Using Data for Improving School and Student Performance

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Lifelong Learning Programme

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Survey Data Analysis

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THE SCHOOLS NETWORK™

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1 Introduction

The EU Comenius project *Using Data for Improving School and Student Performance* aims to develop professional learning communities within schools and their skills in the use of tools that support effective data use for the improvement of educational outcomes. At least two schools from each of the project partners' countries (United Kingdom, Poland, The Netherlands, Lithuania and Germany) have been selected to participate in a pilot course to achieve this goal.

In order to determine the current status of these pilot schools, a survey has been administered to assess the types and extent of use of educational data. The survey was designed in collaboration by the data use project partners and addressed various aspects of data use in schools. Three sections with a total of 78 items were created to collect information on (1) general demographics of the respondents (i.e. teaching subjects, years of experience and level), (2) enablers and barriers of data use (e.g. data, user and organization characteristics) and (3) using data (i.e. for accountability, school development and instructional development). Between May and June 2011, the survey was distributed to the participating schools. While Poland chose a paper version of the survey, the other four countries collected responses from their schools online. In total, 398 teachers from all five countries completed the survey.

The objective of this report is to analyze the survey for trends and patterns, as well as for particular areas of need. The results of the analysis will go into finalizing the course curriculum as well as the training and support of the PLC's data coaches.

2 Methodology

After receiving and cleansing of the data, *Datasets and Displays* (see Appendix III) were created and distributed to all project partners. The intention was to roughly compare the results from all countries and to scan them for trends and patterns to determine the following steps. As this comparison showed great differences across all countries with regards to contents as well as sample sizes, the project partners agreed on focusing the further analysis on country level.

The first step in the statistical analysis was to test for *normal distribution*. All items were tested negative with a high significance (0.01) with no statistical outliers. We chose the following calculations according to this finding. The next step was to look at the *scale usage* in all countries (see Table 1).

Survey item	Category	Scale usage				
		GBR	POL	NED	LTU	GER
01-45	4-point scale	31.33%	29.28%	40.81%	27.70%	53.87%
46-78	6-point scale	38.10%	75.78%	41.30%	61.56%	33.17%
01-05	Data Accessibility	21.03%	12.00%	34.86%	10.56%	21.68%
06-12	Data Quality	9.95%	6.67%	19.16%	8.74%	33.93%
13-17	User Attitudes	18.47%	13.43%	18.53%	11.35%	42.93%
18-22	User Skills	3.74%	3.36%	6.41%	4.90%	25.87%
23-28	School Leadership	7.02%	7.44%	8.42%	9.92%	13.35%
29-34c	School Cooperation	13.93%	16.96%	21.23%	11.56%	34.41%

Survey item	Category	Scale usage				
		GBR	POL	NED	LTU	GER
35-40	School Vision and Norms	9.39%	4.63%	10.42%	3.22%	31.03%
41-45	School Training and Support	23.63%	20.60%	29.70%	20.32%	24.73%
46-56	Using Data for Accountability	26.16%	12.94%	18.06%	7.79%	43.12%
57-65	Using Data for School Development	13.56%	7.02%	18.72%	7.29%	33.74%
66-78	Using Data for Instructional Development	38.10%	75.78%	41.30%	61.56%	33.17%

Table 1: Scale usage for all scales and categories in all countries

This proved to be very insightful. We decided to not only calculate the usage for the two scales used in the survey[1], but also for the categories given by the survey layout (i.e. all eleven sub-sections within the survey sections “enablers and barriers of data use” and “data use”). All countries showed a varying usage across those different categories which led to the assumption that the items to be analysed could be condensed to those categories.

To test whether these categories could indeed be transformed into eleven new variables, we had to test their *reliability*. The distributive parameters for the items belonging to a scale were heterogeneous allowing the use and interpretation of *Cronbachs-α* as a measurement for reliability. The analysis of variance revealed that a regression holds explanatory power as well,

[1] For survey items 01-65 a 4-point scale was used: 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree). For survey items 66-78 a 6-point scale was used: 1 = several times a week, 2 = weekly, 3 = monthly, 4= several times per year, 5 = yearly, 6 = rarely or never).

making variances predictable if the data of one scale are identified. The results in Table 2 show that Cronbachs-α was high throughout suggesting that the selected survey items coherently measure the latent constructs.

Survey item	Latent construct assumed	Number of indicator variables	Cronbachs-α for reliability
01-05	Data Accessibility	5 manifest / observable	0.87
06-12	Data Quality	7 manifest / observable	0.85
13-17	User Attitudes	5 manifest / observable	0.89
18-22	User Skills	5 manifest / observable	0.85
23-28	School Leadership	6 manifest / observable	0.91
29-34c	School Cooperation	10 manifest / observable	0.86
35-40	School Vision and Norms	6 manifest / observable	0.89
41-45	School Training and Support	5 manifest / observable	0.84
46-56	Using Data for Accountability	11 manifest / observable	0.87
57-65	Using Data for School Development	9 manifest / observable	0.93
66-78	Using Data for Instructional Development	12 manifest / observable	0.92

Table 2: Reliability test results for survey categories

In the next step we intended a *bivariate approach* to analyze correlations for the categories taking each country as an independent variable, or in the next step as a factor. The great majority of the scale parameters created (i.e. the categories) correlated significantly positive

making for 2^{11} correlations for each country to analyze. All scale parameters seem to be interdependent: If one of these scales score low, the others will be low as well. Nevertheless, in-between group tests within a *regression analysis* (see Appendix I) revealed that there was a significant difference between countries. While results within groups were rather homogeneous, results for in-between groups indicated that there are manifest differences between countries. For a deeper analysis of variance a *Bonferroni post hoc testing* for multiple group comparison was conducted to see which countries differ in particular and on which dimension (see Appendix II). The chart supplies abundant information ready for analysis. We decided that a further reduction of dimension was necessary to efficiently analyze and display these information.

SPSS Statistics as well as *AMOS* (an additional module for structural equation modeling) certainly supply various statistical procedures. For comparing the five countries to each other we decided for an optimum combination of simplicity and fit which is graphically conveyable. To meet all these needs, a *multivariate approach*, i.e. an *exploratory factor analysis* by specification search seemed most reasonable.

As stated above, due to the significant correlations between all categories, the basic model consists of 2^{11} variables. Since AMOS is limited to a calculation of 30 covariables, analyses needed to be conducted stepwise in any case. Storing calculations for a large number of models can affect the performance and consequently alter the results, though. Therefore we had only the best 10 models computed, which still makes for 110 (i.e. 10*11) models that AMOS calculated for every country to find the best 10 analogons to our data.

To further reduce complexity, a stepwise search was used, which works with the priority to reduce discrepancy between parameters. While calculating, a new model will only be included if it has a smaller discrepancy than any previously encountered model. This procedure of

backward and forward calculation wears on until no further explanatory improvement for the model is detectable. The scree-plot in Figure 1 gives an impression of the procedure.

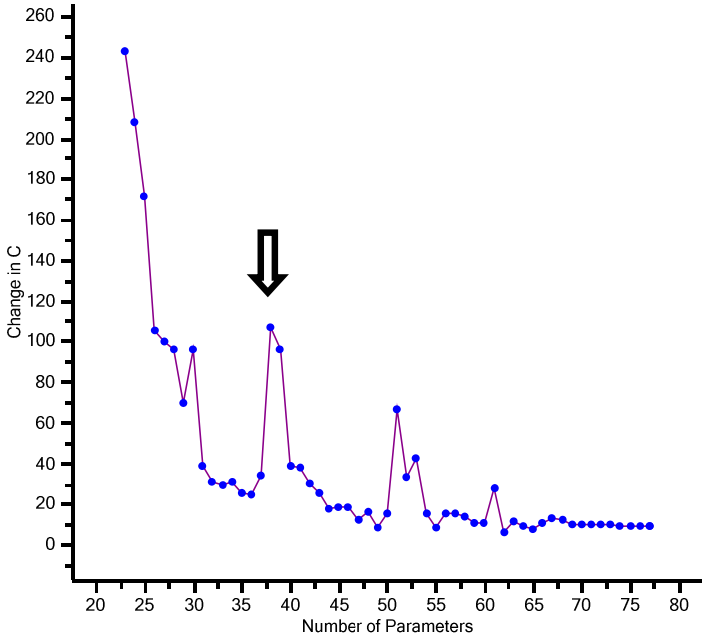


Figure 1: Scree-plot for all countries

As we move along the x-axis and add more parameters to the models, the explanatory power of those models increases. The increment is not always smooth, though; it depends on the parameters. If the responses in a country are very homogenous (e.g. in the case of Lithuania), the scree-plot takes a logarithmic shape, if responses of a sample are rather heterogeneous,

the scree-plot will show peaks and lows like the one above. The Scree-plot shows the differences in C^2 for brevity when adding a parameter to the model. For example, the best 38 parameter model from the calculation across all countries and categories which is marked with the arrow has a smaller discrepancy C than the best 39 parameter model. Including 38 parameters for explanation provides a substantial reduction in discrepancy. Adding parameters beyond 38 provides only slighter reductions.

So, to decide on a statistical model which displays the structure of all countries best, one would choose the 38 parameter model as it gives the right balance between including a graspable number of significant parameters (i.e. those that define the correlations between categories) and depicting a meaningful shift in explanatory power.

[2] C is a commonly used and well validated fit measure on which many further measures for fitting a model depend. Since our aim is to compare models and watch out for complexity of interpretation all calculations are done with C.

3 Results

The first analysis of the 398 teachers' responses shows noteworthy differences across all countries, especially between two groups: Schools in Poland, Lithuania and the United Kingdom take the lead in the practice of data use while the schools from The Netherlands and Germany show less activities in many categories (see Appendix III).

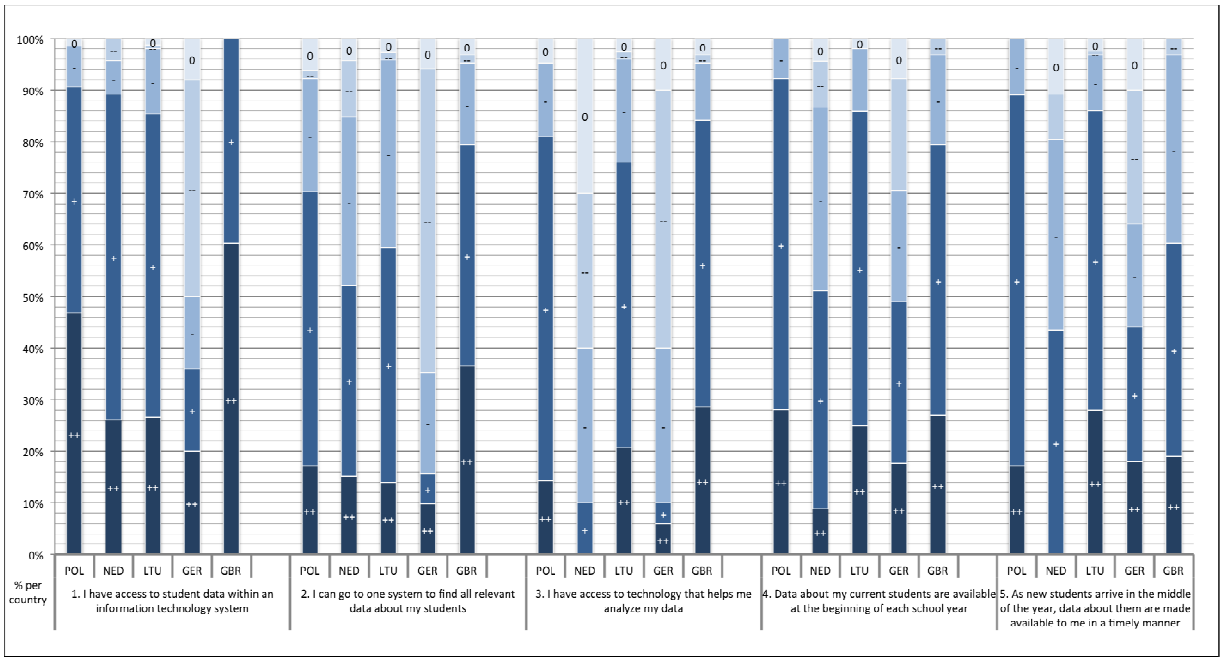


Figure 2: Data Accesibility in all countries

Figure 2 gives a good impression of this phenomenon. In the United Kingdom, Poland and Lithuania, the access to data is very high, supposing that the teachers answered in a consistent way. In the case of The Netherlands, the availability of student-specific data is high, but not the technology etc. Germany scored low on questions regarding data accessibility throughout.

Despite the latent gap between the two country groups, key questions for the DATAUSE project were answered considerably positive by all countries (i.e. more than 50 per cent answered with "strongly agree" or "agree"). For example, in the user attitudes section of the survey the majority of the respondents (strongly) agree that *it is important to use data to diagnose individual student learning needs* and that *data can offer information about students that was not already known*. Moreover, more than half of the respondents stated that their *principal or assistant principal(s) encourage data use as a way to support effective teaching*. And finally, the cooperation level seems also promising: Most *would like to collaborate more with other educators about using data*, their school *effectively communicates school improvement goals* to them and *share and discuss student performance data with students, parents and other teachers*.

When we take a look at the model that was found in the factor analysis across all countries (see Figure 3) we find even more leads to the potential of the DATAUSE project.

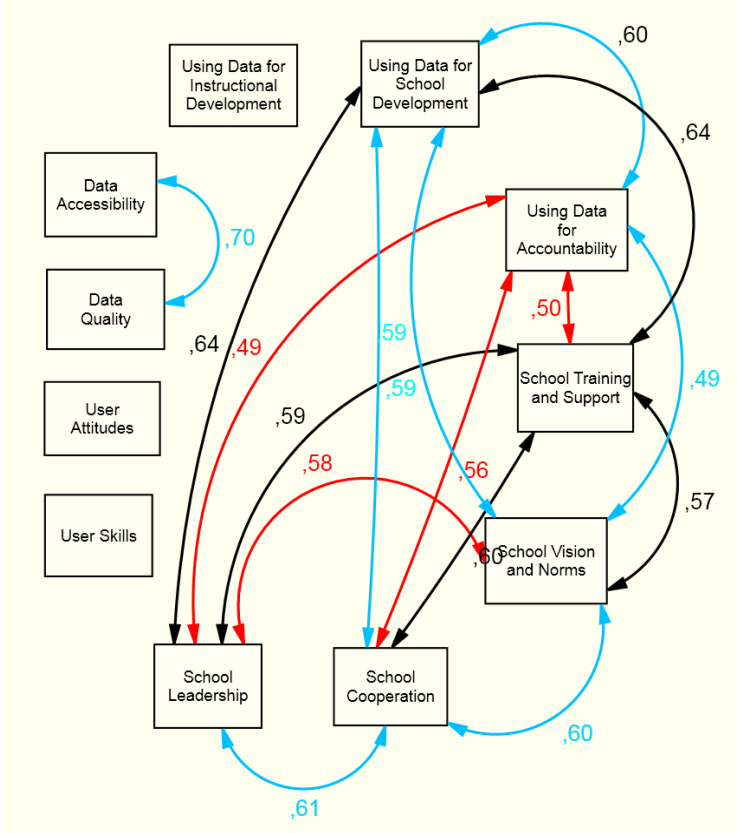


Figure 3: Cross-country model with category correlations[3]

[3] Colors in these models were used to make the assignment of arrows and correlation values clearer.

The model was chosen for its simplicity and fit (see p. 10) and thus displays a number of correlations between categories with high explanatory power. So, when we look at this model which describes the data of all countries we see, for example, that **Data Accessibility** and **Data Quality** have a very high correlation of 0.7. Since we know that all scales are reliable (see Table 2) and correlation between scales is high we can say that data accessibility and data quality significantly change together. What is more interesting than the individual correlations though is that certain categories are linked to others very often and others aren't linked in this model at all. **School leardership**, for example is linked to five other categories with high correlation values. Also, most of these categories are interlinked with each other. This means that these categories have the most influence on each other and thus on aspects of data use in all countries. The categories that are not linked at all in this model are **User Skills**, **User Attitudes** and **Using Data for Instructional Development**, which at first sight seems problematic since these are the key elements to the goals of the DATAUSE project:

"This project aims to develop the skills of school professional learning communities in their use of tools that support effective data use. We intend that this approach will drive decision making processes that will contribute towards improvement in educational outcomes."

But from the statistical analysis we know that everything is in fact correlated – just not significantly enough to be included in this model of best fit. The model proves that our aim to enable the PLCs in our countries to advance their skills to use data for instructional development is indeed targeting a gap in the current status of data use in this cross-country sample. To determine whether the pilot course was successful in changing the culture of data use overall, one way would be to check whether these categories became part of the future model of best fit.

3.1 United Kingdom

In the United Kingdom, 63 teachers participated in the survey – 33 from *Capital City Academy London* and 30 from *Harrop Fold School Manchester*. 31.7 per cent of the respondents teach in the lower secondary, 68.3 per cent in the upper secondary. On average they have 10.81 years of teaching experience. The most common subject among the teachers in the sample are *social sciences*, followed by *science*, *art-music-culture* and *language* (see Figure 4).

