized energy network. Management and work planning in EE and EERR. Energy Audits. Collective systems of water heating and environment in buildings.	**4**
Energy storage: Latent accumulation of heat and cold, PCM phase change materials. Mechanical ventilation with heat recovery. Ventilation/ Energy storage. Heat chamber operation.	**4**
Distribution of Energy: Building Planning and Type of Energy Distribution (centralized or decentralized); District heating systems; District heating and cooling (DHC).	**3**

Conclusions or GAPs in the interviews	Citation Counting
Efficient insulation: Thermal losses detection techniques (e.g. thermography). Thermal losses detection methods.	2
Co-generation and Tri-generation systems: Production and use of energy from the systems more efficient than the conventional ones and not being renewable (Tri-generation systems); Co-generation.	2
Other GAPs or conclusions:	
Elevator/escalators.	1
It is very important the rehabilitation of our architectural heritage in terms of EE.	1

From the analysis of Table 8 it is verified "**Climatic strategies**"and "**Energy consumption**" are the major concerns, since present a greater number of responses, following by "Renewable Energy Sources", "Energy management"and "Energy storage", with the same number of answers. It should be noted that with exception of "Elevator/escalators", all are subjects included within the topics already presented. So should be considered subtopics to be developed inside the correspondent topics of this thematic area and cannot be considered GAPs.

In addition, it is appropriate to indicate that the "Energy consumption" subject adds a series of concepts that trainers have about energy consumption, both on energetic solutions and on equipment.

Question 6.1 - What gaps regarding Green Skills do you think exist in current vocational education program in terms of Energy Efficiency and Renewable Energy Sources?

Table 9 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Efficient energy strategies: Selection of the most appropriate EE and EERR in each building according its prior conditionings. Applying different technologies to different sites and contexts. There is a clear GAP in the provision of training on the installation of energy efficient solutions. Preventive maintenance in the heat production (heat and cold). Verification of correctness and decoding of thermal insulation performance statements. Calculation of equivalent insulation thickness based on design energy performance. Investment amortization. In vitro energy performance test. Implementation of technical standards for energy upgrading works.	9
New technologies: Lack of uptake of new technologies; Need incentives to apply new technologies.	2
Renewable energy integration: Lack of integrated vision between energy efficiency and renewable energies. Not enough importance is given to green buildings and RES.	2
Other GAPs or conclusions:	
Not with deep content.	1
Point out the differences.	1

Training in Solar shades.	**1**
Other GAPs or conclusions:	
Seismic insulation in nZEB.	**1**
The skills needed to transfer the know-how.	**1**
GAP between what is taught and what is actually applies in practice throughout the construction industry.	**1**
The figure of energy auditor (training and professional qualification) has not been created yet.	**1**

Table 9 presents and systematizes all the answers related to all interviews concerning GAPs regarding Green Skills in current vocational education program in terms of Energy Efficiency and Renewable Energy Sources. From its analysis it is verified that **"Efficient energy strategies"**, is the main GAP identified in the vocational education programs in this thematic area. A considerable distance appears the use of new technologies and the integration of renewable energies. The others subjects have fewer responses.

Theme D – Project Design and Management

a) Life Cycle Perspective
b) Life Cycle Costs
c) Integration of Environmental/Sustainable Criteria in Design Process
d) Systems of Economic Incentives for Efficient Energy and Renewable Energy Sources
e) Building Management

Question 7.1 - Can you identify other topics within this thematic area that were not indicated above?

Table 10 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Statistical methods and digital tools: Graphic tools and HTML. BIM systems technology and tools interoperability. DB-HE (CTE) Life cycle of construction materials, Environmental Product Declaration (EDP). Integrated and automatic building management using BIM and home automation technologies. Three-dimensional modeling and editing of information in construction. Digital tools for the performance simulation. Calculation of ROI (Return on investment). Data base for certifications (Data, data base for the ACV / LEED, BREAM, etc.).	**8**
Project Management: Project management basic principles; Management of the end of life of a project and degradation or reuse of materials. Risk assessment, registration book for the building and tools to control the project. Procedure for project commissioning. Integration of sustainable criteria into the refurbishment project. Economic impact and healthy criteria. Optimal maintenance of installations. Construction quality sheets.	**8**

Conclusions or GAPs in the interviews	Citation Counting
Good practices and feasibility studies: Evaluation of quality process; Focus on cost benefit analysis and feasibility studies; Cost benefit analysis which compares traditional and innovative methods/materials; Cost optimal – integrated design. Benefits comparing to non-efficient assumptions. Techno-economic studies and cost-benefit analysis for alternative proposals. Methods for solution selection and multi-criteria analysis.	**7**
Planning: The importance of the environment and urban planning for the EE. Planning. How the integration of vegetation can complement architecture in terms of design, energy performance etc. and how green design could affect property valuations. Integrated analysis of energy issues, noise, visual impact and comfort, and road/mobility planning. Analysis of the urban environment.	**5**
Other GAPs or conclusions:	
Setting of targets methods	**1**
Manufacturer - installer liability	**1**

From the analysis of Table 10 it is verified that unlike the previous thematic areas, this thematic area has 4 subjects with high answers, which are: **"Statistical methods and digital tools"**, **"Project management"**, **"Good practices and feasibility studies"** and **"Planning"**. There is great concern about having knowledge of statistical methods and digital tools, and making a good project management. So, these subjects can be considered topics to be added in this thematic area and can be considered GAPs.

Question 8.1 - What gaps regarding Green Skills do you think exists in current vocational education program in terms of Project Design and Management?

Table 11 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Life Cycle Perspective: Lack of Integrated vision (mobility, water infrastructure, electricity, and possibly of heat and cold, green spaces, pedestrian spaces, roadways of different types of vehicles and others); Need a stronger relationship and integration between the phases of a development project, from idea to concept and execution (holistic approach). Learn how to evaluate the whole environmental impact of building and monitor the green performance during the life of building. Training for the whole construction (entire aspect of construction). Learn how to evaluate the whole environmental impact of building and monitor the green performance during the life of building. Building LIFE CYCLE. Adequate knowledge of: Project planning and of critical paths for its implementation Theoretical and practical performance of systems and procedures. Design of details of materials and installations' connection to the building elements. Planning in project phase.	**9**
Good Practices and feasibility studies: Cost / benefit analysis. Incentives / BIM / integrated design / cost optimal design. Economic feasibility studies concerning potential customers. Economic and	**7**

Conclusions or GAPs in the interviews	Citation Counting
financial issues. Systems and risk analysis to assess and understand the necessary changes and measures. The simplification that is made in the idealization of buildings at the time of using the different software recognized for the energy rating. To go in deep of the use / profit / benefit to practice the green solution.	
Use of ICT: Examples of use and operation with the help of ICT; Need to use adequate software for training related to project design and management; Lack of training and use of new technologies. Graphic and HTML use.	**4**
Maintenance and Refurbishment: More emphasis in the maintenance of buildings and in their periodic inspection. Renovation and rehabilitation of old buildings. Design a sequence of energy upgrades.	**3**
Other GAPs or conclusions:	
Control of building pathology by non-destructive methods.	**1**

Table 11 presents and systematizes all the answers related to all interviews concerning GAPs regarding Green Skills in current vocational education program in terms of Project Design and Management. From its analysis it is verified that **"Life Cycle Perspective"** and **"Good Practices and feasibility studies"**, followed by the "use of ICT" are the main GAPs identified in the vocational education programs in this thematic area.

