ENGIE DELIVERABLE D1.1

REPORT ON BASELINE ASSESSMENT

Summary:
This deliverable presents the results of the survey on the interest of secondary school students for geosciences. Results of another survey on the gender policy of organisations in the geo- and mining sectors are also assessed.

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1 EXECUTIVE SUMMARY

The objective of Task 1.1 is to assess the status of geo-education (secondary level) in Europe based on statistical data, results of previous studies and targeted surveys. This task will serve as a baseline for the implementation of the project. To meet this objective, three surveys targeting secondary school students, geography teachers and prospective future employers, stakeholders and representatives of decision-making bodies have been carried out during the course of the task.

Luleå University of Technology (LTU) has overseen the work. The survey's targeting students and teachers in respective country have been carried out by the EFG's linked third parties in 20 European countries. In addition, LTU managed the survey in Sweden. The engagement of the LTPs was crucial for the success of the study. The survey including stakeholders have been carried out with the help of all project partners.

This report describes the empirical data collected from each of the survey. The focus is on describing the data and identifying a number of aspects for the continuous analyses to explore before developing the ENGIE Action Plan.

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2 PRESENTATION OF DATA

2.1 REPORT ON THE STATUS OF SECONDARY GEO-EDUCATION

The Earth science/geoscience/geology education in the primary school and secondary school level is quite different worldwide and it is also various within the European Union. These differences come from the different education/school systems. The compulsory education time is not the same in the EU (e.g. in France and Spain the students have to visit obligatory the school until they reach 16 years, whereas in Portugal the education is compulsory until the age of 18 years), so the education material cannot be the same in the different countries.

The earth science/geoscience/geology education has different ways in the EU's countries. There are countries, where the government/education ministry specifies national standards or national curriculum (e.g. Czech Republic, England, Estonia, Finland, Italy, Hungary, Portugal, Romania, Spain), and there are countries, where the different regions have different "standards" or there are only guidelines (e.g. Germany, France, Scotland).

The students learn earth science/geoscience/geology in the first 3-4 years of primary school with biology, social science in one subject comprised of age-appropriate in general. The education diversity grows commonly from the 5th grade. Mainly the Earth science/geoscience/geology appear in the geography and natural science subjects, which are most times obligatory for the students. In the secondary school (from 12-14 years old student) the earth science/geoscience/geology education is less compulsory and it appears mostly in geography or natural science. Sometimes there are optional courses, which relate directly to earth science/geoscience/geology approaching the end of secondary school (e.g. in the UK geology course to the 16-18/19 years old student; in France Earth Science course to 15-18 years old student; in Portugal Geology course to 12th grade student).

The approach to earth science subject teaching is different in the EU's countries. Natural science teachers can specialize in Biology (e.g. in Czech Republic, Italy, Portugal); in Chemistry (e.g. in England); in general science (e.g. in Norway, Russia /not EU countries/), in Earth Science (e.g. Czech Republic); in Geography (e.g. in Hungary).

Mainly textbooks and worksheets support the Earth science/geoscience/geology education, but nowadays the interactive (e.g. VR, AR) support materials are spreading as well. Different organizations promote the Earth science/geoscience/geology education, too, e.g. museums, national parks, geoparks, interactive science centres.

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Sources:

European Commission/EACEA/Eurydice, 2018. The Structure of the European Education Systems 2018/19: Schematic Diagrams. Eurydice Facts and Figures. Luxembourg: Publications Office of the European Union.

International GeoScience Education Organisation: http://www.igeoscied.org/activities/geoscience-education-survey/

Geoscience in primary and secondary education (2019): Vol. 2 Published by the United Nations Educational, Scientific and Cultural Organization

González, R. M., Donert, K. (2014): Innovative Learning Geography in Europe: New Challenges for the 21st Century, Cambridge Scholars Publishing, ISBN (10): 1-4438-5508-1

Greco, R., Almberg Leslie (2016): Earth Science Education: Global perspective ISBN: 987-85-67952-14-7

2.2 REPORT ON SECONDARY SCHOOL STUDENTS INTEREST IN GEOSCIENCES

A concise questionnaire targeting secondary school students was developed to determine the current interest among young women expressed for geosciences and respectively towards science careers choice, as well as to identify any possible bottlenecks dissuading young women to embark on a geoscientific profession. The questionnaires were translated into national languages and the surveys were carried out with the help of the EFG member associations (LTPs). From March to May 2020, 4795 students from 21 European countries participated in the survey.

2.2.1 Survey participants

4795 students from 21 European countries participated in the survey. The average number of students in each country was 228 which means that the designated number of participants (200 per country) has been reached.