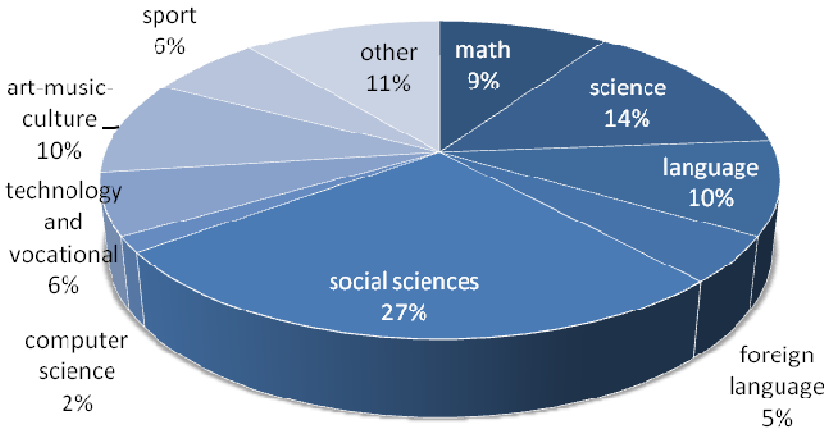


Figure 4: Distribution of subjects in the schools in United Kingdom

The mean values for all categories confirm the impression from the study of the datasets and displays. Overall, the English respondents gave rather positive ratings in each of the categories (see Table 3). **User Attitudes** and **School Leadership** received the best ratings with a mean of 1.5. The area which seems to be lacking most is **School Training and Support** with a mean of 2.2. Also, **Data Quality** and **School Vision and Norms** have potential for improvement with a

mean of 2.0. The frequency of **Using Data for Instructional Development** settles between *monthly* and *several times* a year with a mean of 3.5.

Survey item	Category	Mean	Standard deviation
01-05	Data Accessibility	1.851	0.49786
06-12	Data Quality	2.047	0.48064
13-17	User Attitudes	1.554	0.42030
18-22	User Skills	1.807	0.51319
23-28	School Leadership	1.558	0.43540
29-34c	School Cooperation	1.881	0.43205
35-40	School Vision and Norms	2.012	0.47850
41-45	School Training and Support	2.230	0.46904
46-56	Using Data for Accountability	1.987	0.45038
57-65	Using Data for School Development	1.839	0.46757
66-78	Using Data for Instructional Development	3.515	0.72430

Table 3: Mean values for all categories in the United Kingdom

The model that was chosen to describe the English data is model 10. Its location in the scree-plot is marked with an arrow in Figure 5.

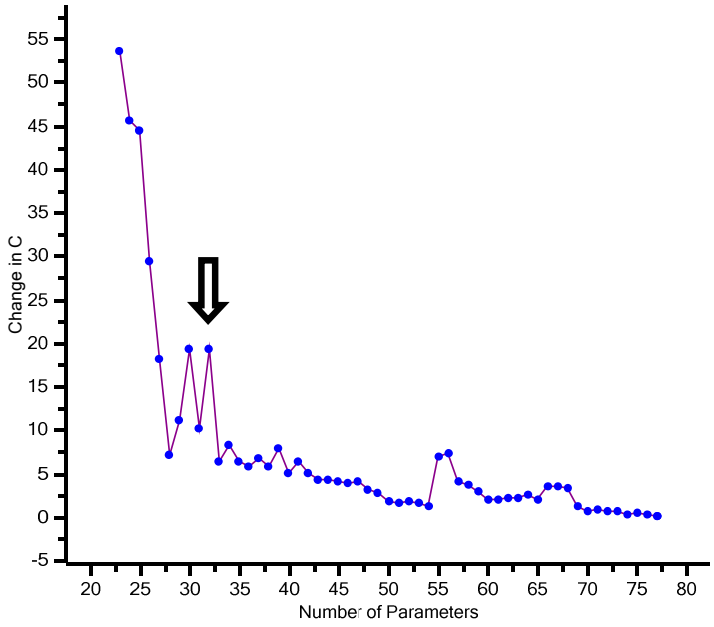


Figure 5: Scree-plot for the United Kingdom

Note that this scree-plot has much less irregularities than the cross-country scree-plot – a consequence of the respondents' overall trend towards homogeneously positive answers. Another consequence of such a response pattern is that the correlations between categories in this model are fairly strong (see Figure 6).

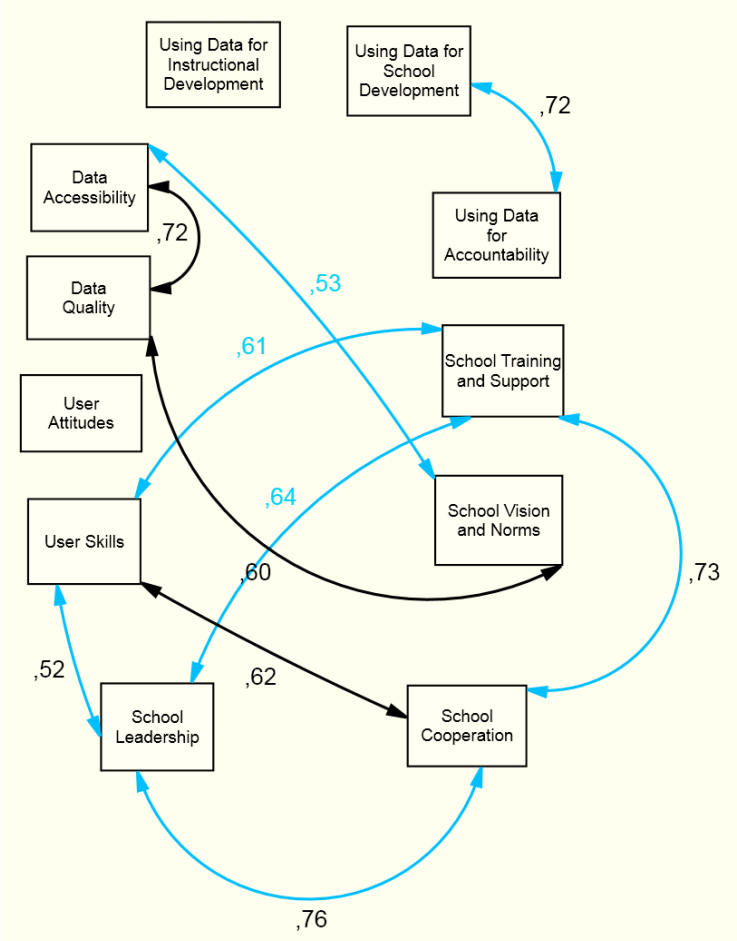


Figure 6: English model with category correlations

Two of those categories that received comparatively low ratings with regard to the overall very high mean valus in the English sample are included in the model and they are linked with each other: **Data Quality** and **School Vision and Norms** have a correlation of 0.6. It is likely that if the PLC were able to push forward clear visions and norms for their schools in terms of data use, the quality of their data might improve.

School Training and Support which ranked lowest is linked to a number of categories: **School Cooperation** with a correlation of 0.73, **School Leadership** with a correlation of 0.64 and **User Skills** with a correlation of 0.61. In turn, **User Skills** correlates with **School Cooperation** (0.62) and **School Leadership** (0.52) as well. All these categories ranked very well with mean values from 1.5 to 1.8 which suggests that **School Training and Support** is an area of particular need as it shows a definite lag despite the correlations with these well established categories.

Additionally, as was mentioned in the discussion of the cross-country model, the focus should also be directed towards those categories that do not correlate with any others in the model. In this case, these are **User Attitudes** and **Using Data for Instructional Development**.

3.2 Poland

In Poland, 64 teachers participated in the survey – 34 *from Gimnazjum nr 26 im Mikolaja Reja w Lodz*i and 30 from *Publiczne Gimnazjum w Wisniowej Górze*. All of them teach in the lower secondary. On average they have 14.27 years of teaching experience. The most common subject among the teachers in the sample are *foreign languages, followed by social sciences* and *science* (see Figure 7).

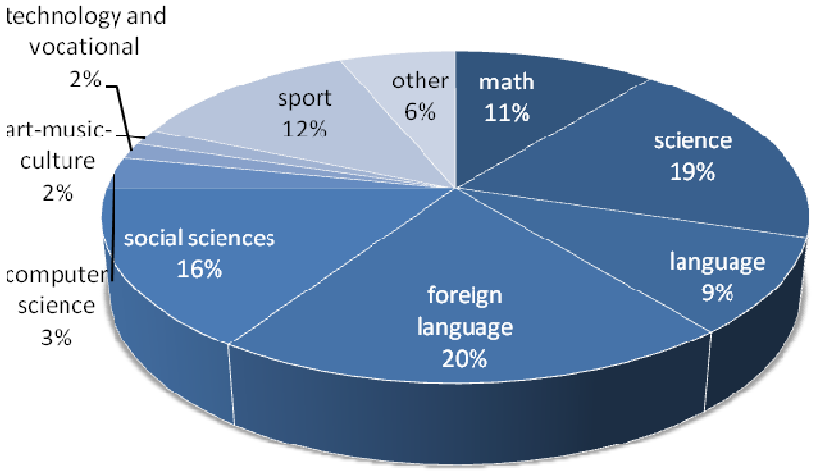


Figure 7: Distribution of subjects in the schools in Poland

The mean values for all categories confirm the impression from the study of the datasets and displays. Overall, the Polish respondents gave good ratings in each of the categories (see Table 4). **School Leadership**, **User Attitudes**, **Using Data for School Development** and **Using Data for Accountability** received the best ratings with a mean of 1.7. Also, one of the key categories

User Skills is rated very well with a mean value of 1.8. The areas with the lowest rating are **School Cooperation** with a mean of 2.0 and **School Training and Support** with a mean of 2.2. The frequency of **Using Data for Instructional Development** settles between *monthly* and *several times* a year with a mean of 3.5.

Survey item	Category	Mean	Standard deviation
01-05	Data Accessibility	1.874	0.45613
06-12	Data Quality	1.945	0.39332
13-17	User Attitudes	1.719	0.4853
18-22	User Skills	1.847	0.44752
23-28	School Leadership	1.704	0.43630
29-34c	School Cooperation	2.029	0.39185
35-40	School Vision and Norms	1.926	0.36908
41-45	School Training and Support	2.243	0.52690
46-56	Using Data for Accountability	1.794	0.34490
57-65	Using Data for School Development	1.737	0.41295
66-78	Using Data for Instructional Development	3.571	0.91577

Table 4: Mean values for all categories in Poland

The model that was chosen to describe the Polish data is model 9. Its location in the scree-plot is marked with an arrow in Figure 8.

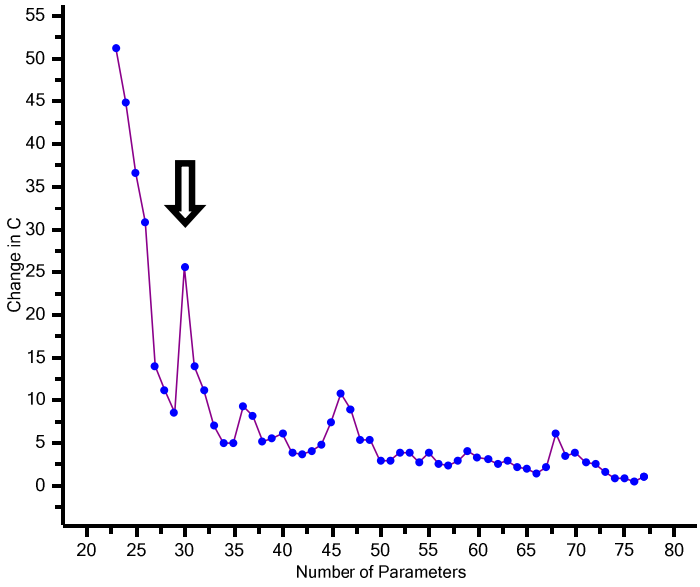


Figure 8: Scree-plot for Poland

This scree-plot also has less irregularities than the cross-country scree-plot and takes a rather logarithmic shape – a consequence of the respondents' overall trend towards homogeneously positive answers. Another consequence of this response pattern is that the correlations between categories in this model are fairly strong (see Figure 9).

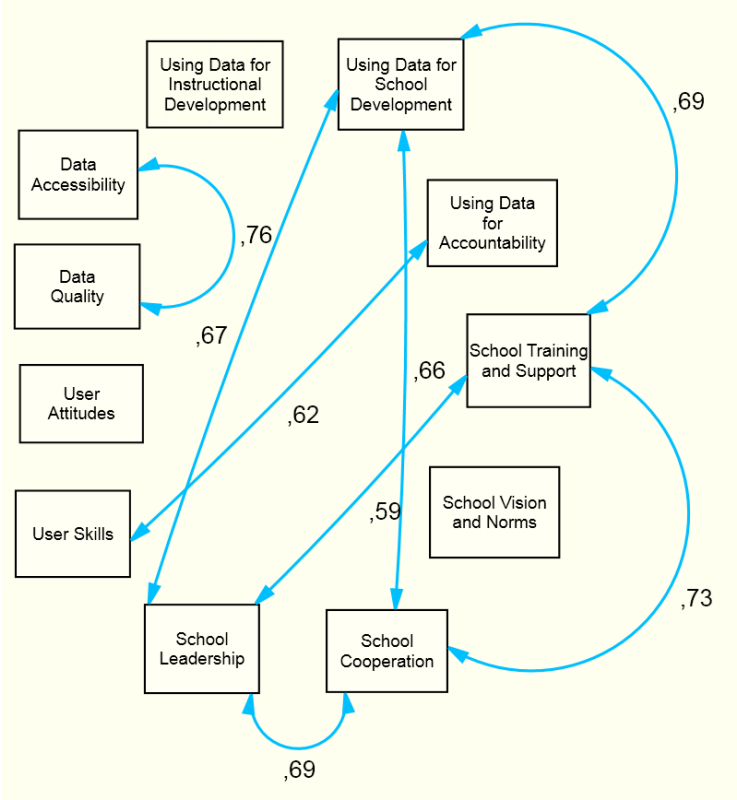


Figure 9: Polish model with category correlations

The two categories that received comparatively low ratings with regard to the overall very high mean values in the Polish sample are included in the model and they are strongly linked with each other: **School Cooperation** and **School Training and Support** have a correlation of 0.73. They are both also linked with **School Leadership** – the category with the best mean value –

School Cooperation with a correlation of 0.69 and **School Training and Support** with a correlation of 0.59. Since all of these categories change together, it might prove to be a challenge to raise the ratings in **School Cooperation** and **School Training and Support**. The key might lie in the correlations with **Using Data for School Development** – another category with a very good rating – which strongly correlates with both **School Training and Support** (0.69) and **School Cooperation** (0.66). If **School Leadership** and **Using Data for School Development** both changed in a way that works towards focusing issues of cooperation, improvements might be possible.

At this stage, three categories are not linked in the model at all: **User Attitudes**, **School Vision and Norms** and **Using Data for Instructional Improvement**. Establishing a stronger correlation that would appear in a model between the very well rated **User Skills** (mean value: 1.8) and **Using Data for Instructional Improvement** should be an especial goal for the work with the PLCs during the pilot course.

3.3 The Netherlands

In the Netherlands, 46 teachers participated in the survey – 22 from *Bonhoeffer College* and 24 from *Twents Carmel College*. Half of the respondents teach in the lower secondary, the other half in the upper secondary. On average they have 17.89 years of teaching experience. The most common subject among the teachers in the sample are *foreign languages, followed by social sciences* and *science* (see Figure 10).

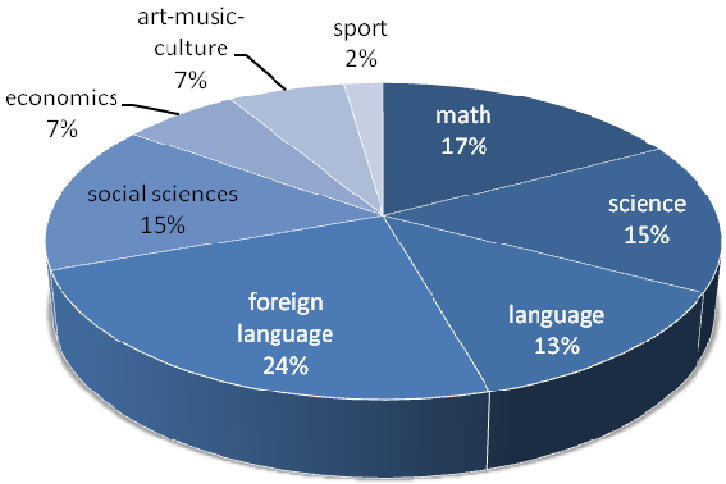


Figure 10: Distribution of subjects in the schools in the Netherlands

The mean values for all categories reflect the impression from the study of the datasets and displays. Overall, the Dutch respondents gave only mediocre ratings in each of the categories (see Table 5). None of the categories reach a mean value above 2.0. The areas which ranked highest are **User Attitudes** with 2.0 as well as **User Skills** and **Using Data for Accountability** with

2.1. The categories with the lowest ratings are **School Vision and Norms** and **School Training and Support** with a mean value of 2.8 and **Using Data for School Development** with a mean of 2.6. The frequency of **Using Data for Instructional Development** settles between *several times a year* and *yearly* with a mean of 4.6.

Survey item	Category	Mean	Standard deviation
01-05	Data Accessibility	2.583	0.52039
06-12	Data Quality	2.565	0.37550
13-17	User Attitudes	2.062	0.61589
18-22	User Skills	2.156	0.52343
23-28	School Leadership	2.514	0.57725
29-34c	School Cooperation	2.377	0.29577
35-40	School Vision and Norms	2.839	0.42552
41-45	School Training and Support	2.848	0.39926
46-56	Using Data for Accountability	2.136	0.27324
57-65	Using Data for School Development	2.644	0.49157
66-78	Using Data for Instructional Development	4.612	0.85378

Table 5: Mean values for all categories in the Netherlands

The model that was chosen to describe the Dutch data is model 8. Its location in the scree-plot is marked with an arrow in Figure 11.