There is again a major concern about cost/benefit analysis, Incentives/BIM/integrated design/ cost optimal design, and about learning how to evaluate the whole environmental impact of building and monitoring the green performance during the life of building (holistic approach).

Theme E – Communication and Information & Communication Technology skills

Question 9.1 - What kind of skills do you think trainers would need in this area to improve their performance?

Table 12 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Training in ICT and ICT use: Use ICT for training. Use of ICT educational models for the above mentioned topics. Trainers need more IT skills & knowledge of specific software. Trainers need to be at the forefront of communication and IT skills. Trainers should be more familiar with online learning technologies. Improve the skills to use digital tools and e-learning. Trainers should support as little as possible pre-formatted models and use dynamic models that can be adapted and constructed during the training session whenever possible. Examples of use and operation with the help of ICT. It is necessary to pay special attention in Trainers Qualification. Knowledge of how to handle interconnected and interfaced systems and how to operate mobile devices. It is interesting to establish a	**22**

Conclusions or GAPs in the interviews	Citation Counting
platform for sharing information with other areas and sectors. Knowledge of the use of special software's (e.g. for energy planning, estimation of material's thermal properties, life cycle analysis, etc.). Knowledge of existing Didactic apps and training material. Recruitment and measurement instruments, communication gateways (hardware), communication protocols on the market and ICLOUD based systems (software as a service). Access to and use of a Database Application of Environmental. Computer skills for performing specialized tasks.	
Other GAPs or conclusions:	
Importance of the awareness of clients and general citizens	**1**
The Trainer should increasingly be a Tutor who is always available to help Trainee to take options framed in the concept of Sustainability.	**1**
Existing Market technology.	**1**
Practical experience.	**1**
Knowledge of structural physic-chemistry, engineering and construction.	**1**
Economics incentives.	**1**
Skills such as sales and customer service, teamwork, management and exercise leadership functions, and entrepreneurial skills.	**1**
Leadership skills to promote change, risk analysis to investigate options.	**1**

From the analysis of Table 12 it is verified that one subject has the highest number of answers obtained in all interviews which are: **"Training in ICT and ICT use"** (22). This value allows assess the great need in the use of ICT for training and also knowledge of the use of special software's to improve the trainer's performance. So, these subjects should be considered subtopics to be developed inside the correspondent topics of this thematic area.

Question 9.2 - What gaps regarding soft skills do you think exists in current vocational education program in terms of communication skills and ICT?

Table 13 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Practical application and educational visits to construction sites: Practical application/Practices. Lack of practical part. Low incidence on the practical component and poor preparation for insertion in the labor market. There is a big difference between theory and actual practical application. Need for a more practical approach. Training paths too extensive and too theoretical. Educational visits to construction sites. Field-work exercises/Educational visits to construction sites. Field-work exercises. Application to selected case studies.	**12**
Levels of education: Specific topics related to green skills or only taught in higher levels of education. Skills for research and development as well as managerial skills to support and promote innovation. Reinforcement of the skills of technicians and workers	**9**

Conclusions or GAPs in the interviews	Citation Counting
working on Energy Rehabilitation. Need a stronger educational and cultural back ground. Deficiencies in the mapping of green professions into professional classifications. High skills for trainers and teachers. Trainers with specific high skills. Trainers should be always updated with the latest information about economic incentives and schemes.	
Training in new communication tools: Lack of training and use of new communication tools. Need for better use of IT and software. Lack of training for the use of new technologies and methodologies in training: Project-Based Learning and Inquiry-Based Learning. Lack of Training. There is a significant GAP in the use of visual tools. Examples of use and operation with the help of ICT. There is not that much information available for trainers. Difficult access to verified and certified information.	**8**
Qualification: Certification of competence. No certification. How to implement in practice: Mandatory certification of construction groups of professionals.	**3**
Other GAPs or conclusions:	
Communication between designer and builders.	**1**
Business skills to take advantage of green opportunities	**1**
No information campaigns, guidance and counseling services for the promotion of careers in a few targeted professions for both newcomers in the labor market and for existing workers	**1**
Management skills will be also needed along with technical skills	**1**
Making relevant links between concepts train and teach using creative/lateral thinking.	**1**
Environmental awareness and consultation skills.	**1**
Training for people without experience.	**1**

Table 13 presents and systematizes all the answers related to all interviews concerning GAPs regarding Soft Skills in current vocational education program in terms of communication skills and ICT. From its analysis it is verified that this thematic area has 3 subjects with high answers, which are: **"Practical application and educational visits to construction sites"**, **"Levels of education"** and **"Training in new communication tools"**. There is a great deal of concern about the need for more practice and also that professional visits are also seen as a major necessity in current vocational education programs.

General Questions

Question 10.1 - What estimated percentage of trainers do you think that would need to be trained in green skills in your country?

Because this question was not well understood by the interviewees and the results were not coherent, the partnership decided not to take into consideration the results of this question.

Question 10.2 - What kind of training actions and accompany measures do you think that could better suit the training of trainers on green skills and technological developments in ICT?

Table 14 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Practical Application: Laboratory practice and field applications where possible. Laboratory. There is the need to create relevance in the theory being taught through practical examples. Therefore topics which apply the theory to common practice like the 'Integration of Environmental/Sustainable Criteria in Design Process' and 'New Technologies applied to Building Maintenance and Refurbishment' are extremely important. Trainers need to be involved in the professional field more actively by doing practical work on site. It is important to carry out more site visits to construction sites which implement green solutions. Testing of energy audits. Case study in recent energy upgrading projects, in which an analysis of the weaknesses of project specifications and a new planning of works will be made during the training. Frontal and practical technology in enterprise.	**9**
Training Methods: E learning and practice. Development of online courses, lectures, onsite work visits, etc. Semi-distance learning. Online courses and videoconferences. There is the need to dedicate more time for training of trainers. Need of an affective policy instruments that will make the sector become more "green-knowledgeable". This needs to be done through legislation.	**6**
Tools and Innovative tools: GAPS related to availability of more tools, guidance and training on innovative tools. Creation of appropriate training material for the distance learning of trainers (e.g. Moodle platform, application for Android & IOS).	**3**
Training Actions: Integration of topics with a view to sustainability in the area of Buildings. New attitudes of the Trainer in the face of the digital revolution. Intensive courses about sustainable architecture and construction, and the importance of the EE in our cities. Training focused on learning objects that incorporate the dimension of sustainable environmental development.	**3**
New Technologies: Use of new information and communication technology. New technologies.	**2**
Other GAPs or conclusions:	
The training should lead to certification of qualifications.	**1**
National regulations and financial incentives.	**1**

As has have seen previously, also in this part concerning training actions and accompany measures, the Table 14 shows a great concern with **"Practical Application"**, stating among others conclusions that: *Trainers need to be involved in the professional field more actively by doing practical work on site.*This subject is following by: "Training Methods", "Tools and Innovative tools" and "Training Actions". It is evident that there is a tendency for *e-learning and online courses*, *creation of appropriate material for the distance learning of trainers*, as well as the need of *integration of topics with a view to sustainability* and *new attitudes of the trainer in the face of digital revolution.*

Question 11.1- In general, what are the vital topics concerning Green Skills that trainers should acquire to provide suitable training in this matter?