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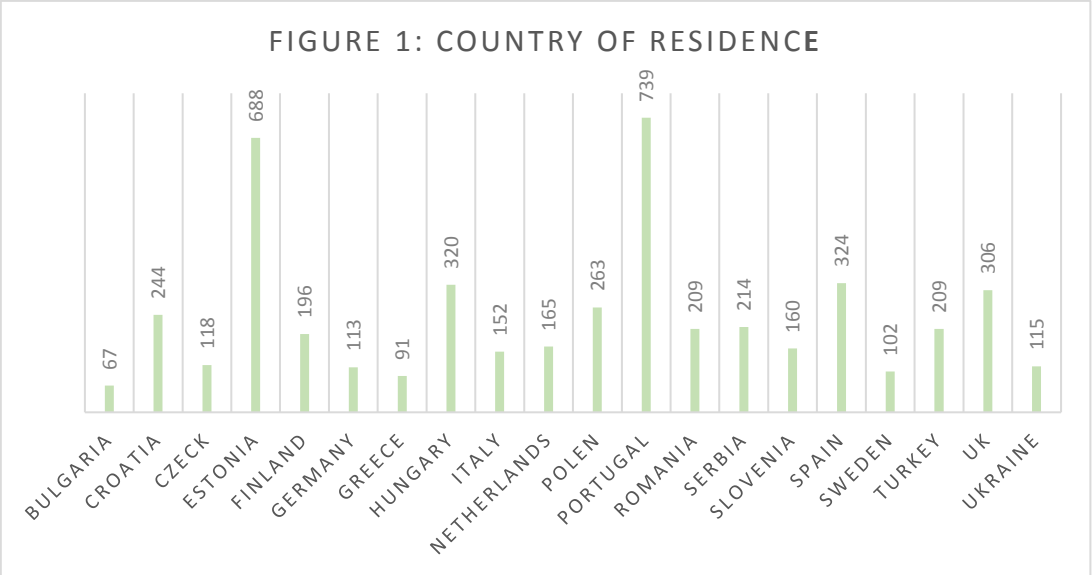
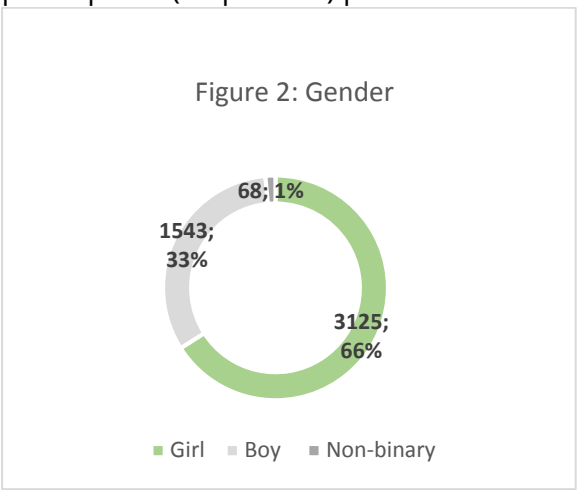
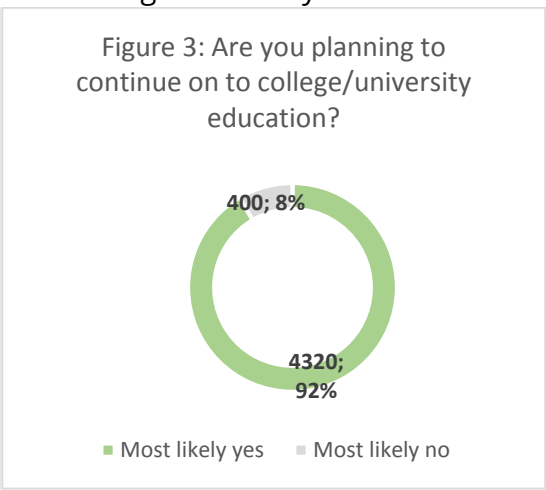


66 percent of the participants were girls and 33 percent were boys (Figure 2). Almost all participants (92 percent) plan to continue on to college/university education.





2.2.2 Participants knowledge of geoscience

The second part of the questionnaire assessed participants' knowledge of geoscience. The findings show that almost half (48 percent) of the participants' perceive themselves to be familiar with geoscience (Figure 4) and less than one forth (23 percent) know somebody working as a geoscience professional (Figure 5). In an attempt to validate this result, the participants were also presented with three definitions of scientific disciplines and asked to identify which one was geoscience. About 85 percent managed to make the right choice (Figure 6).

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Figure 4: Would you say that you are familiar with geoscience?

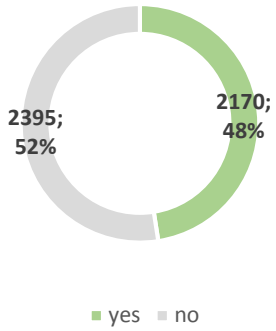


Figure 5: Do you know anybody working as a geoscience professinal?

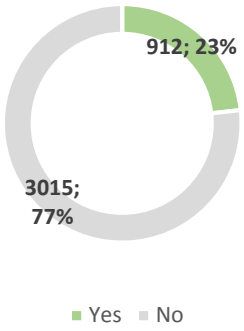
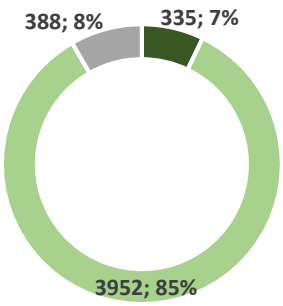


Figure 6: What is geoscience to you?