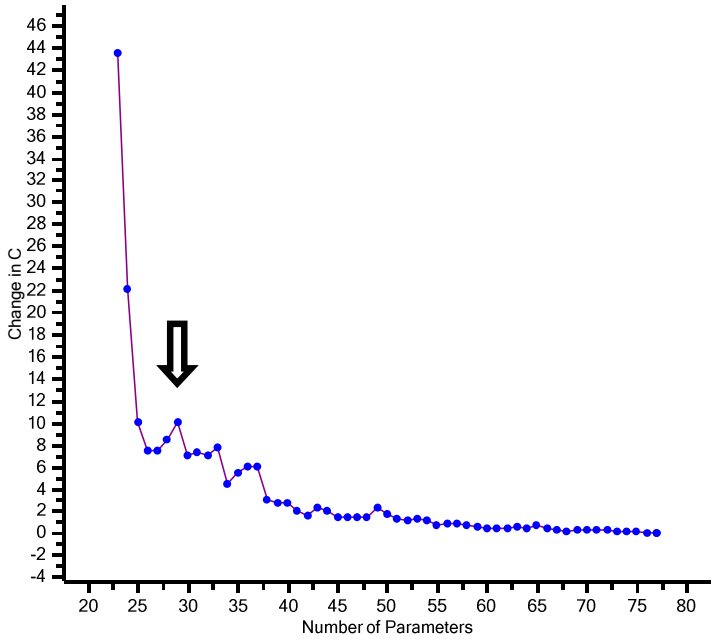


Figure 11: Scree-plot for the Netherlands

This scree-plot also has very little irregularities compared to the cross-country scree-plot and takes an almost logarithmic shape – a consequence of the Dutch respondents' trend towards homogeneous answers accross all categories. As a consequence to this response pattern the correlations between categories in this model are quite strong (see Figure 12).

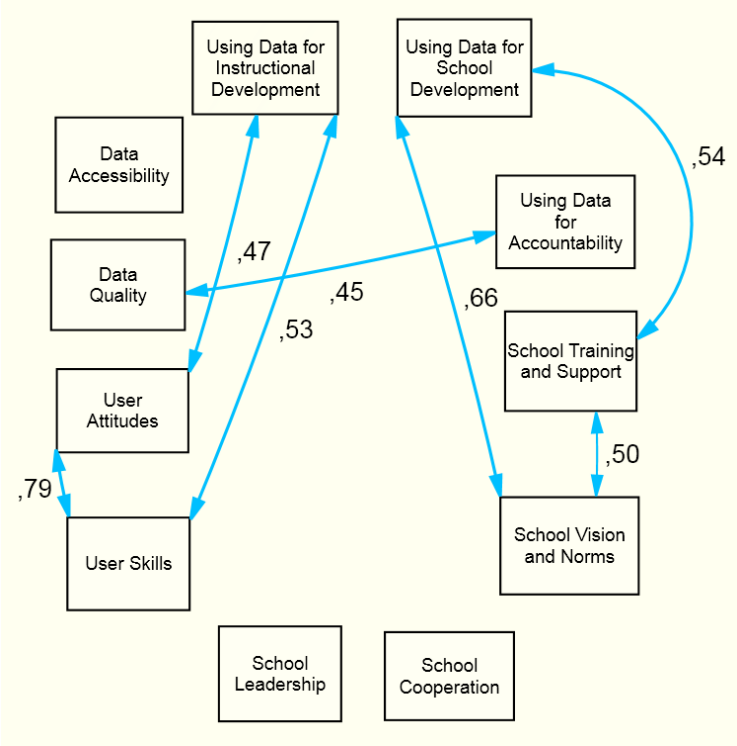


Figure 12: Dutch model with category correlations

The two categories that correlate the strongest are also those that received the highest ratings from the Dutch respondents**: User Attitudes** and **User Skills** correlate with a factor of 0.79. They are also linked with a rather weak category: **Using Data for Instructional Development**. **User Attitudes** correlates with 0.47, **User Skills** with 0.53. If the DATAUSE course pilot was to improve both **User Attitudes** and **User Skills** which already show a good tendency, the result might be a positive change in **Using Data for Instructional Development**.

The categories which received the lowest ratings are all connected to each other in a circular way with solid correlation values above 0.5. **School Vision and Norms** correlate with **School Training and Support** (0.5) which correlates with **Using Data for School Development** (0.54) which again correlates with **School Vision and Norms** (0.66). Right now, none of these categories have any other correlations with another category in this model. This might change as other categories grow stronger during the pilot course. But at this stage, to bring about change in these areas, the Dutch PLCs would have to establish action plans on school-level.

Finally, there are three categories which are not linked at all in this model and thus do not play a role in changing data use in Dutch schools, yet: **Data Accessibility**, **School Leadership** and **School Cooperation**. In the discussion of datasets and displays, we learned that only 14 per cent of the Dutch respondents "have access to technology that helps [them] analyze [their] data". This is definitely an area to improve. Improving the status of **School Leadership** and **School Cooperation** more might also result in advancements in the before mentioned areas of need as these strongly correlate in the cross-country model, for example.

3.4 Lithuania

In Lithuania, 173 teachers participated in the survey – 64 from *Vilniaus Gerosios Vilties vidurine mokykla*. 49 from *Vilniaus Antano Vienuolio pagrindine mokykla*, 15 from *Utenos Krašuonos pagrindine mokykla*, 14 from *Kauno Kovo 11-osios vidurine mokykla* and 31 from *Kupiškio Lauryno Stuokos-Guceviciaus gimnazija*. 28.9 per cent of the respondents teach in the lower secondary, 71.1 per cent in the upper secondary. On average they have 19.77 years of teaching experience. The most common subject among the teachers are *foreign languages*, followed by *science*, l*anguage* and *math* (see Figure 13).

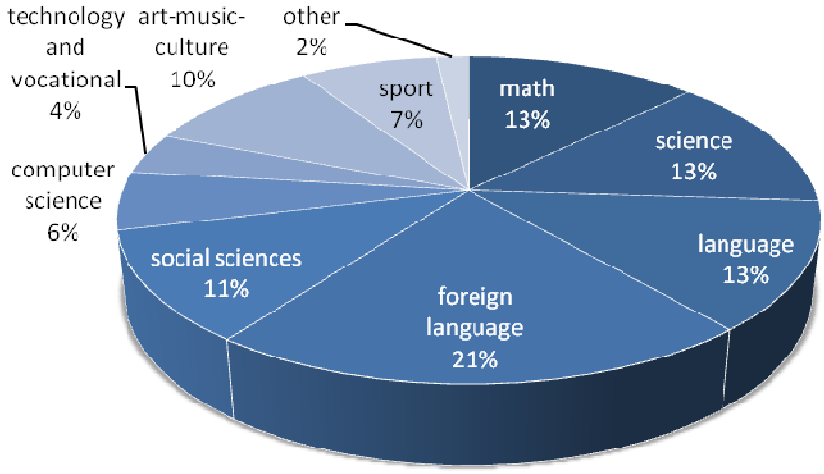


Figure 13: Distribution of subjects in the schools ins Lithuania

The mean values for all categories follow the first impression from the study of the datasets and displays. Overall, the Lithuanian respondents gave good ratings in each of the categories

(see Table 6). The areas which ranked highest are **User Attitudes** with a mean value of 1.6 and **School Leadership** with a mean value of 1.7. **User Skills**, Using Data for School Development and School Cooperation are ranked high with a mean of 1.8. School Training and Support is ranked lowest with a mean value of 2.2 followed by School Vision and Norms wit a mean of 2.0. The frequency of **Using Data for Instructional Development** settles between *monthly* and *several times a year* with a mean of 3.6.

Survey item	Category	Mean	Standard deviation
01-05	Data Accessibility	1.976	0.53000
06-12	Data Quality	1.929	0.36360
13-17	User Attitudes	1.699	0.42990
18-22	User Skills	1.819	0.44588
23-28	School Leadership	1.768	0.46648
29-34c	School Cooperation	1.883	0.36507
35-40	School Vision and Norms	2.025	0.51760
41-45	School Training and Support	2.240	0.53204
46-56	Using Data for Accountability	1.936	0.35779
57-65	Using Data for School Development	1.856	0.40865
66-78	Using Data for Instructional Development	3.665	0.87214

Table 6: Mean values for all categories in Lithuania

The model that was chosen to describe the Lithuanian data is model 8. Its location in the scree-plot is marked with an arrow in Figure 14.

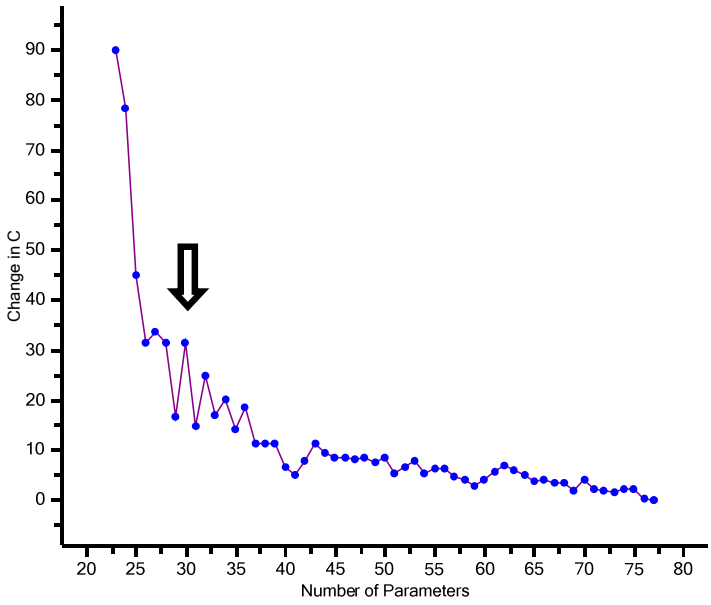


Figure 14: Scree-plot for Lithuania

This scree-plot also has less irregularities compared to the cross-country scree-plot, but only towards the end of the x-achsis – a consequence of the Lithuanian respondents' trend towards rather positve answers accross all categories, but not as homogeneous as in other countries. As a consequence to this response pattern, the correlations between categories in this model are strong, but not as strong as in previous country models (see Figure 15).

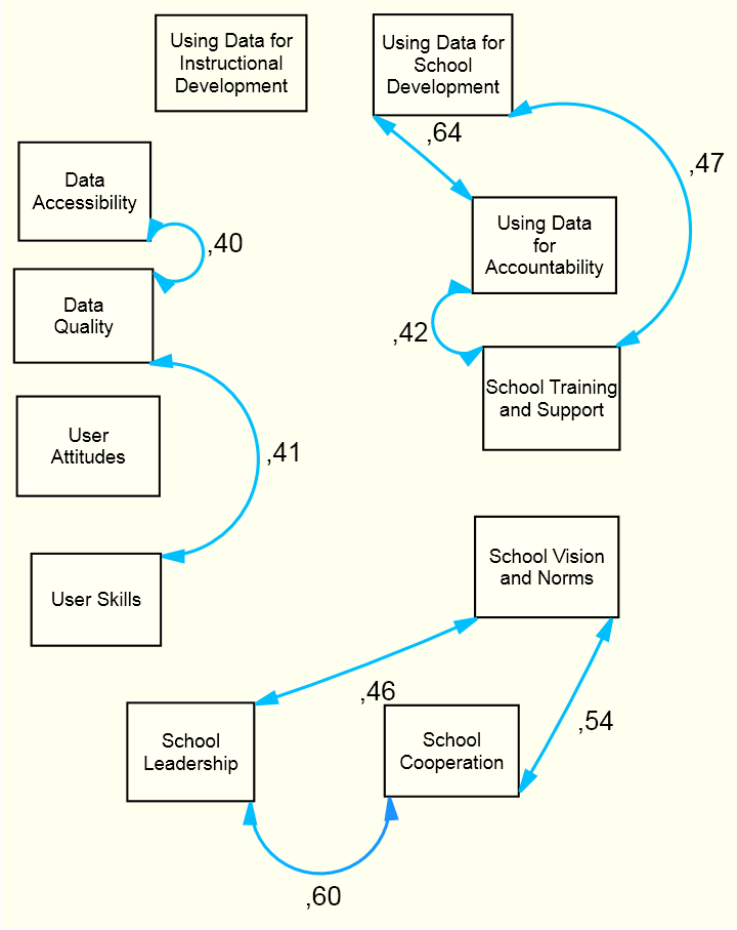


Figure 15: Lithuanian model with category correlations

The first observation that can be made for this model is that categories are not as interlinked as in the two other countries with a similar response pattern – the United Kingdom and Poland. But there still are some interesting correlations.

Two of the best rated categories – **School Leadership** and **School Cooperation** – correlate relatively strongly in this model with a value of 0.6. They also both correlate with **School Vision and Norms** – **School Leadership** with a value of 0.46 and **School Cooperation** with a value of 0.54 – which is one of categories with the lowest rating. It appears that to improve **School Vision and Norms** significant changes have to occur in **School Leadership** and **School Cooperation**. The lowest rated category **School Training and Support** correlates with the well rated **Using Data for School Development** (0.47) as well as with **Using Data for Accountability** (0.42) which in turn correlate strongly with each other (0.64). From the state-of-the-art research that preceded this survey we have learned that **Using Data for Accountability** plays a big role in Lithuania and thus the correlation with **Using Data for School Development** is a logical consequence. To advance in this area even more, the Lithuanian PLCs should focus on the area of **School Training and Support**.

Finally, two categories are not linked in this model and thus should be in the focus of the PLCs' work: **User Attitudes** which received the best rating among all categories in Lithuania and **Using Data for Instructional Development** which is one of the key categories to the DATAUSE project. The lack of correlations with **User Attitudes** seems quite unintelligible, but it shows that well developed motivations of teachers are not sufficient to bring about change in other categories in this Lithuanian model.

3.5 Germany

In Germany, 52 teachers participated in the survey – 22 from *Oberschule Helgolander Strasse* and 30 from *Walter-Gropius-Schule*. 23.1 per cent of the respondents teach in the lower secondary, 76.9 per cent in the upper secondary. On average they have 15.88 years of teaching experience. The most common subject among the teachers are *foreign languages* and *science*, followed by *language* and *math* (see Figure 16).

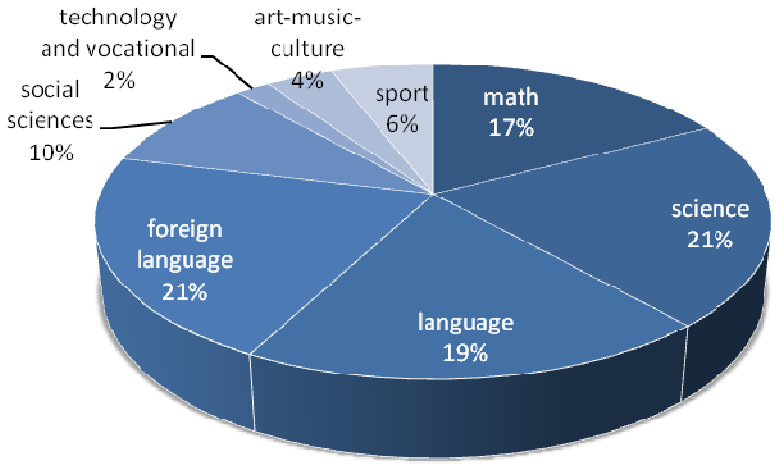


Figure 16: Distribution of subjects in the schools in Germany

The mean values for all categories confirm the first impression from the study of the datasets and displays. Overall, the German respondents gave rather mediocre ratings in each of the categories, except for two outliers (see Table 7). The category which ranked highest is **User Attitudes** with a mean value of 1.6. The next best mean values are 2.2 for **User Skills** and 2.3 for **School Cooperation**. The category which ranked lowest is **School Training and Support** with a

mean value of 3.3. Two more categories with particular need are **Data Accessibility** with a mean of 2.9 and **Using Data for School Development** with a mean of 2.7. The frequency of **Using Data for Instructional Development** settles between *several times a year* and *yearly*, leaning towards the former with a mean value of 4.1.

Survey item	Category	Mean	Standard deviation
01-05	Data Accessibility	2.941	0.84779
06-12	Data Quality	2.638	0.65386
13-17	User Attitudes	1.690	0.60792
18-22	User Skills	2.277	0.62219
23-28	School Leadership	2.571	0.75879
29-34c	School Cooperation	2.365	0.54747
35-40	School Vision and Norms	2.795	0.58854
41-45	School Training and Support	3.300	0.63865
46-56	Using Data for Accountability	2.394	0.58908
57-65	Using Data for School Development	2.732	0.63394
66-78	Using Data for Instructional Development	4.141	1.06463

Table 7: Mean values for all categories in Germany

The model that was chosen to describe the German data is model 9. Its location in the scree-plot is marked with an arrow in Figure 17.