Table 15 - Presents and systematizes all the answers related to this question for all interviews.

Conclusions or GAPs in the interviews	Citation Counting
Green Skills: How to use the green skills; Need of green skills. Awareness-raising for sustainability in construction. Need updated information on green skills and training.	**4**
Practical application and exercises: All topics but with more practical experience. Presentation of examples and field exercises. Best training practices.	**3**
ICT Skills: All topics but with a specification on digitalization (BIM _ augmented reality). More ICT skills.	**2**
Energy Efficiency; Energy Infrastructures; Renewable energy; Energy Networks (Electricity and Heat); Water supply and their networks; Urban mobility; Visual and Noise Impacts in Construction; Environmental Impacts of Construction in the phases of construction, use and End of life; "Green" use of Buildings directed at Consumers and their users; Social impact of "green" construction; Systems integration.	**1**
General (architecture): 1. Know and apply the principles of bioclimatic architecture, the life cycle of buildings and materials. Specialties (engineering) - technical skills 2. Refurbishment - it is indispensable to know and identify the characteristics of the different construction systems.	**1**
The trainers should be very knowledgeable about the passive refurbishment technics and about the EE and EERR systems that must be applied in construction.	**1**
Global vision and knowledge of the construction market.	**1**
Regulation, certification, ACV, sustainable technologies	**1**
Thermal performance of the building and profitability studies	**1**
Life cycle	**1**
Additional knowledge on: • Legislation • Structural physicochemistry and engineering • Buildings pathology • Application of technical standards • Use of modern software's for designing purposes	**1**
Adequate knowledge on:	**1**

Conclusions or GAPs in the interviews	Citation Counting
• Legislative requirements and policy issues (National & European) • How to increase the energy efficiency in constructions • Use of innovative and energy-friendly products and techniques • Managing/recycling materials • Reduce the energy footprint of products and constructions	
Coordination, management and guidance skills for integrating environmental objectives.	1
The trainers should develop skills in the field: "Quantified specification – Control – Application - Control - Measurement of result and Repeat of the procedure".	1
The trainers need to apply a holistic approach when teaching sustainability, in order to show the connection between different topics and help the learner in building a comprehensive knowledge.	1
Synthesis of all topics.	1

In terms of vital topics concerning Green Skills that trainers should acquire to provide suitable training in this matter, Table 15 shows again the importance of "Green Skills", "Practical application and exercises" and "ICT Skills". In addition, Table 15 shows that each interviewee gave different points of view, i.e. his / her view on the vital topics, but that these complement each other and are in agreement with the topics presented in the interview.

4.4. SUMMARY OF GREEN SKILLS GAPS

The results obtained in the questionnaire show that for all themes and for all topics, with exception of two topics E6 – Use of Communication Devices and E8 - Assertiveness, there are Green Skills GAPs, some with higher percentages in average than others.

According to Table 16, the Themes D and A have the highest total GAPs average (respectively 75% and 73%). The other themes have very similar values, ranging from 56% to 69%.

By observing the averages of levels I and II combined, it is verified that for Themes D (45%) and A (44%), even without including level III, all the values on average are bigger than levels IV and V combined (Table 16). **Consequently, it can be concluded that A and D are the Themes where the trainers have more needs, that is, they have less capacity to give training.**

On the other hand, Themes E (44%) and C (39%) presented higher average values for levels IV and V combined than for levels I and II together; however, when level III is added to I and II, they also have GAPs (Table 16). **In this case, it can be concluded that the Themes C and E are those in which the trainers are more familiar and therefore have lower training needs and also greater capacity for teaching. Theme E was, in fact, the one that presented a lower value in terms of total GAP average (56%).** It should be also noted that belonging to theme E, the topics E6 – Use of Communication Devices and E8 - Assertiveness are the only ones that can be considered No GAP because they are values of percentage below of 50%.

Table 16 – Results for each theme in average according the results of questionnaire.

Theme	Average for levels I and II combined	Average for level III	Average for levels IV and V combined	Total GAP average (levels I, II and III)
Theme A Legislation, Labelling and Certification	44%	29%	27%	73% (318 respondents in a sample of 435)
Theme B - Materials, Water and Construction Techniques	39%	30%	31%	69% (291 respondents in a sample of 424)
Theme C - Energy Efficiency and Renewable Energy Sources	35%	26%	39%	61% (254 respondents in a sample of 417)
Theme D - Project Design and Management	45%	30%	25%	75% (313 respondents in a sample of 417)
Theme E - Communication and Information & Communication Technology	27%	30%	44%	56% (227 respondents in a sample of 405)

Also it can be observed in the Table 16 that the values referring to level III in all the themes is very similar and constant, ranging from 26% to 30%, i.e. having a difference of only 4%. This consistency shows the relevance of level III in relation to the other levels.

The combined levels (I and II, and IV and V) have greater differences (17%).

Regarding the results of the interviews and in relation to the topics, it is possible to verify that **some topics were identified that were not indicated in the topics presented in the interview on the themes A and D**. They were the following (Table 17):

Table 17 – New topics identified in the interviews.

Themes	New Topics
A. Legislation, Labelling and Certification	**Management Systems**
D. Project Design and Management	**Statistical Methods and Digital Tools**
	Project Management
	Good Practices and Feasibility Studies
	Planning

For themes B, C and E, the subjects did not originate new topics, but for the theme D several subjects allowed the identification of new topics, showing that the topics presented in the interview were insufficient to meet the GAPs of the respondents. For Theme A, only one

subject allowed the identification of a new topic. For Theme D, five subjects allowed the identification of 5 new topics.

For the others subjects, **they should be considered subtopics to be developed inside the topics for a considered theme**. It is the case of the following subjects due the great number of citations (greater than or equal to 3), Table 18.

These are subjects that must be taken into account in the development of the training contents for VET trainers with Green Skills, with emphasis for "Training in ICT and ICT Use" with the highest number of citations (22).

Table 18 - Subtopics to be developed in the others topics and respective number of citation.