- The study of matter and its motion through space-time, along with related concepts such as energy and force
- The study of the earth - its oceans, atmosphere, rivers and lakes, ice sheets and glaciers, soils, its complex surface, rocky interior, and metallic core.
- The study of the relationships that living organisms have with each other and with their abiotic environment.

2.2.3 Participants interest in geoscience

The third and final part of the questionnaire assessed the participants' interest in geoscience. 21 percent of the participants stated that they would consider working as a geoscience professional (Figure 7).

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To explore factors that contribute to students' interest (or disinterest) in working as a geoscience professional, participants were asked to motive their standpoint with the help of five alternatives. Two alternatives assessed the potential influence of socialization processes, conceptualised as significant others (friends) influence and teachers and caregivers encourage. Two alternatives assessed the potential influence of rational choice factors (utility considerations and facility expectations). The participants were also presented with a fifth alternative "other", which they then were asked to explain in a designated text box. Figure 8 and 9 show similar patterns, meaning that participants consider or do not consider a career in geoscience for similar reasons. The finding suggest secondary school students' future career choice to be more influenced by rational choice factors, especially expected educational successes. In comparison, participants' are less likely to acknowledge (at least not concisely) the influence of friends and/or teachers' and caregivers' encouragement. Also evident by both figures is that the second most recurring alternative was "other".

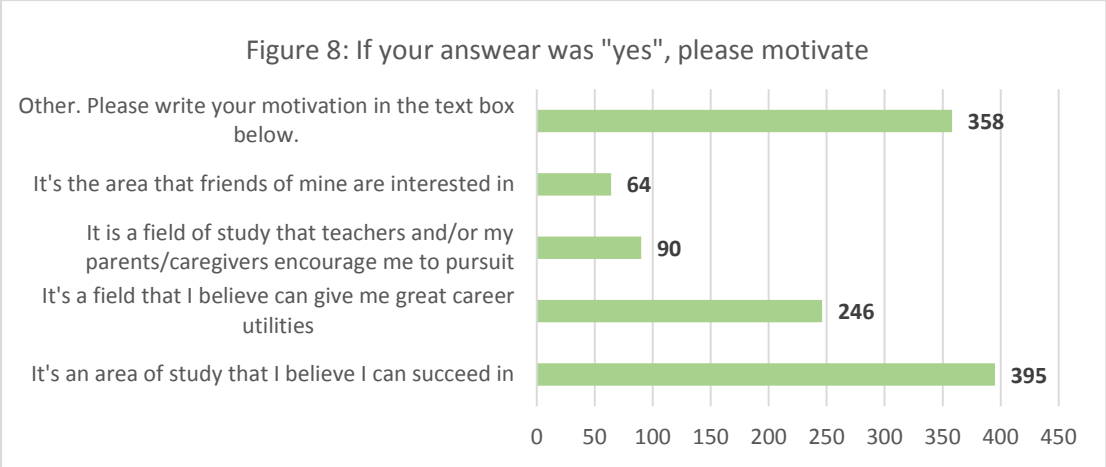

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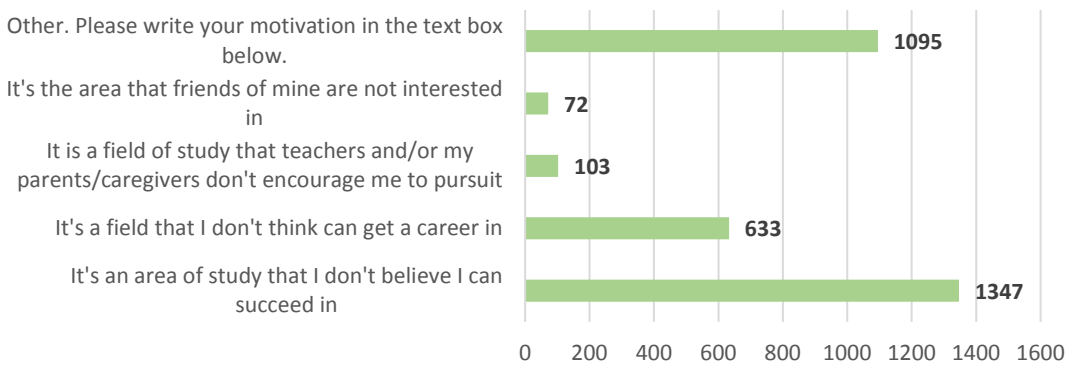
Figure 9: If your answear was "no", please motivate



2.2.4 Indications for further analyses to focus on

The aim of the survey was to assess secondary school students' expressed interest for geosciences. The data presented concern all respondents (girls and boys). One important next step is to analyse the data broken down by gender and identify patterns of similarities and differences in boys and girls responses. Also important is to analyse potential correlation between different questions. For example, the data presented here show a similarity between the percentages of participants who know someone working as a geoscientific processional (Figure 5) and the percentage who states that themselves can consider working as a geoscientific professional (Figure 7), but there is also a correlation between the two. Finally, considering that so many of the participants' choose the "other" alternative when motivating their future career choice, further analyses should also include the open-ended part of the survey. Very preliminary analyses of some of the comments suggest that "being interested" (or "not being interested") predominates, but what having an interest actually means is vaguer.