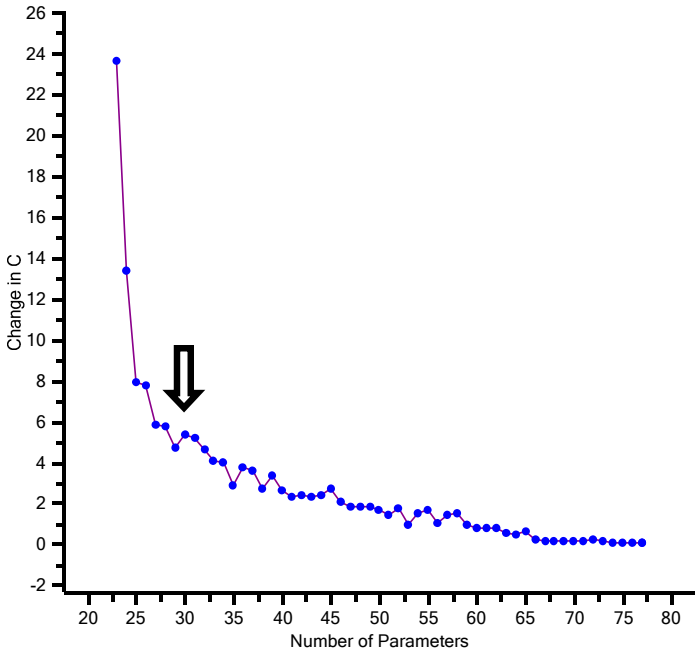


Figure 17: Scree-plot for Germany

This scree-plot has less irregularities than the cross-country scree-plot, but it does not shape into a logarithmic form as for some of the previous countries – a consequence of the German respondents' trend towards average answers accross all categories, but with some outliers. As a consequence to this pattern, the correlations between categories in this model are not as strong as in previous country models, but they are still significant for this particular model (see Figure 18).

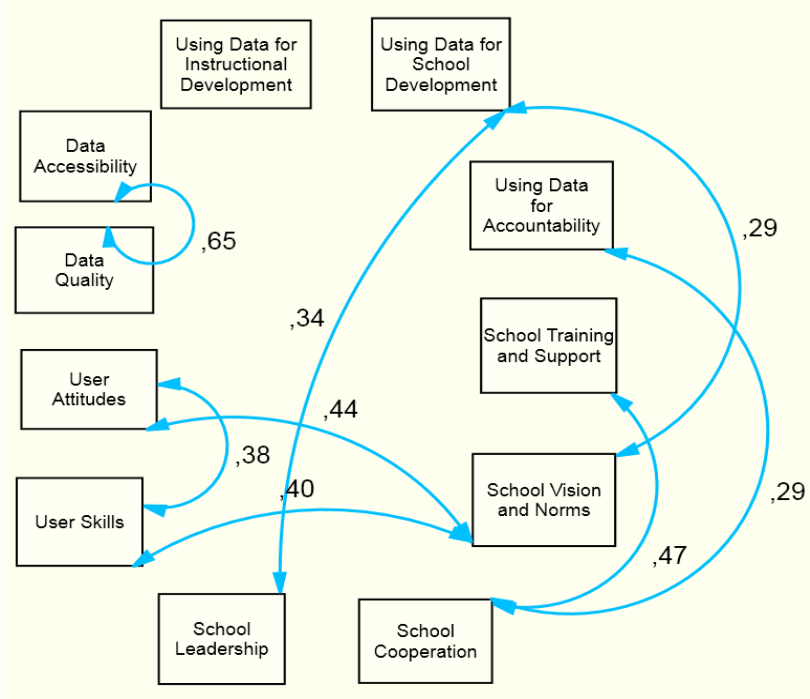


Figure 18: German model with category correlations

The two best rated categories **User Skills** and **User Attitudes** are included in the model and they correlate with each other (0.38). Even though **User Skills** is one of the top categories in the German sample, there is still room for improvement which will ideally be made possible by the DATAUSE pilot course.

Interestingly, both **User Attitudes** and **User Skills** are also linked to **School Vision and Norms** – **User Attitudes** with a strong correlation value of 0.44, **User Skills** with a correlation value of

0.4. One of the weaker categories is **Using Data for School Development** which correlates with **School Vision and Norms** (0.29) as well. Another stronger correlation can be found with **School Leadership** (0.44). To improve **Using Data for School Development** it appears that both **School Leadership** as well as **School Vision and Norms** will have to change and that the latter will be a challenge since good results in **User Attitudes** and **User Skills** apparently are not enough to fascilitate such a change. The cross-country model suggests that a link between **School Cooperation** and **Using Data for School Development** could occur as well, so changes in **School Cooperation** which is also one of the well rated categories in Germany might lead to a correlation with and improvement of **Using Data for School Development**. **School Cooperation** also strongly correlates with **School Training and Support** (0.47) which is the most problematic category. So **School Cooperation** is definitely a category worth analyzing during the work with the PLCs.

Data Accessibility which is the second lowest rated category in this sample very strongly correlates with **Data Quality** (0.65) which has a rather low mean value of 2.6. Focus should be directed to improving both of these categories since they are key elements of successful data use in schools. Finally, **Using Data for Instructional Development** is not linked to any other categories in this model and thus depicts another area to focus.

4 Conclusion

The survey analysis has shown two important things: (1) The intentions of the DATAUSE project are targeting an area that is both valued by the survey respondents and proven to be significantly underdeveloped. The cross-country analysis has shown that **User Skills**, **User Attitudes** and **Using Data for Instructional Development** are no pivotal categories in the current framework of data use in schools. (2) Although all countries share this foundation, there are country-specific differences which need to be considered during the work with the PLCs:

On the surface, data use in the *United Kingdom* appears to be at a very high level. But the English model revealed that **User Attitudes** as well as **Using Data for Instructional Development** are not part of the equation. Additionally, **Data Quality** and **School Training and Support** were identified as areas which will need particular attention to allow for further improvement.

In Poland, the mean values also suggested very little deficits in data use. But again, **User Attitudes** and **Using Data for Instructional Development** lack importance in the country's model and **School Vision and Norms** are not part of the model, either. Apart from strengthening these areas, another challenge will be to raise awareness and practice of **School Cooperation** and to improve **School Training and Support**.

The Netherlands are comparatively weak in data use, but their model firmly incorporates **User Attitudes**, **User Skills** and **Using Data for Instructional Improvement**, which is a valuable precondition for the DATAUSE course. Areas that need to be targeted in this country are on school-level as **School Vision and Norms**, **School Training and Support** and **Using Data for School Development** are not part of the current model.

Another country which also received very positive results is Lithuania. But **User Attitudes** and **Using Data for Instructional Development** do not play a role in the data use model, yet. While data use seems to be common practice in schools, especially for accountability and school-wide development purposes, it has no solid foundation in **School Vision and Norms**. Another area of need is **School Training and Support**.

The survey results for Germany show many deficits in the current practice of data use. While **User Attitudes** and **User Skills** are incorporated in the country's model and rated relatively well, **Using Data for Instructional Development** still does not play any part. Two areas with particular need for improvement are **Data Accessibility** and **Data Quality**. Also, **School Training and Support** needs to be strengthened to enable other areas to improve as well.

Appendix I: Results of the regression analysis accross all countries and categories

		df	Mean square	F	Significance
Data Accessibility	In-between groups	4	13.534	42.374	.000
	Within groups	373	.319		
	Total	377			
Data Quality	In-between groups	4	7.769	41.203	.000
	Within groups	382	.189		
	Total	386			
User Attitudes	In-between groups	4	2.628	11.052	.000
	Within groups	391	.238		
	Total	395			
User Skills	In-between groups	4	2.901	12.004	.000
	Within groups	390	.242		
	Total	394			
School Leadership	In-between groups	4	11.046	41.752	.000
	Within groups	388	.265		
	Total	392			
School Cooperation	In-between groups	4	4.067	25.320	.000

		df	Mean square	F	Significance
	Within groups	389	.161		
	Total	393			
School Vision and Norms	In-between groups	4	8.681	35.902	.000
	Within groups	384	.242		
	Total	388			
School Training and Support	In-between groups	4	12.052	44.113	.000
	Within groups	388	.273		
	Total	392			
Using Data for Accountability	In-between groups	4	4.579	28.756	.000
	Within groups	390	.159		
	Total	394			
Using Data for School Development	In-between groups	4	7.449	34.906	.000
	Within groups	389	.213		
	Total	393			
Using Data for Instructional Development	In-between groups	4	10.785	13.815	.000
	Within groups	393	.781		
	Total	397			

Appendix II: Results of Bonferroni post hoc testing accross all countries and categories

Dependent variable	(I) Country	(J) Country	Mean difference (I-J)	Standard error	Significance
Data Accessibility	United Kingdom	Poland	-.02724	.10030	1.000
		Netherlands	-.60017*	.10961	.000
		Lithuania	-.10634	.08444	1.000
		Germany	-1.12565*	.10704	.000
	Poland	United Kingdom	.02724	.10030	1.000
		Netherlands	-.57293*	.10924	.000
		Lithuania	-.07909	.08397	1.000
		Germany	-1.09841*	.10667	.000
	Netherlands	United Kingdom	.60017*	.10961	.000
		Poland	.57293*	.10924	.000
		Lithuania	.49383*	.09489	.000
		Germany	-.52548*	.11546	.000
	Lithuania	United Kingdom	.10634	.08444	1.000
		Poland	.07909	.08397	1.000
		Netherlands	-.49383*	.09489	.000
		Germany	-1.01931*	.09192	.000
	Germany	United Kingdom	1.12565*	.10704	.000
		Poland	1.09841*	.10667	.000
		Netherlands	.52548*	.11546	.000
		Lithuania	1.01931*	.09192	.000
Data Quality	United Kingdom	Poland	.01062	.07707	1.000
		Netherlands	-.44519*	.08421	.000
		Lithuania	.06974	.06420	1.000
		Germany	-.74279*	.08369	.000

	Poland	United Kingdom	-.01062	.07707	1.000
		Netherlands	-.45581*	.08394	.000
		Lithuania	.05912	.06384	1.000
		Germany	-.75341*	.08341	.000
	Netherlands	United Kingdom	.44519*	.08421	.000
		Poland	.45581*	.08394	.000
		Lithuania	.51493*	.07231	.000
		Germany	-.29760*	.09006	.010
	Lithuania	United Kingdom	-.06974	.06420	1.000
		Poland	-.05912	.06384	1.000
		Netherlands	-.51493*	.07231	.000
		Germany	-.81253*	.07170	.000
	Germany	United Kingdom	.74279*	.08369	.000
		Poland	.75341*	.08341	.000
		Netherlands	.29760*	.09006	.010
		Lithuania	.81253*	.07170	.000
User Attitudes	United Kingdom	Poland	-.18204	.08654	.360
		Netherlands	-.59391*	.09456	.000
		Lithuania	-.12085	.07181	.932
		Germany	-.18053	.09185	.501
	Poland	United Kingdom	.18204	.08654	.360
		Netherlands	-.41187*	.09425	.000
		Lithuania	.06119	.07139	1.000
		Germany	.00151	.09152	1.000
	Netherlands	United Kingdom	.59391*	.09456	.000
		Poland	.41187*	.09425	.000
		Lithuania	.47306*	.08094	.000
		Germany	.41338*	.09915	.000
	Lithuania	United Kingdom	.12085	.07181	.932
		Poland	-.06119	.07139	1.000
		Netherlands	-.47306*	.08094	.000

		Germany	-.05968	.07774	1.000
	Germany	United Kingdom	.18053	.09185	.501
		Poland	-.00151	.09152	1.000
		Netherlands	-.41338*	.09915	.000
		Lithuania	.05968	.07774	1.000
User Skills	United Kingdom	Poland	-.12336	.08724	1.000
		Netherlands	-.43401*	.09533	.000
		Lithuania	-.06491	.07239	1.000
		Germany	-.47290*	.09310	.000
	Poland	United Kingdom	.12336	.08724	1.000
		Netherlands	-.31064*	.09502	.012
		Lithuania	.05845	.07198	1.000
		Germany	-.34954*	.09278	.002
	Netherlands	United Kingdom	.43401*	.09533	.000
		Poland	.31064*	.09502	.012
		Lithuania	.36910*	.08160	.000
		Germany	-.03890	.10043	1.000
	Lithuania	United Kingdom	.06491	.07239	1.000
		Poland	-.05845	.07198	1.000
		Netherlands	-.36910*	.08160	.000
		Germany	-.40800*	.07898	.000
	Germany	United Kingdom	.47290*	.09310	.000
		Poland	.34954*	.09278	.002
		Netherlands	.03890	.10043	1.000
		Lithuania	.40800*	.07898	.000
School Leadership	United Kingdom	Poland	-.20278	.09129	.269
		Netherlands	-.95159*	.09976	.000
		Lithuania	-.25608*	.07569	.008
		Germany	-.95287*	.09914	.000
	Poland	United Kingdom	.20278	.09129	.269
		Netherlands	-.74881*	.09943	.000

		Lithuania	-.05330	.07525	1.000
		Germany	-.75008*	.09881	.000
	Netherlands	United Kingdom	.95159*	.09976	.000
		Poland	.74881*	.09943	.000
		Lithuania	.69552*	.08533	.000
		Germany	-.00127	.10668	1.000
	Lithuania	United Kingdom	.25608*	.07569	.008
		Poland	.05330	.07525	1.000
		Netherlands	-.69552*	.08533	.000
		Germany	-.69679*	.08461	.000
	Germany	United Kingdom	.95287*	.09914	.000
		Poland	.75008*	.09881	.000
		Netherlands	.00127	.10668	1.000
		Lithuania	.69679*	.08461	.000
School Cooperation	United Kingdom	Poland	-.16061	.07170	.256
		Netherlands	-.40469*	.07773	.000
		Lithuania	.01340	.05898	1.000
		Germany	-.53311*	.07591	.000
	Poland	United Kingdom	.16061	.07170	.256
		Netherlands	-.24407*	.07799	.019
		Lithuania	.17401*	.05932	.036
		Germany	-.37250*	.07618	.000
	Netherlands	United Kingdom	.40469*	.07773	.000
		Poland	.24407*	.07799	.019
		Lithuania	.41808*	.06649	.000
		Germany	-.12842	.08188	1.000
	Lithuania	United Kingdom	-.01340	.05898	1.000
		Poland	-.17401*	.05932	.036
		Netherlands	-.41808*	.06649	.000
		Germany	-.54650*	.06435	.000
	Germany	United Kingdom	.53311*	.07591	.000

		Poland	.37250*	.07618	.000
		Netherlands	.12842	.08188	1.000
		Lithuania	.54650*	.06435	.000
School Vision and Norms	United Kingdom	Poland	.03261	.08909	1.000
		Netherlands	-.72910*	.09597	.000
		Lithuania	-.04607	.07241	1.000
		Germany	-.69762*	.09313	.000
	Poland	United Kingdom	-.03261	.08909	1.000
		Netherlands	-.76171*	.09732	.000
		Lithuania	-.07868	.07419	1.000
		Germany	-.73023*	.09452	.000
	Netherlands	United Kingdom	.72910*	.09597	.000
		Poland	.76171*	.09732	.000
		Lithuania	.68303*	.08233	.000
		Germany	.03148	.10104	1.000
	Lithuania	United Kingdom	.04607	.07241	1.000
		Poland	.07868	.07419	1.000
		Netherlands	-.68303*	.08233	.000
		Germany	-.65155*	.07900	.000
	Germany	United Kingdom	.69762*	.09313	.000
		Poland	.73023*	.09452	.000
		Netherlands	-.03148	.10104	1.000
		Lithuania	.65155*	.07900	.000
School Training and Support	United Kingdom	Poland	-.07884	.09313	1.000
		Netherlands	-.62790*	.10137	.000
		Lithuania	-.08624	.07698	1.000
		Germany	-1.04864*	.09956	.000
	Poland	United Kingdom	.07884	.09313	1.000
		Netherlands	-.54906*	.10137	.000
		Lithuania	-.00740	.07698	1.000
		Germany	-.96980*	.09956	.000

	Netherlands	United Kingdom	.62790*	.10137	.000
		Poland	.54906*	.10137	.000
		Lithuania	.54166*	.08676	.000
		Germany	-.42074*	.10731	.001
	Lithuania	United Kingdom	.08624	.07698	1.000
		Poland	.00740	.07698	1.000
		Netherlands	-.54166*	.08676	.000
		Germany	-.96240*	.08464	.000
	Germany	United Kingdom	1.04864*	.09956	.000
		Poland	.96980*	.09956	.000
		Netherlands	.42074*	.10731	.001
		Lithuania	.96240*	.08464	.000
Using Data for Accountability	United Kingdom	Poland	.03803	.07082	1.000
		Netherlands	-.18150	.07739	.195
		Lithuania	.02889	.05872	1.000
		Germany	-.62393*	.07601	.000
	Poland	United Kingdom	-.03803	.07082	1.000
		Netherlands	-.21953*	.07714	.047
		Lithuania	-.00913	.05838	1.000
		Germany	-.66195*	.07575	.000
	Netherlands	United Kingdom	.18150	.07739	.195
		Poland	.21953*	.07714	.047
		Lithuania	.21039*	.06620	.016
		Germany	-.44243*	.08193	.000
	Lithuania	United Kingdom	-.02889	.05872	1.000
		Poland	.00913	.05838	1.000
		Netherlands	-.21039*	.06620	.016
		Germany	-.65282*	.06458	.000
	Germany	United Kingdom	.62393*	.07601	.000
		Poland	.66195*	.07575	.000
		Netherlands	.44243*	.08193	.000