Theme	Subtopics
A. Legislation, Labelling and Certification	Verification and Validation (3)
B. Materials, Water and Construction Techniques	Management of CDW (7)
	Techniques and Technologies (5)
	Bioclimatic Architecture (4)
	Sustainable Materials (3)
	Water Management (3)
C. Energy Efficiency and Renewable Energy Sources	Climatic strategies (7)
	Energy consumption (6)
	Renewable Energy Sources (4)
	Energy Management (4)
	Energy Storage (4)
	Distribution of Energy (3)
E. Communication and Information & Communication Technology	Training in ICT and ICT Use (22)

In terms of GAPs regarding Green Skills in current vocational education programs, the Table 19 shows the subjects corresponding a GAPs identified by the respondents with more citations (greater than or equal to 3).

Table 19 - Gaps identified by the respondents regarding Green Skills in current vocational education programs with the respective number of citation.

Themes	GAPs in current vocational education programs
A. Legislation, Labelling and Certification	Certification and Labelling (8)
	Standardization (4)
	Legislation (4)
B. Materials, Water and Construction Techniques	Selection, Application and Installation of Materials and Products in terms of Sustainability (8)
	New Materials and Technologies (3)

Themes	GAPs in current vocational education programs
C. Energy Efficiency and Renewable Energy Sources	Efficient Energy Strategies (9)
D. Project Design and Management	Life Cycle Perspective (9)
	Good Practices and Feasibility Studies (7)
	Use of ICT (4)
	Maintenance and Refurbishment (3)
E. Communication and Information & Communication Technology	Practical Application and Educational Visits to Construction Sites(12)
	Levels of Education (9)
	Training in New Communication Tools (8)
	Qualification (3)

From the obtained results it can be verified that there **are GAPs in all themes in current vocational education programs**, with a great deal of concern about "Certification and Labelling", "Selection, Application and Installation of Materials and Products in terms of Sustainability", "Efficient Energy Strategies", "Good Practices and Feasibility Studies", "Efficient Energy Strategies", "Life Cycle Perspective", "Practical Application and Educational Visits to Construction Sites", "Levels of Education" and "Training in New Communication Tools".

More practice and professional visits to construction sites obtained the highest number of citations (12), and is therefore a major concern.

In terms of General Questions it is to highlight that the "Practical Application" also presented a large number of citations (9). **There seems to be a broad consensus that the current programs are very theoretical and with little practical component**. In addition they do not give a good preparation for the insertion of trainees in the labor market.

Also it is evident that there is a tendency for online courses in terms of "Training Methods" (6) and development of "Tools and Innovative Tools" (3) with creation of appropriate material for the distance learning of trainers. Training focused in the dimension of sustainable development and new attitudes of trainers are also a concern (3).

In terms of vital topics concerning Green Skills that trainers should acquire to provide suitable training the results shows again the importance of "Green Skills" (4) and "Practical Application and Exercises" (3). Furthermore, each interviewee gave different views, his / her view on vital topics, but they complement each other and are in agreement with the topics already presented in the interview.

In addition, it may be necessary that some topic names be improved so that they can accommodate all or some of the subtopics indicated, that is to have a more comprehensive name.

5. CONCLUSIONS

In total, 461 respondents completed the questionnaire from five countries and 30 respondents completed the semi-structured interviews.

Regarding the total number of responses per level (Figure 36), it was found that level III had the highest number of responses (28.6%), followed by levels II (27.0%) and IV (23.3%). Levels I (10.0%) and V (11.1%) had much lower values.

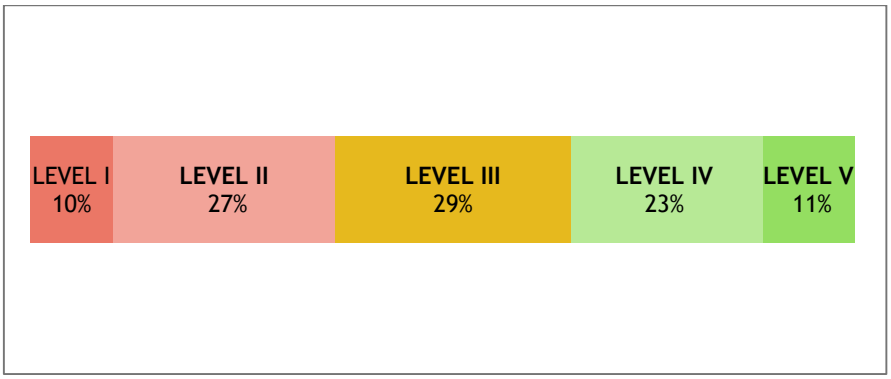

Figure 36 - Total number of responses per level

So, it is important to emphasize that all **the trainers who are at the level III and below will be the main target of this project**. They can be considered the preferential market niche for this project as they may have bigger training needs.

The trainers at levels IV and V are not considered inside the preferential market niche for this project because they are already skilled in the matter. However, they can always check and test their knowledge in the Qualification BuS.Trainers system, to be created under this project, in order to see whether they should undertake or not any extra specific training to cover potential skills GAP. This training will be also provide by the system.

In terms of **Green Skills GAPs**, the results obtained **in the questionnaire** show that for all themes and for all topics with exception of E6 – Use of Communication Devices and E8 - Assertiveness, there are Green Skills GAPs, some with higher percentages in average than others. It can be concluded that the **Themes A and D are those in which the trainers have more training needs, that is, they have less capacity to give training. On the contrary there are the Themes C and E in which the trainers are more familiar and therefore have lower training needs and therefore greater capacity for teaching.**

Specifying in terms of topics, Table 20 shows the higher GAPs in percentage for each theme. So, **considering the various themes it was found that the topics who presented the highest values of GAP are A3, A4, A5, B10, B14, B15, C9, C10, C1, C13, D1, D2, D3, E1, E2 and E3, which are the topics in which trainers are most difficult and therefore should be included in the new qualification.**

Table 20 - More important topics with GAPs, in percentage for each theme.

Theme	Topic	% GAP
Theme A	**A3** -Sustainable Construction Standardization	73
	A4 - Sustainable Building Certification Systems	83
	A5 - Voluntary Environmental Labelling	83
Theme B	**B10** - Emerging Technologies	81
	B14 - Reuse and Recycling CDW	76
	B15 - Deconstruction	80
Theme C	**C9** - Micro-Wind Systems for Building Self-Consumption	73
	C10 - Biomass for Water Heating	64
	C11 - Biomass for Space Heating	64
	C13 - Emerging Technologies	74
Theme D	**D1** - Life Cycle Perspective	79
	D2 - Life Cycle Costs	79
	D3 -Integration in Environmental/ Sustainable Criteria in Design Process	74
Theme E	**E1** - Communication Strategies	62
	E2 - Conflict Resolution and Mediation Skills	64
	E3 - Motivation Strategies	62

The **analysis of the interviews** allows in general verifying that the interviewees agreed with the topics presented in each theme, but some of them should be deepened and also they give some suggestions. **They should be considered subtopics to be developed inside the topics for a considered theme.**

In addition, some **new topics emerge in two thematic areas**. For Theme A, only one subject allowed the identification of a new topic (Management Systems). For Theme D, four subjects allowed the identification of 5 new topics (Statistical Methods and Digital Tools, Project Management, Good Practices and Feasibility Studies and Planning). This result shows that the topics presented in the interview in Themes A and D were insufficient to meet the GAPs of the respondents.