2.3 REPORT ON GEOGRAPHY TEACHERS' PERCEPTION OF OBSTACLES IMPENDING YOUNG WOMEN TO EMBARK ON A GEOSCIENTIFIC CAREER

A concise questionnaire targeting geography teachers was developed to identify obstacles impending young women to embark on a geoscientific career as well as to assess the status of geo-education in secondary schools more generally. The surveys were carried out with the help of the EFG member associations (LTPs). From March to May 2020, 714 teachers from 19 European countries participated in the survey.

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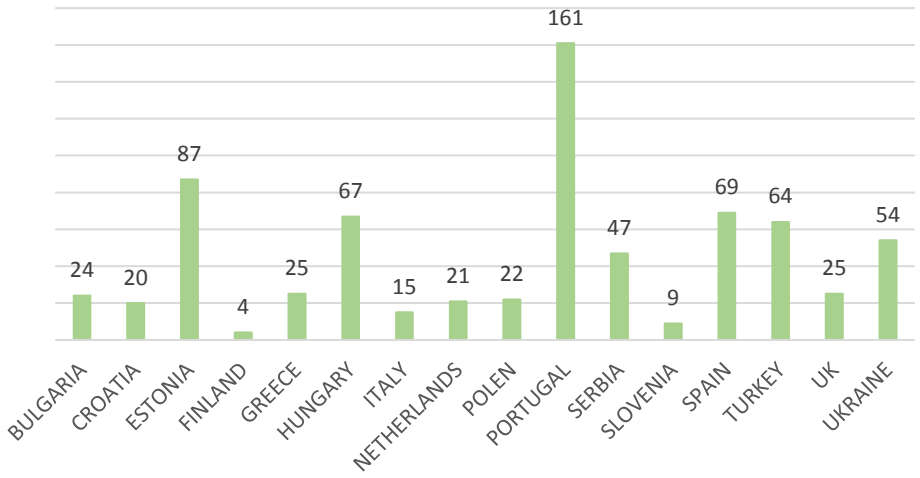
2.3.1 Survey participants

714 teachers from 19 European countries participated in the survey, which means that the designated target of 200 teachers has been met.

Figure 10: Country of residence



66 percent of the participants were women and 34 percent were men (Figure 11). 62 percent were geography teachers and 38 were teachers of other subjects.

Figure 11: Gender

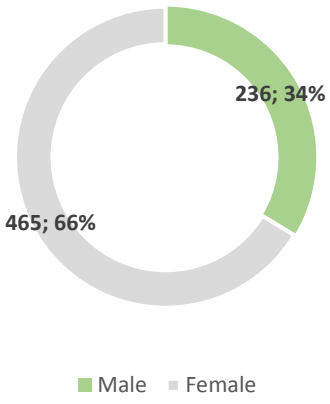
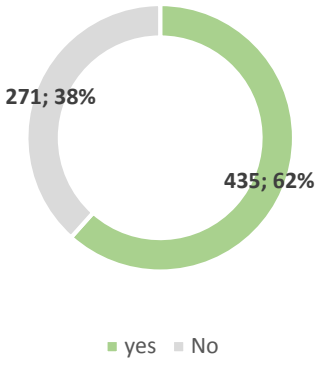


Figure 12: Are you a techer of geography?



2.3.2 Background for teaching geology

Part two of the questionnaire was designed to assess the status of geo-education. The findings show that 67 percent of the participants work at a school were geology form part of the compulsory curriculum (Figure 13).