		Lithuania	.65282*	.06458	.000
Using Data for School Development	United Kingdom	Poland	-.04523	.08199	1.000
		Netherlands	-.60396*	.08959	.000
		Lithuania	-.06221	.06803	1.000
		Germany	-.75278*	.08799	.000
	Poland	United Kingdom	.04523	.08199	1.000
		Netherlands	-.55872*	.08930	.000
		Lithuania	-.01697	.06764	1.000
		Germany	-.70755*	.08769	.000
	Netherlands	United Kingdom	.60396*	.08959	.000
		Poland	.55872*	.08930	.000
		Lithuania	.54175*	.07668	.000
		Germany	-.14883	.09484	1.000
	Lithuania	United Kingdom	.06221	.06803	1.000
		Poland	.01697	.06764	1.000
		Netherlands	-.54175*	.07668	.000
		Germany	-.69058*	.07481	.000
	Germany	United Kingdom	.75278*	.08799	.000
		Poland	.70755*	.08769	.000
		Netherlands	.14883	.09484	1.000
		Lithuania	.69058*	.07481	.000
Using Data for Instructional Development	United Kingdom	Poland	-.06128	.15681	1.000
		Netherlands	-1.04877*	.17135	.000
		Lithuania	-.15028	.13001	1.000
		Germany	-.59183*	.16554	.004
	Poland	United Kingdom	.06128	.15681	1.000
		Netherlands	-.98749*	.17079	.000
		Lithuania	-.08900	.12927	1.000
		Germany	-.53055*	.16496	.014
	Netherlands	United Kingdom	1.04877*	.17135	.000
		Poland	.98749*	.17079	.000

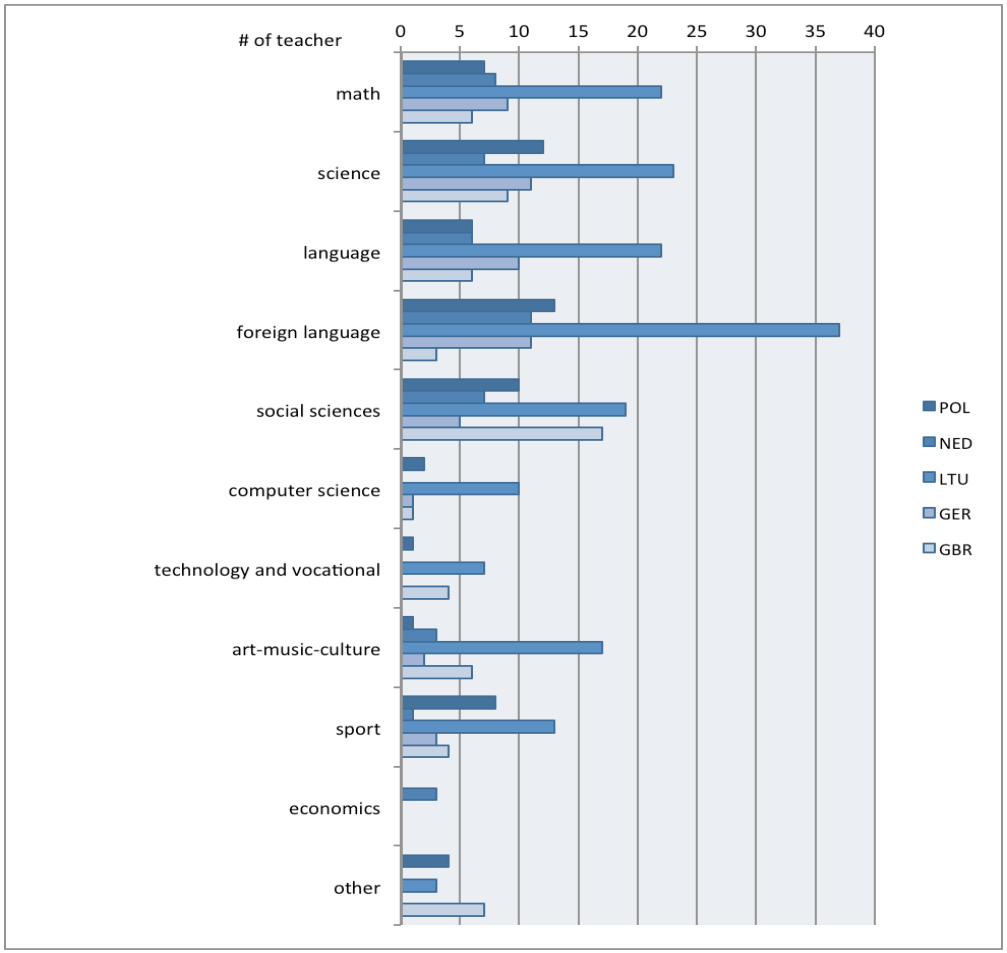
		Lithuania	.89849*	.14657	.000
		Germany	.45694	.17884	.110
	Lithuania	United Kingdom	.15028	.13001	1.000
		Poland	.08900	.12927	1.000
		Netherlands	-.89849*	.14657	.000
		Germany	-.44155*	.13973	.017
	Germany	United Kingdom	.59183*	.16554	.004
		Poland	.53055*	.16496	.014
		Netherlands	-.45694	.17884	.110
		Lithuania	.44155*	.13973	.017

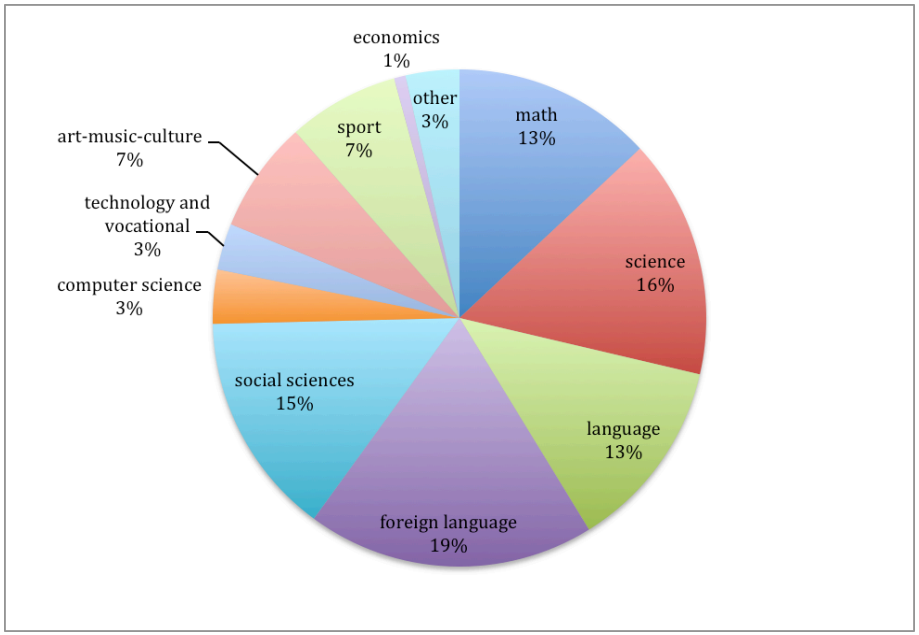
Appendix III: Datasets and Displays

The Sample in all Countries

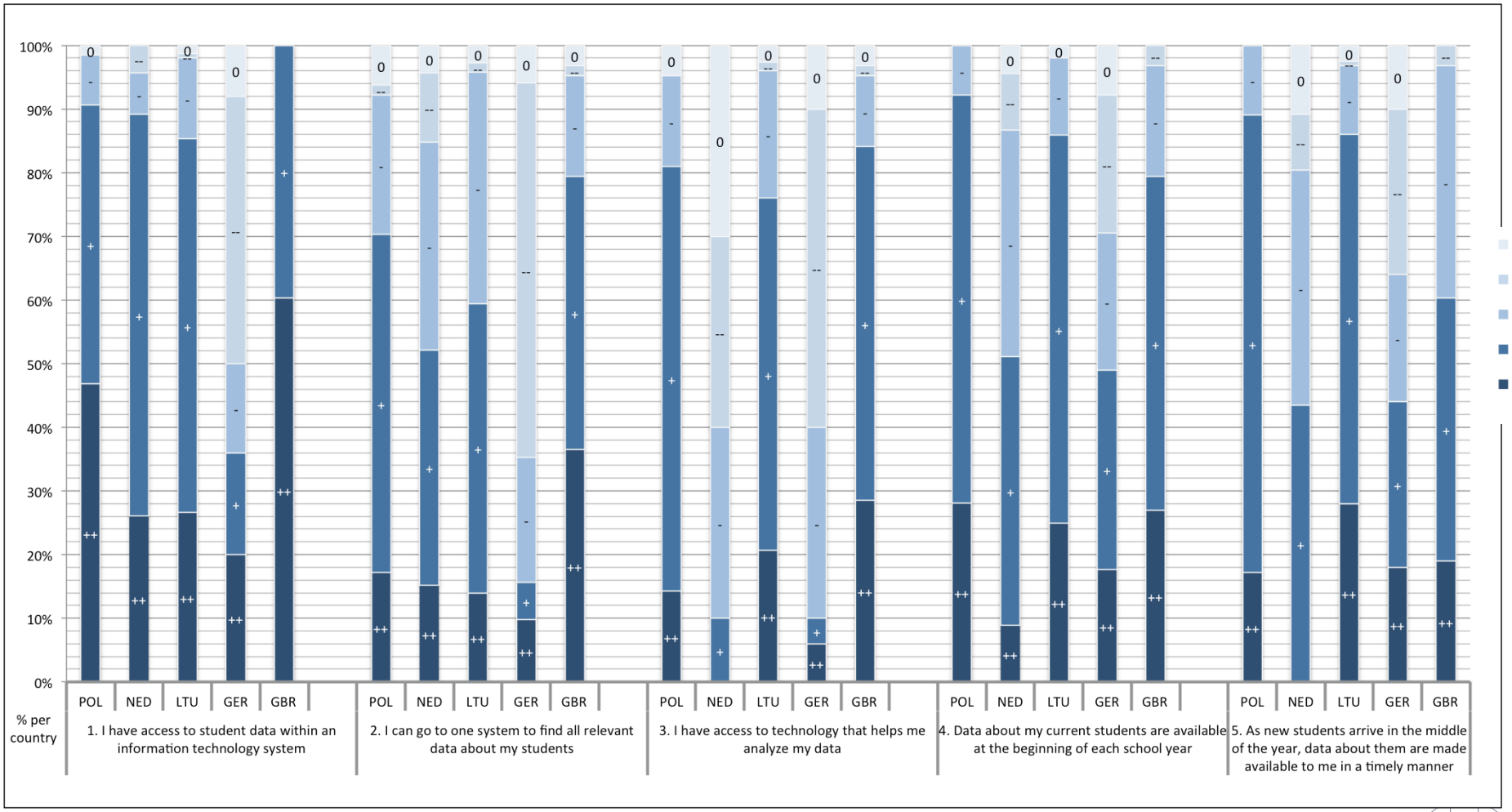
	POL	NED	LTU	GER	GBR
# teacher / % of total number	64 / 87,6%	46 / 23%	173 / 63%	52 / 37%	63 / 61%
∅ years of teaching	14,7	17,9	19,8	15,6	10,64
upper sec/ lower sec	0% / 100%	50% / 50%	71,1% / 28,9 %	23,1% / 76,9%	68,3% / 31,7%

The Distribution of Subjects

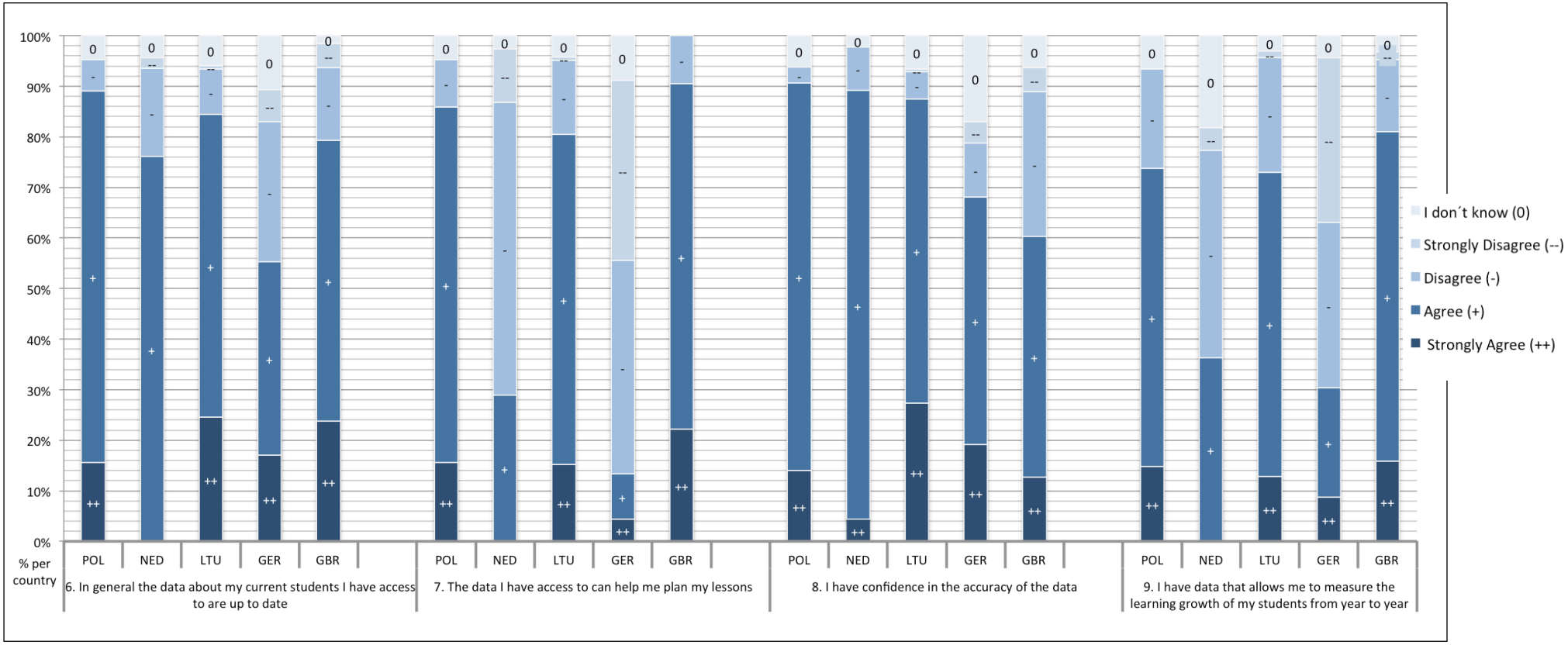


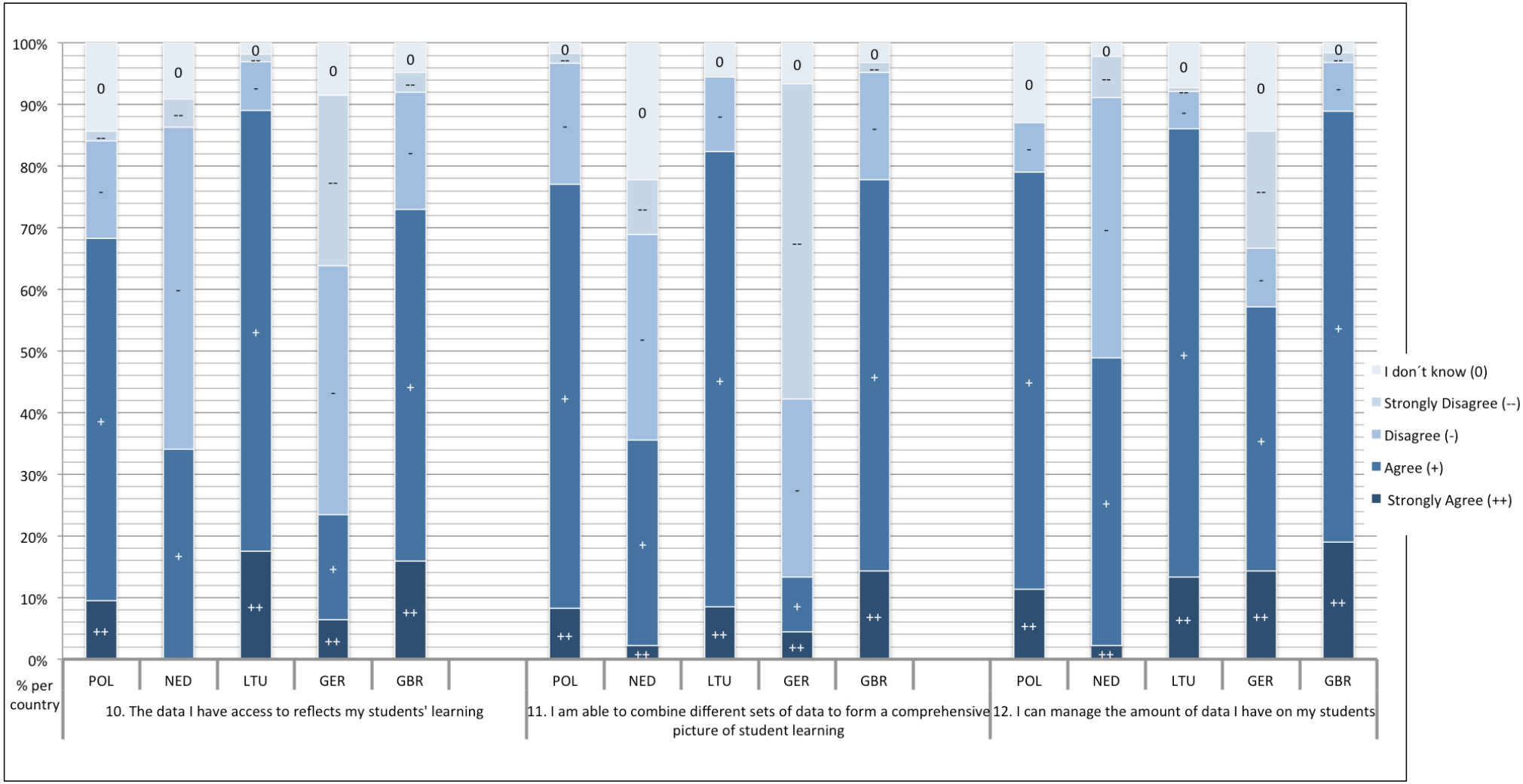


Data Accessibility



Data Quality (Q6 – Q12)