It should be noted that themes A and D were the ones that obtained the largest total GAPs average in the questionnaires and in addition to those in which the experts mentioned the need for new topics. **These results confirm that these two themes are those in which the trainers are less qualified to give training.**

The results of the questionnaire and interviews clearly show the importance of trainers becoming aware of sustainability in construction, as well as the need for new teaching attitudes towards the digital revolution.

With these results it is possible to define the perimeter within the different themes, taking into account the topics presented in table 20 and also the new topics identified in the interviews.

In conclusion, the results obtained meet the objective of this project to produce training content directed towards sustainable construction and training through e-learning / m-learning.

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7. ANNEXES

7.1. ON-LINE SURVEY (TEMPLATE OF THE QUESTIONNAIRE)

Co-funded by the
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BuS Trainers

Trainers' questionnaire on green skills

This questionnaire is part of the **BuS.Trainers project**, which aims to build up green skills for trainers from the construction industry in South Europe to improve teaching skills in sustainable construction, throughout a variable set of interconnected and flexible activities.

This questionnaire is addressed to every trainer who may teach Efficient Energy (EE) and Renewable Energy Sources (RES). In this context, please find below some questions related to important skills and knowledge for your job.

Please, answer each of the questions from the questionnaire honestly.

The aim of this questionnaire is to identify your knowledge regarding green skills applied to training construction activities, in order to provide all trainers with free training tools to improve your working performance.

For greater ease of response, following the first part on the trainer profile, the questionnaire is divided into five thematic areas:

A – Legislation, Labelling and Certification
B – Materials, Water and Construction Techniques
C – Energy Efficiency and Renewable Energy Sources
D –Project Design and Management
E – Communication and Information & Communication Technology

Your answers are of great importance. Please, select the answer that better suits your point of view.

The questionnaire is absolutely anonymous and all answers will be treated only statistically.

BuS.Trainers questionnaire

I - Trainer Profile:

1. Indicate your country:

Greece ☐ Italy ☐ Malta ☐ Portugal ☐ Spain ☐

2. Indicate your Age:

25-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ ≥60 ☐

3. Indicate your Sex:

Male ☐ Female ☐

4. What is the highest level of studies you have completed?

4.1. Primary education	
4.2. Secondary education	
4.3. Vocational Education and Training	
4.4. Higher education and postgraduate education (University - PhD, Master and higher VET)	

5. What institution are you working for? (Check all the options applicable):

5.1. Vocational Training Centre (public)	
5.2. Vocational Training Centre (private)	
5.3. Training Unit/department (inside a construction / supplier company)	
5.4. Professional schools	
5.5. National and Regional employment services	
5.6. Other type of training entities	

6. Indicate the years of experience in the building sector:

<5 years ☐ 5-10 years ☐ 11-15 years ☐ >15 years ☐

7. Indicate the years of experience in Vocational Education and Training within the building sector:

<5 years ☐ 5-10 years ☐ 11-15 years ☐ >15 years ☐

BuS.Trainers questionnaire

8. Indicate your current labour situation:

8.1. Employed	
8.2. Self employed	
8.3. Unemployed	
8.4. Under training	
8.5. Looking for a 1st job	

BuS.Trainers questionnaire

II- Green Skills

A – Legislation, Labelling and Certification

Please, evaluate to what extent you master the green skills concerning the topics below:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
European Environmental and Energy legislation (for example, Directive on the energy performance of buildings (recast), Directive on the promotion of the use of energy from renewable sources)	○	○	○	○	○
National Environmental and Energy legislation and Action Plans	○	○	○	○	○
Sustainable Construction Standardization (for example, Sustainability of construction works: Sustainability assessment of buildings; Environmental product declarations)	○	○	○	○	○
Sustainable Building Certification Systems (for example, LEED, BREEAM, national systems)	○	○	○	○	○
Voluntary Environmental Labelling (for example, EU ecolabel, Environmental product declarations)	○	○	○	○	○
Mandatory Energy Labelling (for example, EU energy label, Building Energy Labelling)	○	○	○	○	○
Mandatory Products Labelling (CE marking)	○	○	○	○	○

BuS.Trainers questionnaire

B – Materials, Water and Construction Techniques

Please, evaluate to what extent you master the green skills concerning the topics below:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
Traditional construction (national and regional diversity)	○	○	○	○	○
Local materials (for example, straw, stone, earth, clay mortar, lime mortar)	○	○	○	○	○
New and innovative materials (for example, blocks with integrated insulation, self-healing concrete, phase-change material)	○	○	○	○	○
Low environmental impact materials (for example, materials with low emission of Volatile Organic Compounds – VOC, materials with low embedded energy)	○	○	○	○	○
Selection of construction materials and products in terms of sustainability	○	○	○	○	○
Influence of material, products and equipment in the building performance	○	○	○	○	○
Ecological insulation materials (for example, straw, cork, wool)	○	○	○	○	○

BuS.Trainers questionnaire

Please, continue to evaluate to what extent you master the green skills concerning the topics of Materials, Water and Construction Techniques:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
Sustainable construction techniques (for example, Green roofs, Solar passive systems, Ground cooling system, Mass walls)	○	○	○	○	○
Building Envelope and Thermal inertia	○	○	○	○	○
Emerging Technologies (for example, installation of radio or wireless sensors in the construction materials)	○	○	○	○	○
New technologies applied to building maintenance and refurbishment (ETICS – External Thermal Insulation Composite Systems)	○	○	○	○	○
Water efficiency (consumption, reuse and recycling of water, rainwater, greywater)	○	○	○	○	○
Prevention of Construction and Demolition Waste (CDW)	○	○	○	○	○
Reuse and recycling of CDW	○	○	○	○	○
Deconstruction (Selective demolition)	○	○	○	○	○

BuS.Trainers questionnaire

C — Energy Efficiency and Renewable Energy Sources

Please, evaluate to what extent you master the green skills concerning the topics below:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
Renewable energy sources in buildings in general	○	○	○	○	○
Nearly Zero Energy Building (nZEB)	○	○	○	○	○
Country energy mix (renewable and non-renewable energy sources)	○	○	○	○	○
Efficient insulation (outdoor walls and roof dwellings)	○	○	○	○	○
Efficient windows (glazing type and orientation of facades)	○	○	○	○	○
Efficient lighting (luminaries, bulbs, lighting parameters)	○	○	○	○	○
Solar thermal System for Water Heating	○	○	○	○	○
Solar photovoltaic system for Building Self-consumption (electrification)	○	○	○	○	○
Micro-wind systems for building self-consumption (electrification)	○	○	○	○	○
Biomass for water heating (boilers, heat recover)	○	○	○	○	○
Biomass for space heating (radiant floor, wall convectors)	○	○	○	○	○
Heat pumps for efficient heating and cooling (heat pumps)	○	○	○	○	○