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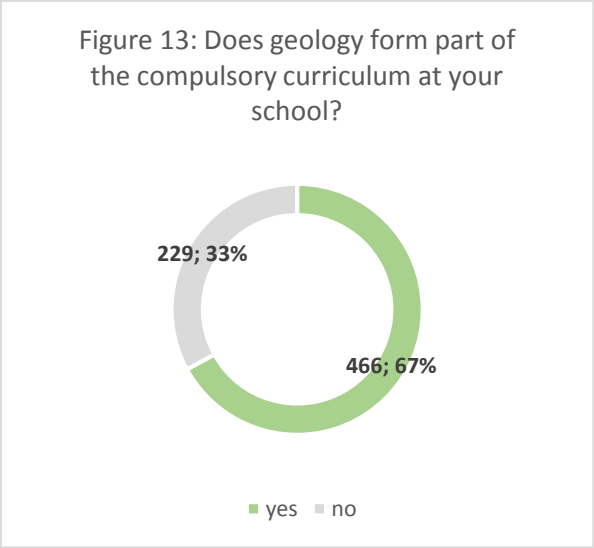
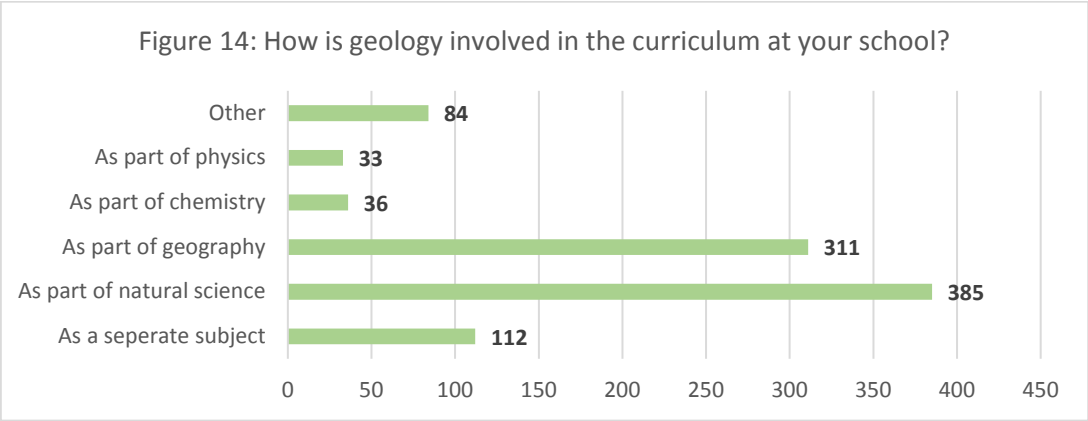
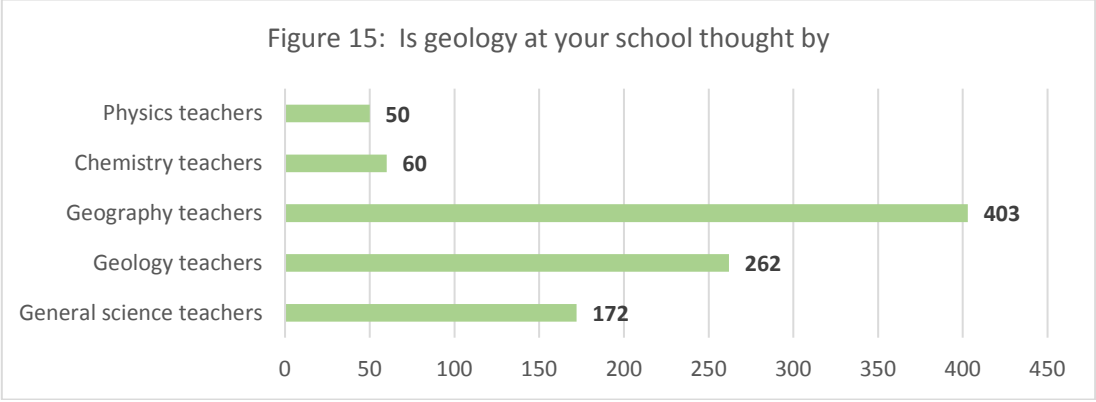


More than half (54 percent) of the 714 participating teachers work at a school were geology is involved in the curriculum as part of natural science, followed by geography (44 percent). 112 participants (16 percent) states that geology constitutes a separate subject (Figure 14).



Most often, geography teachers (56 percent) teach geology, followed by geology teachers (37 percent) and general science teachers (16 percent) (Figure 15).