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% per country
POL
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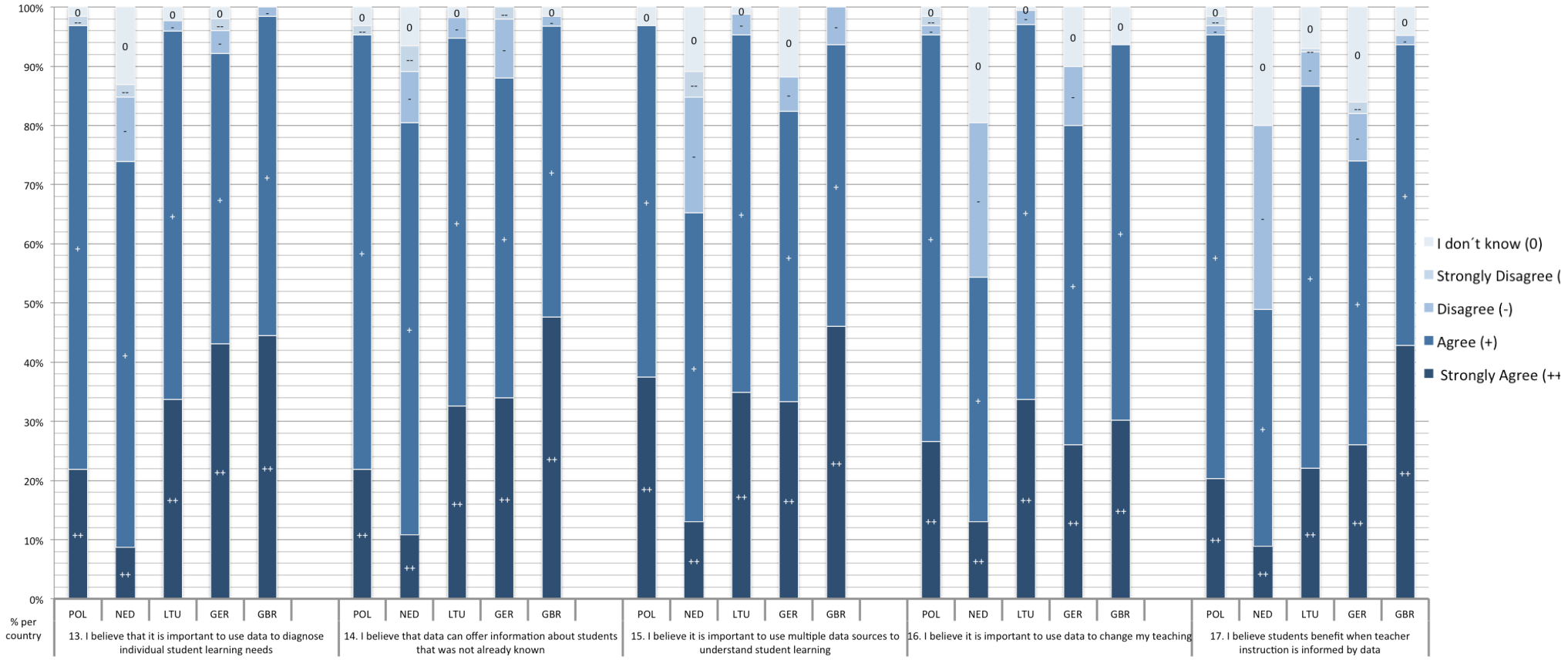
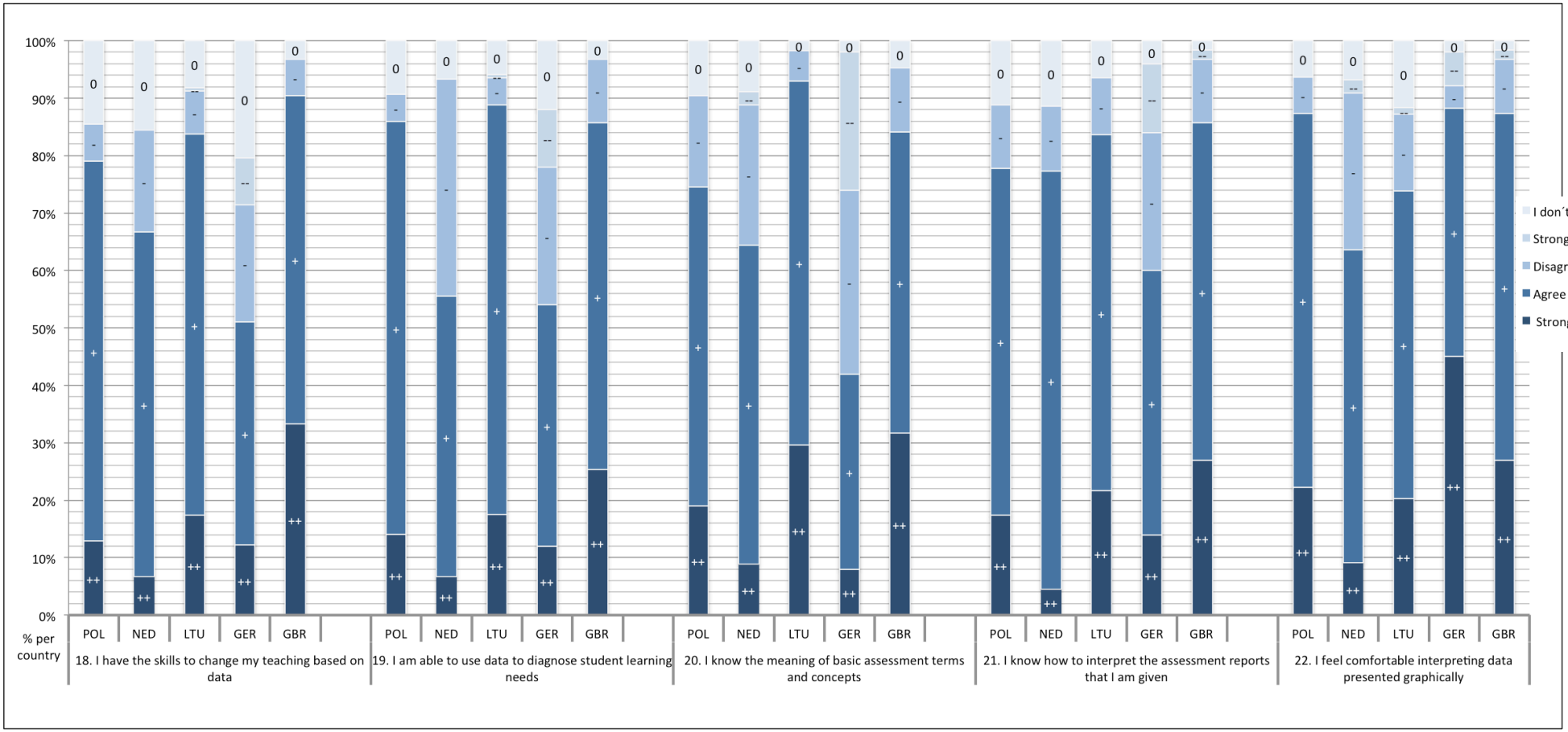
10. The data I have access to reflects my students' learning
11. I am able to combine different sets of data to form a comprehensive picture of student learning
12. I can manage the amount of data I have on my students
I don´t know (0)
Strongly Disagree (--)
Disagree (-)
Agree (+)
Strongly Agree (++)

User Attitudes



User Skills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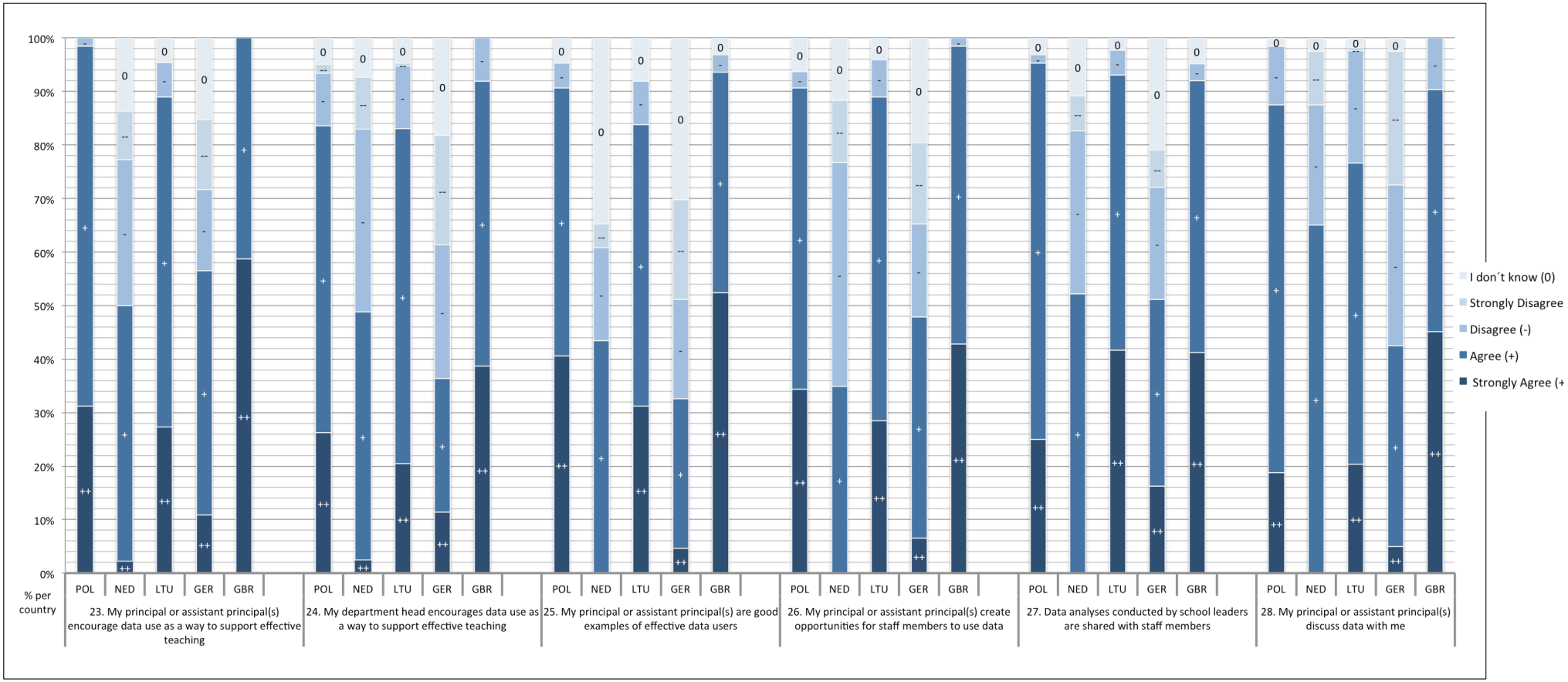
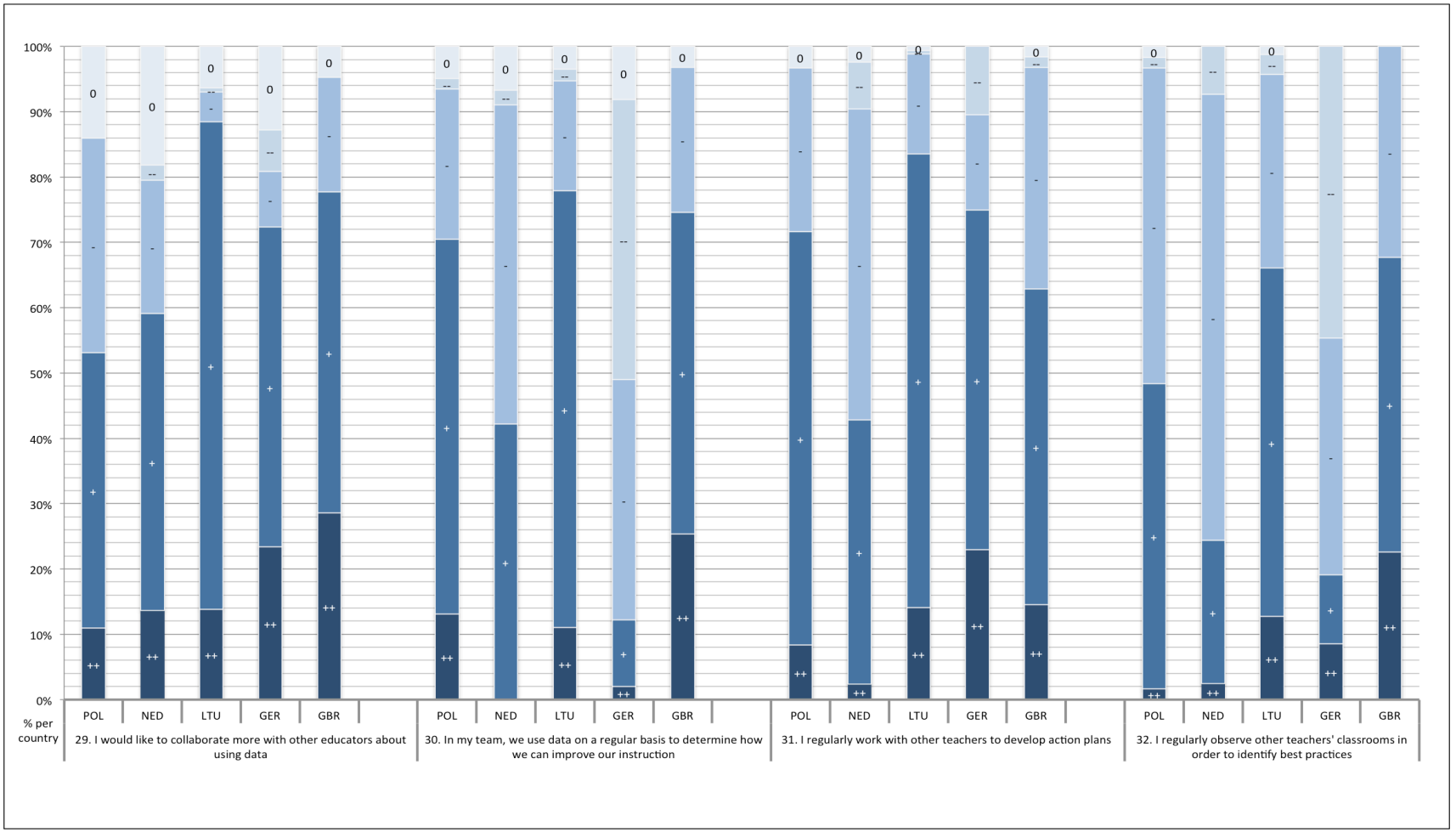
% per country
POL NED LTU GER GBR
18. I have the skills to change my teaching based on data
19. I am able to use data to diagnose student learning needs
20. I know the meaning of basic assessment terms and concepts
21. I know how to interpret the assessment reports that I am given
22. I feel comfortable interpreting data presented graphically
I don´t know (0)
Strongly Disagree
Disagree (-)
Agree (+)
Strongly Agree (+