BuS.Trainers questionnaire

Please, continue to evaluate to what extent you master the green skills concerning the topics of Energy Efficiency and Renewable Energy Sources:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
Emerging technologies (for example, Shallow geothermal system, Smart grids, Ice storage)	○	○	○	○	○
Building user behavior (lighting, heating, cooling and ventilation, acoustic)	○	○	○	○	○

D – Project Design and Management

Please, evaluate to what extent you master the green skills concerning the topics below:

Topics	Unfamiliar with topic	Understand the concept but cannot teach	Understand the concept and might teach	Good Knowledge and can teach	Deep Knowledge and teaching skills (even to Train other Trainers)
Life Cycle perspective (from the extraction of materials until end of life)	○	○	○	○	○
Life Cycle Costs (including acquisition, maintenance and end of life costs)	○	○	○	○	○
Integration of environmental/sustainable criteria in design process	○	○	○	○	○
Systems of economic incentives for efficient energy and renewable energies sources	○	○	○	○	○
Building Management (preventive maintenance, equipment's durability, safety procedures, operation and services)	○	○	○	○	○

BuS.Trainers questionnaire

E – Communication and Information & Communication Technology (ICT)

Find below a set of communication and Information & Communication Technology skills. Please, evaluate to what extent you master them.

Topics	Unfamiliar with topic	Understand the concept but cannot apply	Understand the concept and might apply	Knowledge and can apply	Deep knowledge and application capacity
Communication strategies	○	○	○	○	○
Conflict resolution and mediation skills	○	○	○	○	○
Motivation strategies	○	○	○	○	○
Problem solving (working with operational difficulties)	○	○	○	○	○
Practice training (applying theory to practice)	○	○	○	○	○
Use of communications devices (for example, cellular phones, computer and network hardware and software, videoconferencing and distance learning)	○	○	○	○	○
Self-improvement (new pedagogic methodologies, professional activities, new trends, information, knowledge, etc.)	○	○	○	○	○
Assertiveness (challenging and supporting trainees)	○	○	○	○	○

Thank for your collaboration!

7.2. TEMPLATE OF THE SEMI-STRUCTURED INTERVIEWS

Co-funded by the
Erasmus+ Programme
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Cooperation for Innovation and the Exchange of Good Practices | Sector Skills Alliances (SSA)
Sector Skills Alliances for Design and Delivery of VET
Project number: 575829-EPP-1-2016-1-ES-EPPKA2-SSA

BuS Trainers

Experts' interview on green skills

General Objective: To identify green skills gaps of the trainers in vocational education and training (VET), who may teach Efficient Energy (EE) and Renewable Energy Sources (RES).

Purpose: This interview is part of the BuS Trainers project, which aims to build up green skills for trainers from the construction industry in South Europe to improve teaching skills in sustainable construction, throughout a variable set of interconnected and flexible activities.

Strategy: Semi-structured interview where, in addition to general questions, the interview is divided into the same thematic areas as the questionnaire:

A – Legislation, Labelling and Certification
B – Materials, Water and Construction Techniques
C – Energy Efficiency and Renewable Energy Sources
D –Project Design and Management
E – Communication and Information & Communication Technology

Note: The confidentiality of data is guaranteed.

I. Interviewee profile

1. Indicate your position:

2 What type of institution are you working for?

3 Indicate the name of your company/institution:

II - Interview:

A - Legislation, Labelling and Certification:

a) European Environmental and Energy Legislation
b) National Environmental and Energy legislation and Action Plans
c) Sustainable Construction Standardization
d) Sustainable Building Certification Systems
e) Voluntary and/or Mandatory Labelling
f) Mandatory Products Labelling

Specific objectives	Questions	Results
1. Find out if there are any other important topics in this area that were not indicated.	1.1 Can you identify other topics within this thematic area that were not indicated above?	
2. Identify gaps in Green Skills in this thematic area, taking into account the current vocational education program.	2.1 What gaps regarding Green Skills do you think exist in current vocational education program in terms of Legal Framework, Labeling and Certification Systems?	

3

Expert's Interview on Green Skills

B - Materials, Water and Construction Techniques:

a) Traditional Construction
b) Local Materials
c) New and Innovative Materials
d) Low Environmental Impact Materials
e) Selection of Construction Materials and Products in terms of Sustainability
f) Influence of Construction Materials and Products in terms of Sustainability
g) Ecological insulation Materials
h) Sustainable Construction Techniques
i) Building envelope and Thermal Inertia
j) Emerging Technologies
k) New Technologies applied to Building Maintenance and Refurbishment
l) Water Efficiency
m) Prevention of Construction and Demolition Waste (CDW)
n) Reuse and Recycling of CDW
o) Deconstruction

Specific objectives	Questions	Results
3. Find out if there are any other important topics in this area that were not indicated.	3.1 Can you identify other topics within this thematic area that were not indicated above?	
4. Identify gaps in Green Skills in this thematic area, taking into account the current vocational education program.	4.1 What gaps regarding Green Skills do you think exist in current vocational education program in terms of on Ecological Materials, Water Efficiency and Sustainable Construction Techniques?	

4

Expert's Interview on Green Skills

C - Energy Efficiency and Renewable Energy Sources:

a) Renewable Energy Sources in Buildings in General
b) Nearly Zero Energy Building (nZEB)
c) Country Energy Mix
d) Efficient Insulation
e) Efficient Windows
f) Efficient Lighting
g) Solar Thermal System for Water Heating
h) Solar PV system for Building Self-Consumption
j) Micro-wind systems for Building Self-Consumption
j)Biomass for Water Heating,
k) Biomass for Space Heating
l) Heat pumps for efficient heating and cooling
m) Emerging Technologies
n) Building User Behavior

Specific objectives	Questions	Results
5. Find out if there are any other important topics in this area that were not indicated.	5.1 Can you identify other topics within this thematic area that were not indicated above?	
6. Identify gaps in Green Skills in this thematic area, taking into account the current vocational education program.	6.1 What gaps regarding Green Skills do you think exist in current vocational education program in terms of Energy Efficiency and Renewable Energy Sources?	

5

Expert's Interview on Green Skills

D - Project Design and Management:

a) Life Cycle Perspective
b) Life Cycle Costs
c) Integration of Environmental/Sustainable Criteria in Design Process
d) Systems of Economic Incentives for Efficient Energy and Renewable Energy Sources
e) Building Management

Specific objectives	Questions	Results
7. Find out if there are any other important topics in this area that were not indicated.	7.1 Can you identify other topics within this thematic area that were not indicated above?	
8. Identify gaps in Green Skills in this thematic area, taking into account the current vocational education program.	8.1 What gaps regarding Green Skills do you think exists in current vocational education program in terms of Project Design and Management?	