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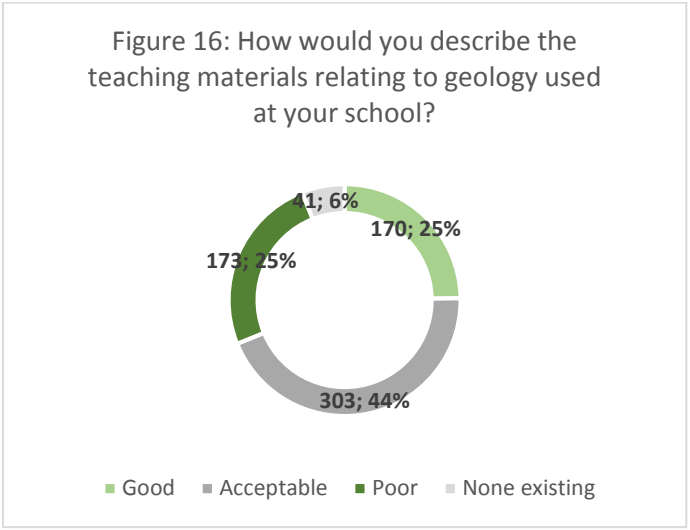
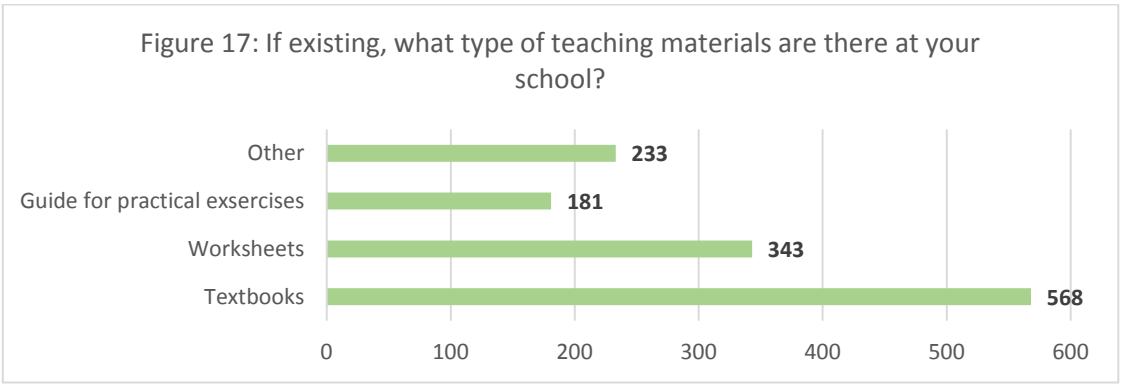
Regarding the statues of available teaching materials relating to geology used at their school, the majority of participants (44 percent) find them acceptable, 25 percent find them poor and 25 percent poor. 41 teachers (6 percent) work at a school were such teaching materials do not exist (Figure 16).

Figure 16: How would you describe the teaching materials relating to geology used at your school?



The type of teaching materials that dominates are textbooks, followed by worksheets.

Figure 17: If existing, what type of teaching materials are there at your school?



2.3.3 Gender perspectives on geology

The third part of the questionnaire was designed to explore teachers' perception of similarities and/or differences in boys and girls' participation and success in learning activities relating to geology. Four different aspects of teachers' perceptions were explored, boys and girls' interest in geology (Figure 18), active participation in teaching activities (Figure 19), test scores (Figure 20) and participation in extra activities relating to geology (Figure 21). Evident is that the predominate part of the participating teachers perceived boys and girls participation and success as equal, thereby focusing on

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sameness rather than differences. When differences are highlighted, it seems as teachers more often perceive boys to show a greater interest in geology compared to girls (Figure 18), whereas girls are perceived to score better on tests relating to geology (Figure 19). In relation to being actively involved and participating in extra activities, teachers state that boys and girls are equally involved in extra activities.

Figure 18: Which students show greater interest in geology?

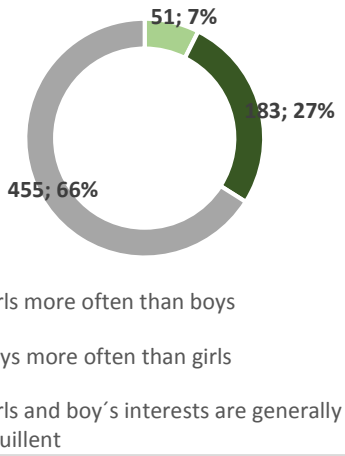


Figure 19: Which students take more active part in learning activities relating to geology?

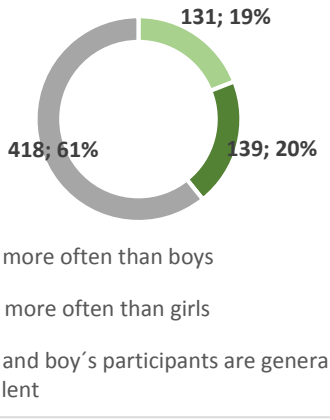


Figure 20: Which students's scores are better on tests relating to geology?

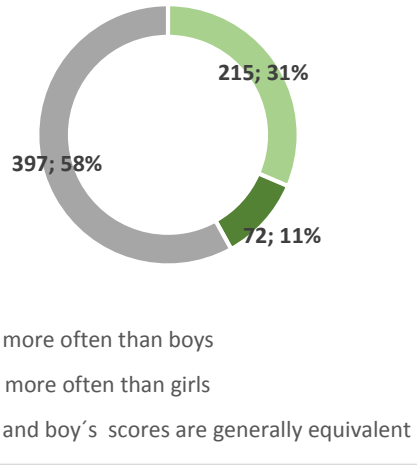
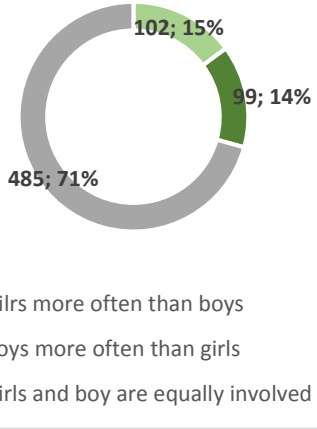


Figure 21: Which students' are involved in activities which can turn their interest of the geoscience profession?