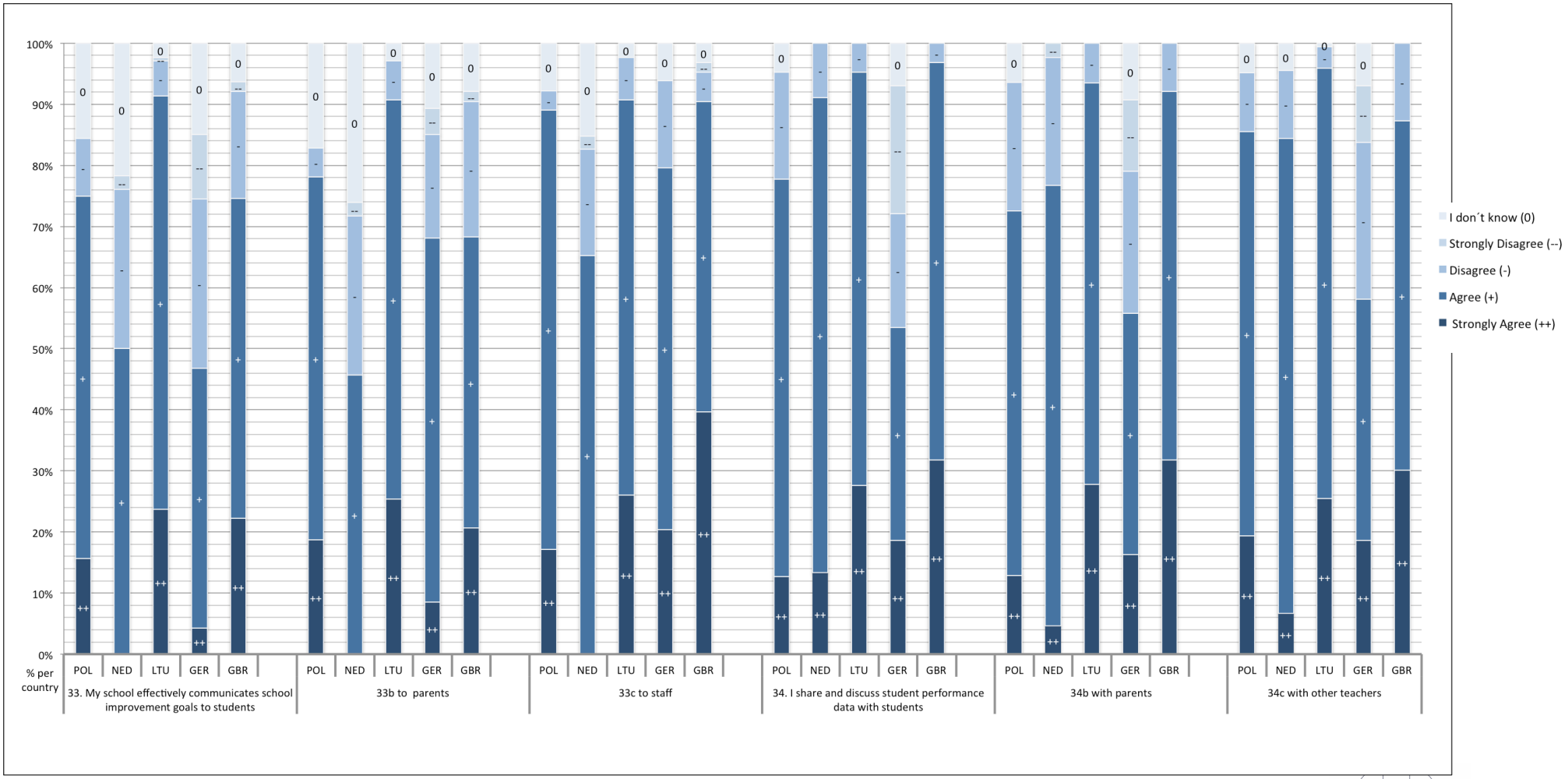
School Leadership



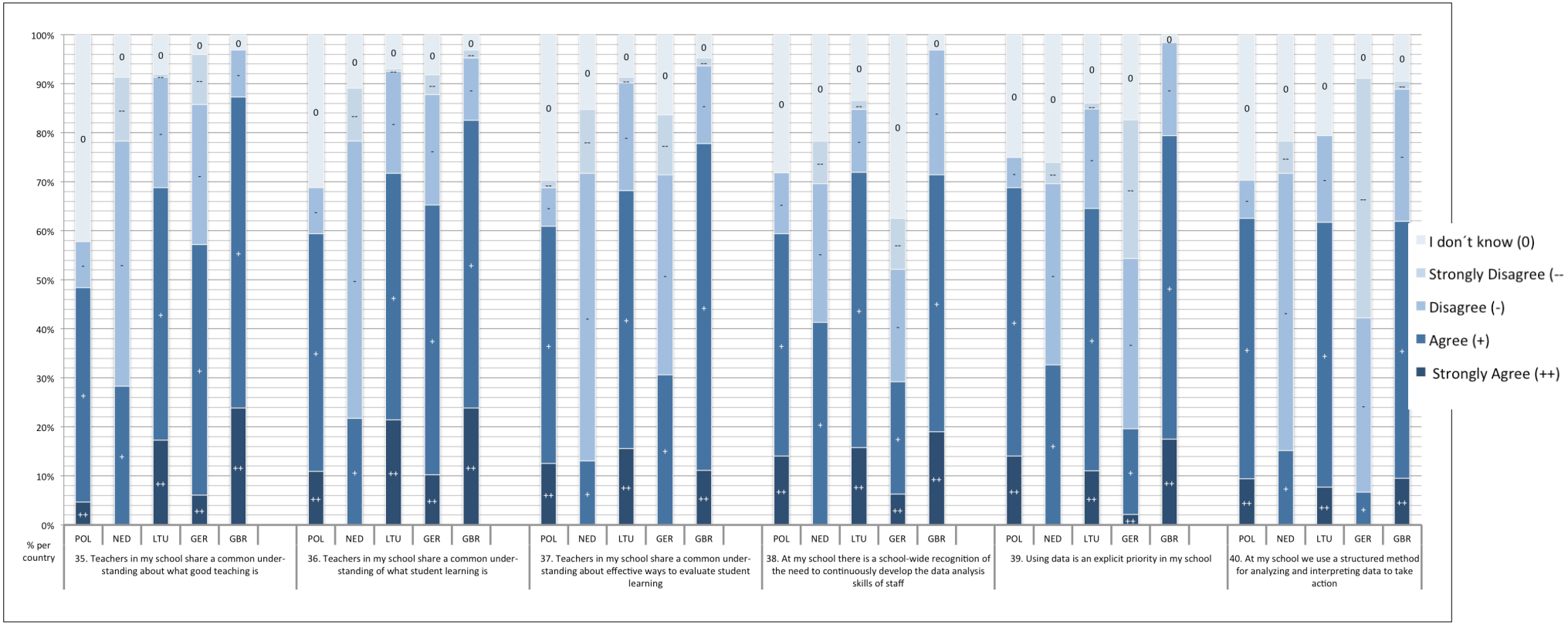
School Cooperation



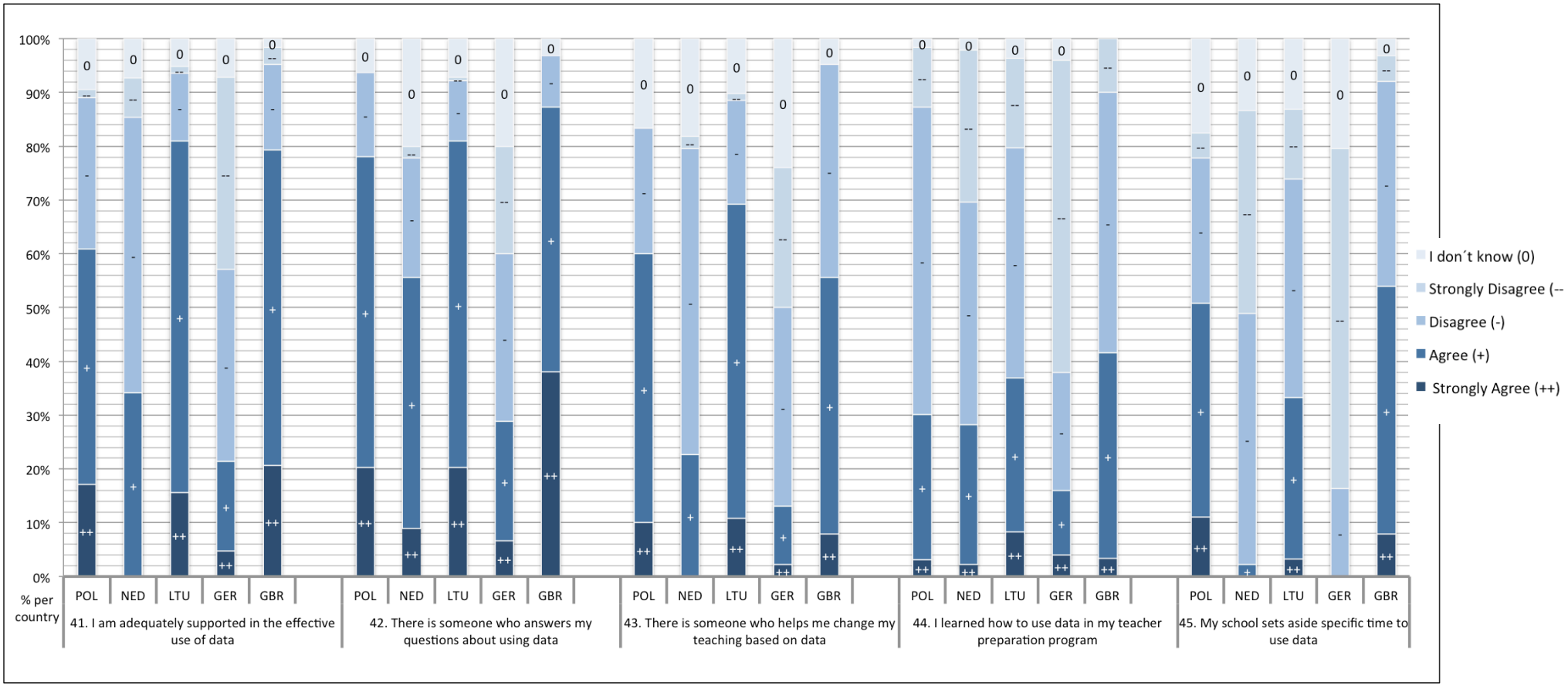
Communication



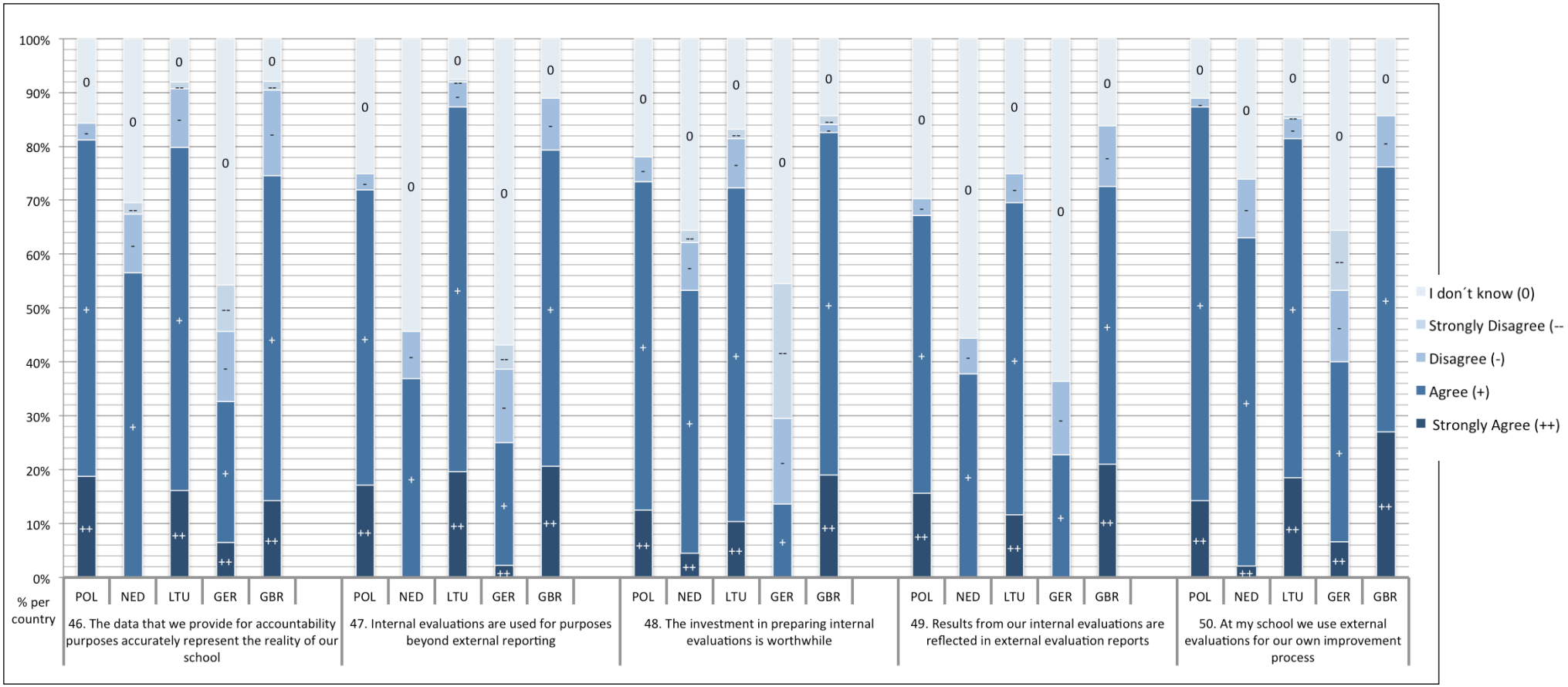
School Vision and Norms

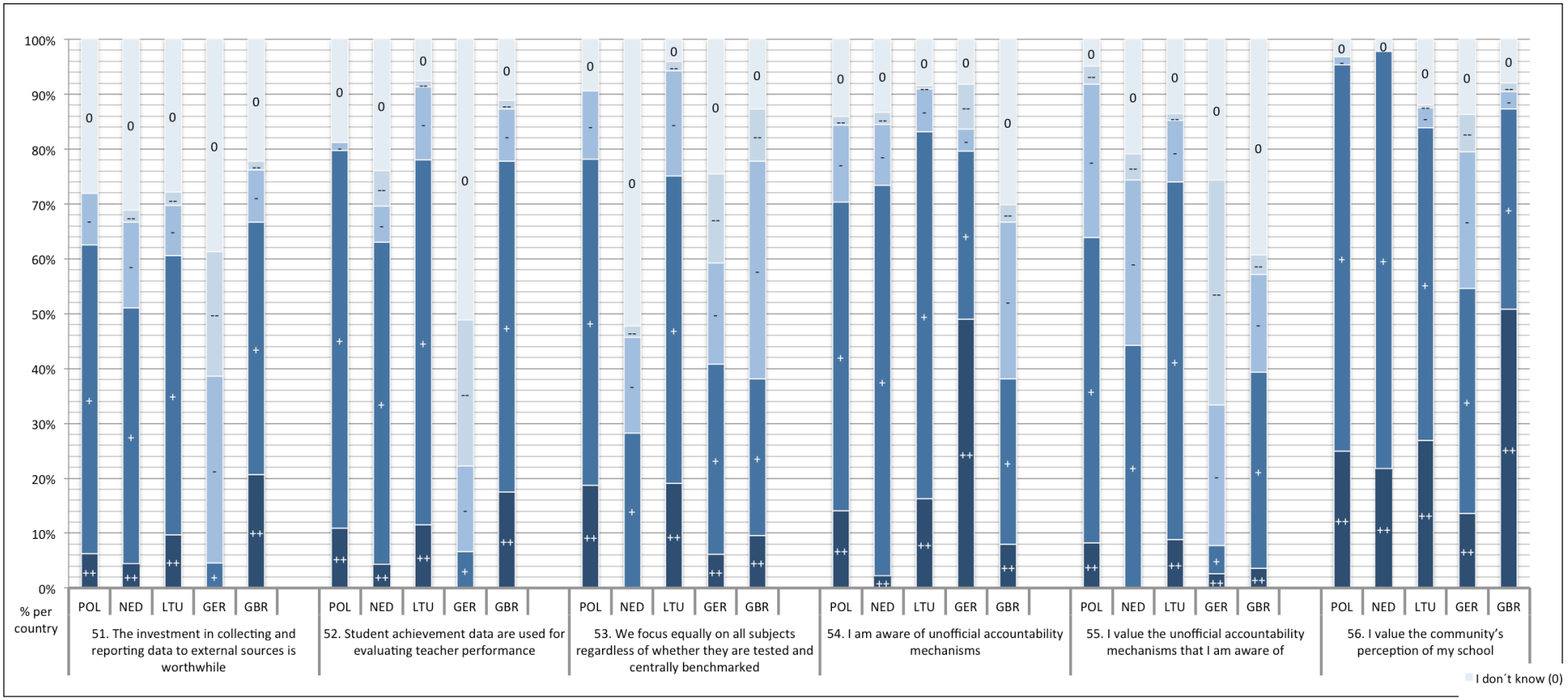


School Training and Support



Using Data for Accountability (Q46 – Q56)