E – Communication and Information & Communications Technology (ICT):

Specific objectives	Questions	Results
9. To assess the need of communication skills and ICT in a trainer with Green skills.	9.1 What kind of skills do you think trainers would need in this area to improve their performance?	
	9.2 What gaps regarding soft skills do you think exists in current vocational education program in terms of communication skills and ICT?	

6

Expert's Interview on Green Skills

General Questions:

Specific objective	Questions	Results
10. To assess the grade of trainers' needs and what kind of actions can complement the training	10.1. What estimated percentage of trainers you think would need to be trained in green skills in your country?	
	10.2. What kind of training actions and accompany measures do you think that could better suit the training of trainers on green skills and technological developments in ICT?	
11. To know the idea that the interviewee has about Green Skills	11.1. In general, what are the vital topics concerning Green Skills that trainers should acquire to provide suitable training in this matter?	

Conclusion on the interview:

- Would you like to add something else?
- Would you like to take part in the project's National Advisory Group?

  Yes ☐ No ☐

Thank you for your cooperation

7.3. DETAILED TABLES

Trainer Profile

Question1: Indicate your Country. (Table of Figure2)

Country	Frequency	Valid Percentage % (rounded to the unit)
Malta	27	6
Greece	102	22
Spain	107	23
Italy	111	24
Portugal	114	25
Total	**461**	**100**

Question2: Indicate your Age. (Table of Figure3)

Age Group	Frequency	Valid Percentage % (rounded to the unit)
25 - 29	17	4
30 - 39	106	23
40 - 49	179	39
50 - 59	130	28
≥ 60	29	6
Total	**461**	**100**

Question3: Indicate your Sex. (Table of Figure4)

Sex	Frequency	Valid Percentage % (rounded to the unit)
Male	370	80
Female	91	20
Total	**461**	**100**

Question 4: What is the highest level of studies you have completed? (Table of Figure 5)

Trainers' Level of Studies	Frequency	Valid Percentage % (rounded to the unit)
Primary	5	1
Secondary	33	7
VET	40	9
Higher and postgraduate	383	83
Total	461	100

Question 5: What institution are you working for? (Table of Figure 6)

Type of Institution	Frequency	Valid Percentage % (rounded to the unit)		
		Institution	System	Total
National and Regional employment services	32	7	93	100
Training Unit/Department	59	13	87	100
Professional schools	63	14	86	100
Vocational Training Centre (public)	111	24	76	100
Vocational Training Centre (private)	182	40	60	100
Other type of training entities	189	41	59	100

Question 6: Indicate the years of experience in the building sector. (Table of Figure 7)

Years of experience in the building sector	Frequency	Valid Percentage % (rounded to the unit)
< 5 years	69	15
5 - 10 years	85	18
11 - 15 years	84	18
> 15 years	223	49
Total	461	100

Question 7: Indicate the years of experience in Vocational Education and Training within the building sector. (Table of Figure 8)

Years of experience in the VET within the building sector	Frequency	Valid Percentage % (rounded to the unit)
< 5 years	142	31
5 - 10 years	128	28
11 - 15 years	65	14
> 15 years	126	27
Total	**461**	**100**

Question 8: Indicate your current labour situation. (Table of Figure 9)

Current labour situation	Frequency	Valid Percentage %
Employed	286	62.0
Self employed	157	34.1
Unemployed	16	3.5
Under training	1	0.2
Looking for a 1st job	1	0.2
Total	**461**	**100**

Group A – Legislation, Labelling and Certification

Table of Figure 10 - Number of answers for each topic of theme A classified by level of knowledge of the respondents.

Levels	A1	A2	A3	A4	A5	A6	A7
I	37	60	47	79	76	54	35
II	121	114	137	158	171	123	124
III	139	127	132	125	114	120	136
IV	99	97	87	58	58	93	100
V	39	37	32	15	16	45	40
Total	**435**	**435**	**435**	**435**	**435**	**435**	**435**

Table of Figure 11 – Valid percentage of answers by levels of knowledge for theme A (rounded to the unit).

Levels	A1	A2	A3	A4	A5	A6	A7
I	8	14	11	18	18	12	8
II	28	26	32	36	39	28	29
III	32	29	30	29	26	28	31
IV	23	22	20	13	13	22	23
V	9	9	7	4	4	10	9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table of Figure 12 – Number of answers by level of knowledge for theme A, ordered by increasing values of level I.

Topics	I	II	III	IV	V
A7	35	124	136	100	40
A1	37	121	139	99	39
A3	47	137	132	87	32
A6	54	123	120	93	45
A2	60	114	127	97	37
A5	76	171	114	58	16
A4	79	158	125	58	15

Table of Figure 13 – Percentages of levels I and II combined, levels IV and V combined, and level III alone by topics (rounded to the unit).

Topics	% Level I and II	% Level III	% Level IV and V
A1	36	32	32
A2	40	29	31
A3	43	30	27
A4	54	29	17
A5	57	26	17
A6	40	28	32
A7	37	31	32

Table of Figure 14 – Theme A, percentages of "GAP" and "No GAPS" by topics (rounded to the unit).

Topics	% GAP	% No GAP
A1	68	32
A2	69	31
A3	73	27
A4	83	17
A5	83	17
A6	68	32
A7	68	32

Group B – Materials, Water and Construction Techniques

Table of Figure 15 - Number of answers for each topic of theme B classified by level of knowledge of the respondents.

Levels	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
I	39	39	46	52	43	36	41	32	37	78	43	35	59	65	70
II	96	106	115	130	111	91	108	109	103	157	109	107	130	137	150
III	134	146	122	130	143	128	133	116	109	111	120	134	115	122	117
IV	104	94	111	90	101	124	112	123	117	61	91	108	82	74	65
V	51	39	30	22	26	45	30	44	58	17	61	40	38	26	22
Total	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**	**424**

Table of Figure 16 – Valid percentage of answers by levels of knowledge for theme B (rounded to the unit).

Levels	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
I	9	9	11	12	10	9	10	8	9	18	10	8	14	15	17
II	23	25	27	31	26	21	26	26	24	37	26	25	31	32	35
III	32	35	29	31	34	30	31	27	26	26	28	32	27	29	28
IV	24	22	26	21	24	29	26	29	27	15	22	26	19	18	15
V	12	9	7	5	6	11	7	10	14	4	14	9	9	6	5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table of Figure 17 – Number of answers by level of knowledge for theme B, ordered by increasing values of level I

Topics	I	II	III	IV	V
B8	32	109	116	123	44
B12	35	107	134	108	40
B6	36	91	128	124	45
B9	37	103	109	117	58
B1	39	96	134	104	51
B2	39	106	146	94	39
B7	41	108	133	112	30
B5	43	111	143	101	26
B11	43	109	120	91	61
B3	46	115	122	111	30
B4	52	130	130	90	22
B13	59	130	115	82	38
B14	65	137	122	74	26
B15	70	150	117	65	22
B10	78	157	111	61	17

Table of Figure 18 - Percentages of levels I and II combined, levels IV and V combined, and level III alone by topics (rounded to the unit).