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2.3.4 Promoting gender equality in geoscience professions

The fourth and final part of the questionnaire assessed teachers' attitudes and perception relating to the promotion of gender equality in geoscience professions. Findings show that while the predominate part of participants (78 percent) stated that they are aware of the underrepresentation of women in geoscience education and profession (Figure 22), not more than half of them (50 percent) thought of it as a problem that needs to be addressed (Figure 23).

Figure 22: Are you aware that women are underrepresented in geoscience education and profession?

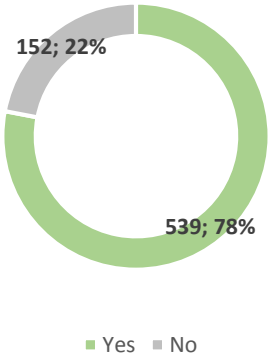
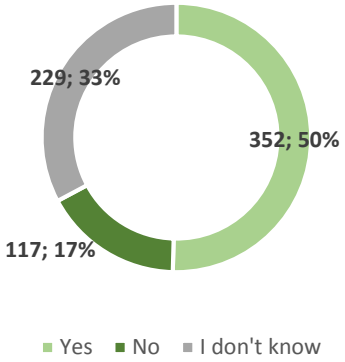


Figure 23: Do you think that the underrepresentation of women in geoscience are a problem that needs to be adressed?



Participants were also asked to state what they saw as the main barriers to increasing the representation of women in the field of geoscience (Figure 24). Evident by the result was that a few teachers perceive girls educational merits as a main barrier. Also, compared to the other four alternative that pointed more to gendered structures and norms, few teachers also saw girls (lack of) interest in geoscience as a main barrier. Instead, the two alternatives most often put forward was girls' lack of encouragement by friends and/or family, together with difficulties to combine a career in geoscience with the responsibilities and life-choses associated with women's gender role. Almost as common was to relate barriers to girls being discouraged by the numerical and symbolical domination of men and masculinity.

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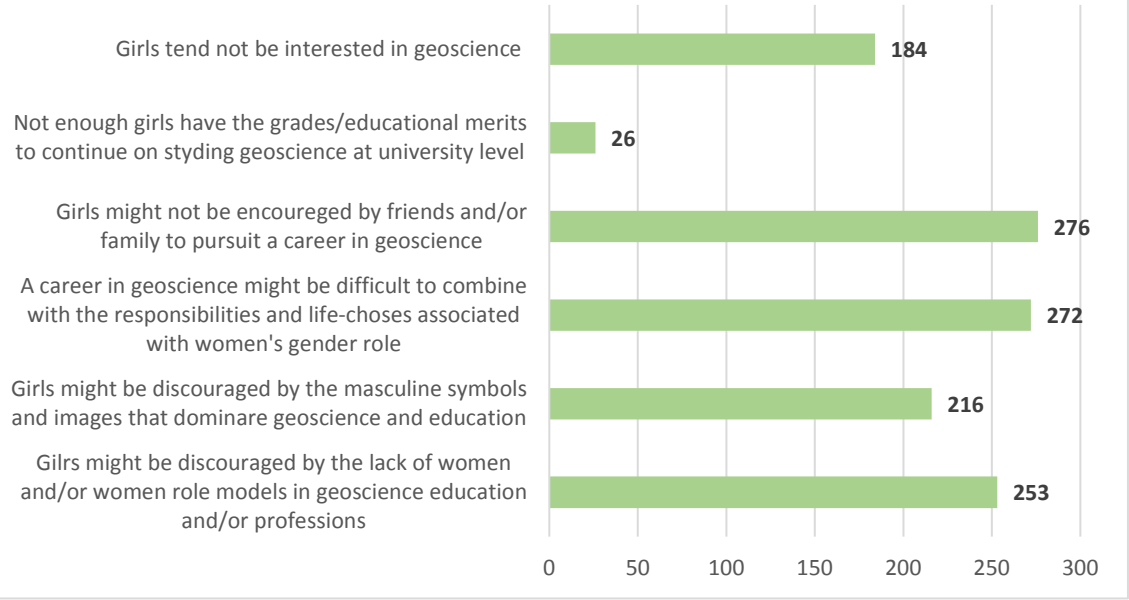
Figure 24: What do you see as the main barriers to increasing the representation of women in the field of geoscience?



2.4 REPORT ON THE DESCRIPTIONS OF GENDER EQUALITY BY FUTURE EMPLOYERS, STAKEHOLDERS AND REPRESENTATIVES OF DECISION-MAKING BODIES

The last data set included in this report is a survey of twenty examples of organisations (potential future employers, stakeholders and representatives of decision-making bodies of the geo and mining sector) of relevance for geoscientist or geo-engineering professionals. This survey, demarcated to information available on their websites, focused on if and how these organisations described and promoted issues relating to gender equality and/or diversity. The twenty organisations were identified and selected by the ENGIE's partners during May and June 2020.