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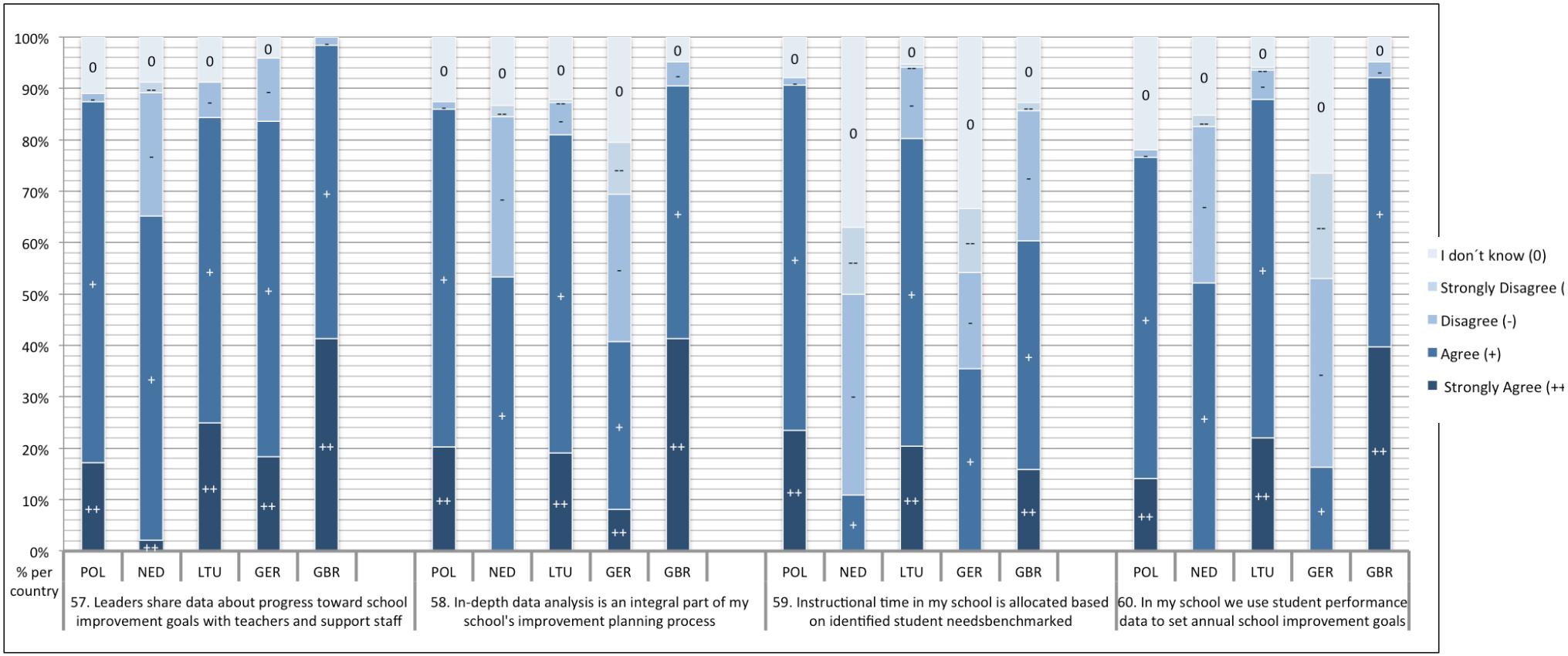
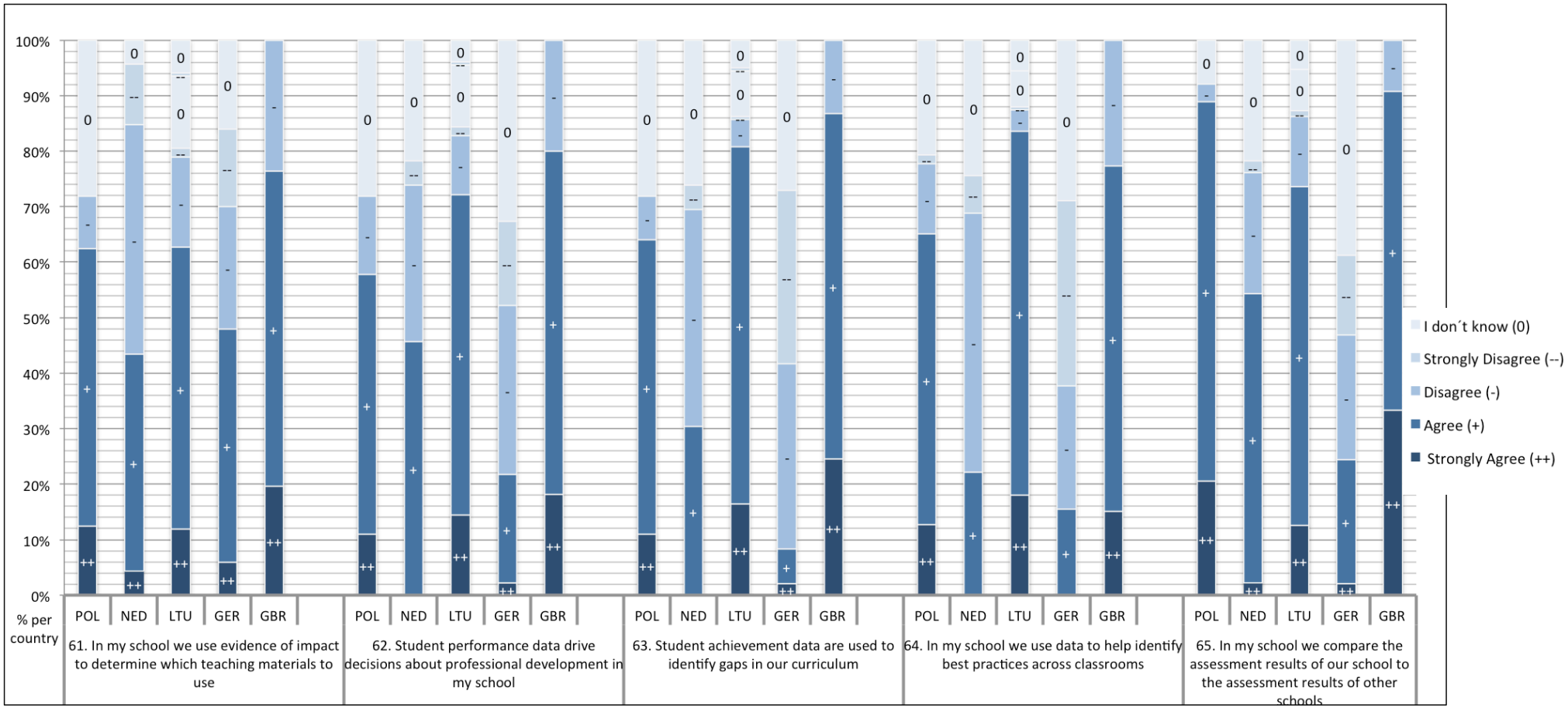
51. The investment in collecting and reporting data to external sources is worthwhile
52. Student achievement data are used for evaluating teacher performance
53. We focus equally on all subjects regardless of whether they are tested and centrally benchmarked
54. I am aware of unofficial accountability mechanisms
55. I value the unofficial accountability mechanisms that I am aware of
56. I value the community's perception of my school
I don´t know (0)
Strongly Disagree (--)
Disagree (-)
Agree (+)
Strongly Agree (++)

Using Data for School Development (Q57 – Q65)

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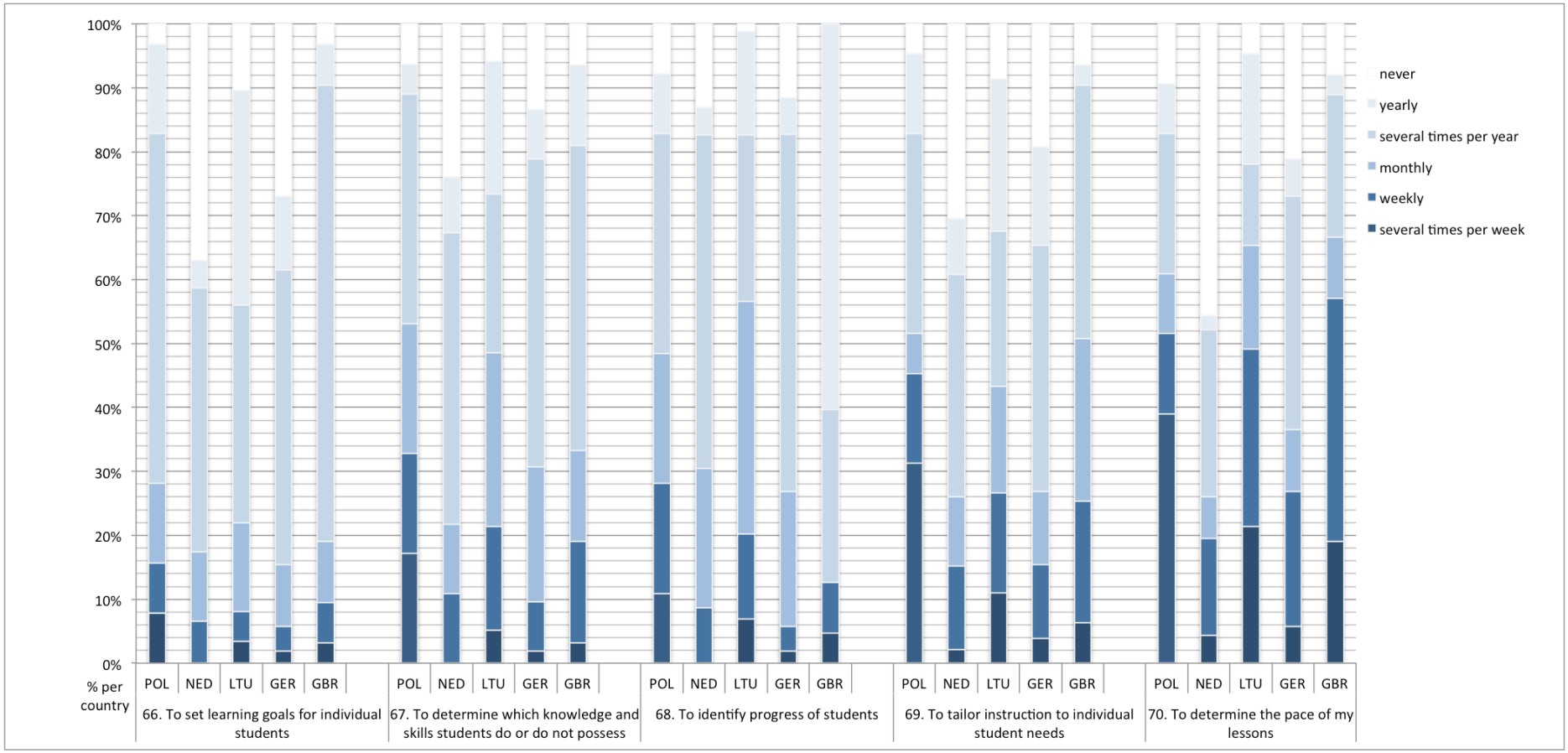
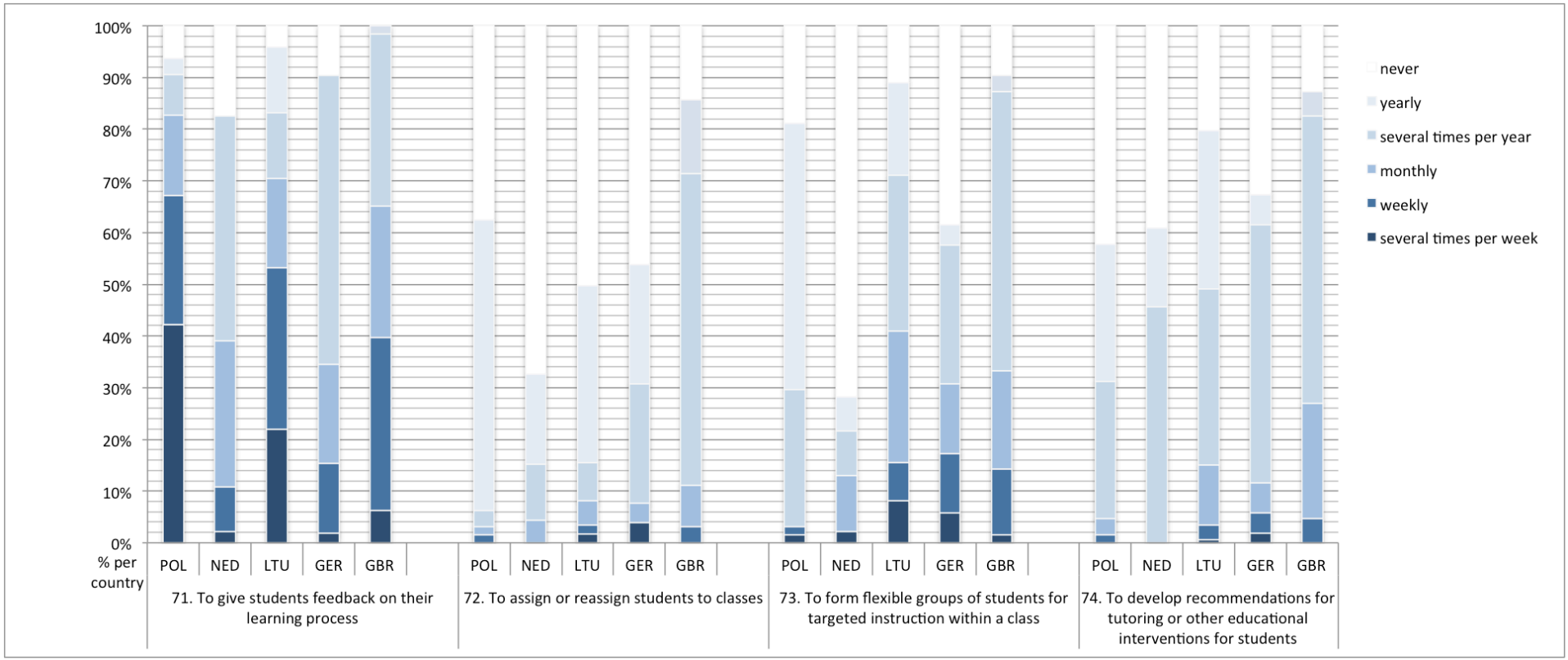
61. In my school we use evidence of impact to determine which teaching materials to use
62. Student performance data drive decisions about professional development in my school
63. Student achievement data are used to identify gaps in our curriculum
64. In my school we use data to help identify best practices across classrooms
65. In my school we compare the assessment results of our school to the assessment results of other schools
I don´t know (0)
Strongly Disagree (--)
Disagree (-)
Agree (+)
Strongly Agree (++)

Using Data for Instructional Development (Q 66 – Q 78)

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monthly
weekly
several times per week
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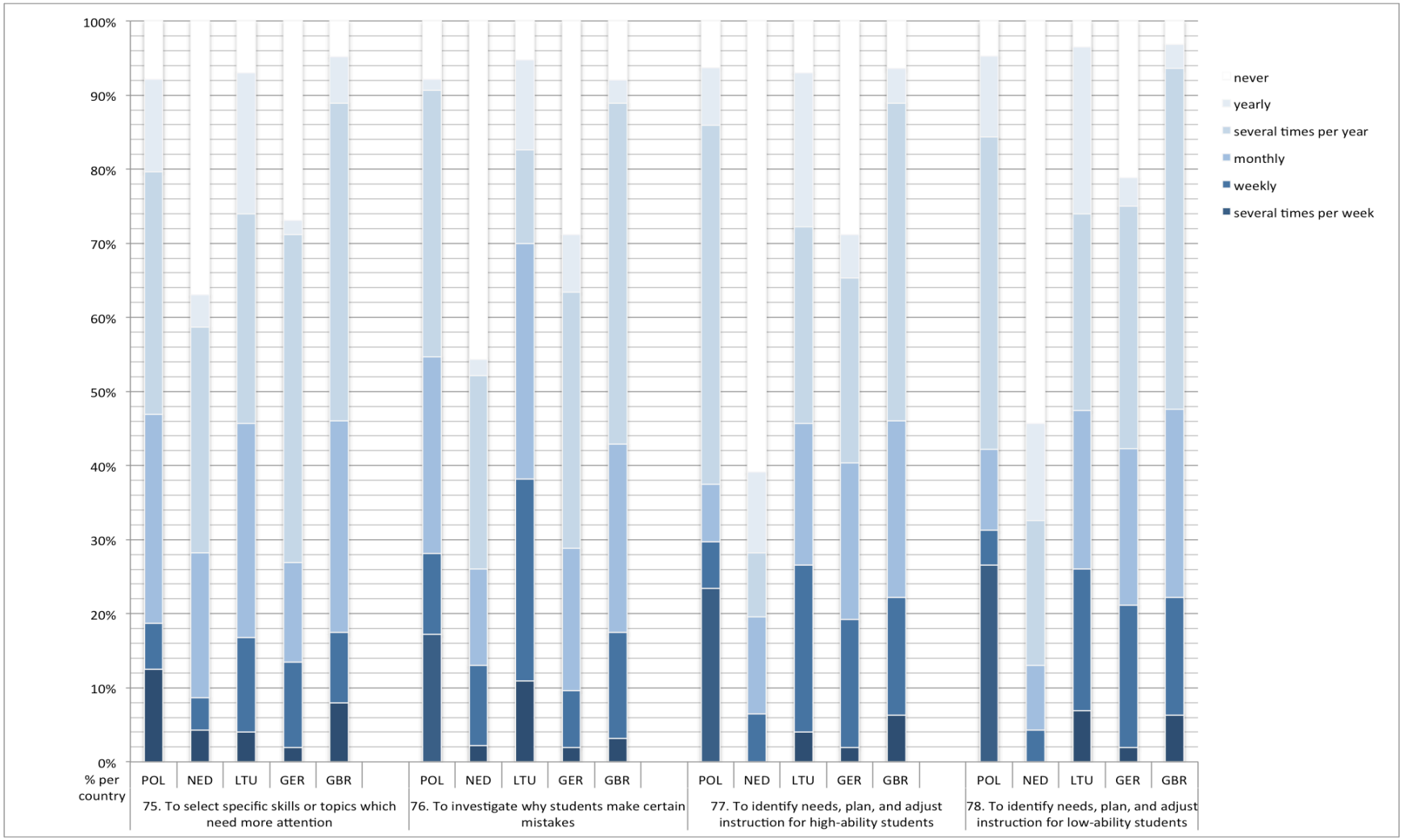
GBR
71. To give students feedback on their learning process
72. To assign or reassign students to classes
73. To form flexible groups of students for targeted instruction within a class
74. To develop recommendations for tutoring or other educational interventions for students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yearly
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monthly
weekly
several times per week
POL
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GBR
75. To select specific skills or topics which need more attention
76. To investigate why students make certain mistakes
77. To identify needs, plan, and adjust instruction for high-ability students
78. To identify needs, plan, and adjust instruction for low-ability students