Topics	% Level I and II	% Level III	% Level IV and V
B1	32	32	36
B2	34	35	31
B3	38	29	33
B4	43	31	26
B5	36	34	30
B6	30	30	40
B7	36	31	33
B8	34	27	39
B9	33	26	41
B10	55	26	19
B11	36	28	36
B12	33	32	35
B13	45	27	28
B14	47	29	24
B15	52	28	20

Table of Figure 19 – Theme B, percentages of "GAP" and "No GAPS" by topics (rounded to the unit).

Topics	% GAP	% No GAP
B1	64	36
B2	69	31
B3	67	33
B4	74	26
B5	70	30
B6	60	40
B7	67	33
B8	61	39
B9	59	41
B10	81	19
B11	64	36
B12	65	35
B13	72	28
B14	76	24
B15	80	20

Group C – Energy Efficiency and Renewable Energy Sources

Table of Figure 20- Number of answers for each topic of theme C classified by level of knowledge of the respondents.

Levels	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
I	18	49	32	24	28	31	21	25	54	48	46	43	68	32
II	101	101	112	88	83	112	100	111	132	112	117	99	123	111
III	105	113	114	117	123	103	100	109	117	108	102	103	116	97
IV	113	97	111	114	119	104	122	112	73	96	95	113	76	109
V	80	57	48	74	64	67	74	60	41	53	57	59	34	68
Total	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**

Table of Figure 21 – Valid percentage of answers by levels of knowledge for theme C (rounded to the unit).

Levels	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
I	5	12	8	6	7	7	5	6	13	11	11	10	16	8
II	24	24	27	21	20	27	24	27	32	27	28	24	30	27
III	25	27	27	28	30	25	24	26	28	26	24	25	28	23
IV	27	23	27	27	28	25	29	27	17	23	23	27	18	26
V	19	14	11	18	15	16	18	14	10	13	14	14	8	16
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table of Figure 22 – Number of answers by level of knowledge for theme C, ordered by increasing values of level I.

Topics	I	II	III	IV	V
C1	18	101	105	113	80
C7	21	100	100	122	74
C4	24	88	117	114	74
C8	25	111	109	112	60
C5	28	83	123	119	64
C6	31	112	103	104	67
C3	32	112	114	111	48
C14	32	111	97	109	68
C12	43	99	103	113	59
C11	46	117	102	95	57
C10	48	112	108	96	53
C2	49	101	113	97	57
C9	54	132	117	73	41
C13	68	123	116	76	34

Table of Figure 23 - Percentages of levels I and II combined, levels IV and V combined, and level III alone by topics (rounded to the unit).

Topics	% Level I and II	% Level III	% Level IV and V
C1	29	25	46
C2	36	27	37
C3	35	27	38
C4	27	28	45
C5	27	30	43
C6	34	25	41
C7	29	24	47
C8	33	26	41
C9	45	28	27
C10	38	26	36
C11	39	24	37
C12	34	25	41
C13	46	28	26
C14	35	23	42

Table of Figure 24 – Theme C, percentages of “GAP” and “No GAPS” by topics (rounded to the unit).

Topics	% GAP	% No GAP
C1	54	46
C2	63	37
C3	62	38
C4	55	45
C5	57	43
C6	59	41
C7	53	47
C8	59	41
C9	73	27
C10	64	36
C11	64	36
C12	59	41
C13	74	26
C14	58	42

Group D – Project Design and Management

Table of Figure 25- Number of answers for each topic of theme D classified by level of knowledge of the respondents.

Levels	D1	D2	D3	D4	D5
I	53	60	62	44	44
II	129	142	132	143	135
III	148	127	112	113	116
IV	54	57	77	74	79
V	33	31	34	43	43
Total	**417**	**417**	**417**	**417**	**417**

Table of Figure 26 – Valid percentage of answers by levels of knowledge for theme D (rounded to the unit).

Levels	D1	D2	D3	D4	D5
I	13	14	15	11	11
II	31	34	32	34	32
III	35	31	27	27	28
IV	13	14	18	18	19
V	8	7	8	10	10
Total	**100**	**100**	**100**	**100**	**100**

Table of Figure 27 – Number of answers by level of knowledge for theme D, ordered by increasing values of level I.

Topics	I	II	III	IV	V
D4	44	143	113	74	43
D5	44	135	116	79	43
D1	53	129	148	54	33
D2	60	142	127	57	31
D3	62	132	112	77	34

Table of Figure 28 - Percentages of levels I and II combined, levels IV and V combined, and level III alone by topics (rounded to the unit).

Topics	% Level I and II	% Level III	% Level IV and V
D1	44	35	21
D2	48	31	21
D3	47	27	26
D4	45	27	28
D5	43	28	29

Table of Figure 29 – Theme D, percentages of "GAP" and "No GAPS" by topics (rounded to the unit).

Topics	% GAP	% No GAP
D1	79	21
D2	79	21
D3	74	26
D4	72	28
D5	71	29

Group E – Communication and Information & Communication Technology skills

Table of Figure 30- Number of answers for each topic of theme E classified by level of application of the respondents.

Levels	E1	E2	E3	E4	E5	E6	E7	E8
I	26	39	31	23	27	8	19	15
II	96	94	91	84	72	70	85	73
III	126	125	131	131	122	110	117	99
IV	107	101	109	124	125	127	114	135
V	50	46	43	43	59	90	70	83
Total	**405**	**405**	**405**	**405**	**405**	**405**	**405**	**405**

Table of Figure 31 – Valid percentage of answers by levels of application for theme E (rounded to the unit).

Levels	E1	E2	E3	E4	E5	E6	E7	E8
I	7	10	8	6	7	2	5	4
II	24	23	22	21	18	17	21	18
III	31	31	32	32	30	27	29	24
IV	26	25	27	30	31	32	28	33
V	12	11	11	11	14	22	17	21
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table of Figure 32 – Number of answers by level of knowledge for theme E, ordered by increasing values of level I.

Topics	I	II	III	IV	V
E6	8	70	110	127	90
E8	15	73	99	135	83
E7	19	85	117	114	70
E4	23	84	131	124	43
E1	26	96	126	107	50
E5	27	72	122	125	59
E3	31	91	131	109	43
E2	39	94	125	101	46

Table of Figure 33 - Percentages of levels I and II combined, levels IV and V combined, and level III alone by topics (rounded to the unit).

Topics	% Level I and II	% Level III	% Level IV and V
E1	31	31	38
E2	33	31	36
E3	30	32	38
E4	27	32	41
E5	25	30	45
E6	19	27	54
E7	26	29	45
E8	22	24	54

Table of Figure 34 – Theme E, percentages of “GAP” and “No GAPS” by topics (rounded to the unit).

Topics	% GAP	% No GAP
E1	62	38
E2	64	36
E3	62	38
E4	59	41
E5	55	45
E6	46	54
E7	55	45
E8	46	54

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