The findings suggest a great variation in how organisations describe and promote gender equality on their websites. Most but not all organisation included in the study had information on gender equality or diversity on their websites, but a handful of organisation did not mention gender equality nor diversity or related concept at all. While this does not necessarily mean that the organisation do not promote gender equality in practice, it does suggest that the organisation do not actively seek to be perceived as a gender equal or "women friendly" organisation.

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Among the organisations that do describe gender equality (or diversity), about half of them did so by relating it to business success. Examples of phrases find on websites that suggest that the organisation describes gender equality as a business value:

> *'We believe that diversity and equality help to increase the operation's profitability and standing as an attractive employer. This should permeate both our working methods and our recruitment process. Equality and diversity are consequently a strategically important area.'*

> *'Diversity contributes to dynamism, creativity, and ultimately better results. [organisation] strives to have employees with different backgrounds, ages, and experiences.'*

> *'[Organisation] is building a culture of diversity and inclusion – which are the catalysts for creativity, innovation, and discovery. It is crucial to highlight that a culture in which people feel accepted, respected, included, and connected, ensures a greater effect for the company and the individuals, and a positive, successful, and encouraging work environment.'*

> *'Diversity and Inclusion Framework is not a project with an exact timeline. It's a commitment aiming to create an organizational culture where differences are regarded as values that contribute to the development of a corporate culture of respect, mutual dignity, and understanding. By integrating Diversity into our everyday operations and business practices, everyone can feel supported and involved. The creativity, perspectives and ideas of our diverse workforce will create a productive and efficient work environment, leveraging long term business value by making the organization more capable of adaptation.'*

Similar phrases are used in all four quotes. For these organisations, gender equality is articulated in terms of "diversity and inclusive" and related to the promotion of an organisational culture where diversity is seen as an asset contributing to business success.

The descriptions of organisations' that do describe gender equality but not in relation to business values is not as streamlines as does that do. Some examples:

> *'We are committed to promoting equality and diversity across our organisation as well as across all areas of our science community. As such, we aim to have a workforce with employees from all backgrounds with people who are passionate about earth science and who share our*

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commitment to work for the good of the environment and the benefit of society.'

'There is gender inequality in how the benefits as well as the adverse impacts of mining are experienced. In general, the benefits (in terms of employment and economic opportunities) tend to accrue to men whereas women bear a disproportionate burden of impacts – which in extreme cases can include violence. Mining companies have a responsibility to ensure gender equality, as it relates to both the workforce and to communities. This requires companies to actively recognise women's rights to property and resources, include women as stakeholders in land acquisition, resettlement and consultation processes, and build inclusive access to jobs and economic opportunities.'

'We are also improving all aspects of diversity, to strengthen an inclusive work environment that's based on merit, fairness and respect. In a traditionally male-dominated sector, we want to improve our gender balance by reaching a target of at least 40% female members as soon as we responsibly can. We have made further progress on that this year with an increase from 34.2% to 35.9% across the firm. We need to go further and will maintain our efforts until our target is exceeded.'

In the first quote the engagement to gender equality is not explicitly motivated but rather described as a "benefit for society". The second quote puts the promotion of gender equality in relation to their external activities, targeting the "gender inequality in how the benefits as well as the adverse impacts of mining are experienced". In the third quote, the focus is again inside the organisation and increasing the proportion of women. Gender equality is related to the creation of an "inclusive work environment that's based on merit, fairness and respect", with no explicit motivation for why gender equality should be promoted.

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3 CONCLUSIONS

The aim of the survey on the interest of secondary school students for geosciences was to identify obstacles impending young women to embark on a geoscientific career as well as to assess the status of geo-education in secondary school more generally. The survey included secondary school students and teachers. The data presented concern all respondents but analysing the data broken down by categories such as gender seem less relevant at the teachers compared to the data on students. More important, it seems, is to analyse potential correlations between different questions. For example, one interesting finding is that not more than half of the teachers perceived the underrepresentation of women to be a problem in need of addressing. How does this relate to other questions, such as the perception of barriers and boys and girls' participation and success in learning activities relating to geology? Also relevant for further exploration is the open ended question, not included in this presentation, asking the participants "what, according to you, could be done in the secondary school education to increase the representation of women and promote gender equality in geoscience and related engineering fields?" Analysing these comments have the potential to increase the qualitative understanding of how teachers perceive the problems and solutions relating to empowering girls to pursuit a career in geoscience. Very preliminary analyses of part of this data indicate that teachers highlight on one hand a general need to increase and promote geo-education in secondary school, and on the other hand the need to specifically promote women role models.

The other survey, which included future employers, stakeholders and representatives of decision-making bodies of the geo and mining sector, assessed how organisations describe gender equality. The survey only include websites, meaning that the assessment concerns organisational rhetoric's more than practice. Importantly, if and how the organisations described gender equality varied greatly. Some organisations did not mention gender equality at all, while other organisations described in length how promoting diversity related to business success. How this variation shapes the possibilities to encourage girls to study geoscience and geo-engineering is one aspect to analyse further.

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