# SPIDAS State of art review Part 2

# The teaching and learning of data analytics in the UK

From the UK, we summarised the current situation of the teaching and learning of data analytics from the following points of view:

1. Data analytics related learning objectives including teching approaches
2. Web resources
3. Students' attitudes towards statistics – initial survey results
4. Students' interests in weather

## 1. Data analytics related learning objectives

A comprehensive summary of is available (Vanessa Pittard (2018) *The integration of data science in the primary and secondary curriculum Final report*, the Royal Society Advisory Committee on Mathematics Education). According to this report, the data science which is related to fata analytics in England is summarised as follows (p. 3):

- Core knowledge and skills are developed mainly through the statistics strand of mathematics at Key Stage 2 and algorithms and use of digital technology in computing at Key Stages 1 & 2.
- At lower Key Stage 2, science curriculum requirements to 'work scientifically' highlight the application of mathematics, but this is not fully reflected in guidance on attainment targets.
- Neither history nor geography at Key Stages 1 & 2 include mathematics application or use of data, focusing instead on building a base of subject knowledge.

In the Annex 1 of this report (pp. 18-22) gives a summary of learning objectives related to Data science (Mathematics, Computing, Science, and Humanities). In below, we shall summarise the learning objectives related to data analytics from mathematics curriculum,

general teaching approaches, technology tools and allocated hours. Sources of information are the current National Curriculum in the UK, NCETM mathematics scheme, and information from the teachers in our local partner schools.

## 1.1. Primary School

| **UK** | **Primary school** | | | | | |
|---|---|---|---|---|---|---|
| **Key content** | **Learning objectives/Competencies** | **Subject (math, science etc)** | **Age/s** | **Teaching approach/methods** | **Technology tools used** | **Hours/Timing Approx.** |
| **Statistics** | • interpret and construct simple pictograms, tally charts, block diagrams and tables<br>• ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity<br>• ask-and-answer questions about totalling and | Mathematics | Y2 | Teacher led lessons<br>Collaborative group work<br>Discussion | Interactive board<br>Spreadsheet (KS2) | 1 week |

| | | | | | | |
|---|---|---|---|---|---|---|
| | comparing categorical data | | | | | |
| | • interpret and present data using bar charts, pictograms and tables<br>• solve one-step and two-step questions [for example ‘How many more?’ and ‘How many fewer?’] using information presented in scaled bar charts and pictograms and tables | | Y3 | | | 1 week |
| | • interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs<br>• solve comparison, sum and difference problems using information | | Y4 | | | 2 weeks |

| | | | | | | |
|---|---|---|---|---|---|---|
| | presented in bar charts, pictograms, tables and other graphs | | | | | |
| | • solve comparison, sum and difference problems using information presented in a line graph<br>• complete, read and interpret information in tables, including timetables | | Y5 | | | 2 weeks |
| | • interpret and construct pie charts and line graphs and use these to solve problems<br>• calculate and interpret the mean as an average | | Y6 | | | 1 week |

## 1.2. Lower Secondary School

UK National Curriculum (https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study)

KS3 Statistics

- describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)
- construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data
- describe simple mathematical relationships between 2 variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs

KS4 Statistics

- infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling
- interpret and construct tables and line graphs for time series data
- {construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use}
- interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:
    - appropriate graphical representation involving discrete, continuous and grouped data, {including box plots}
    - appropriate measures of central tendency (including modal class) and spread {including quartiles and inter-quartile range}
- apply statistics to describe a population
- use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing.

In St James' school, the following information is provided:

- Related area of the subject – mathematics, statistics
- Teaching Methods: Whole class teaching, students' individual work, collaborative group work
- Technological tools – Interactive white board, Excel

Y9, 10 and 11 related objectives (about 15% of maths curriculum) are as follows:

| Collecting data (estimated teaching hours, 5-7) | |
|---|---|
| Grade 2 | • Specify the problem and plan: |

| | |
|---|---|
| | ○ decide what data to collect and what analysis is needed;<br>○ understand primary and secondary data courses;<br>○ consider fairness;<br>• Identify possible sources of bias and plan to minimise it; |
| Grade 3 | • Writing questionnaire questions to eliminate bias, and on timing and location of survey to ensure samples Is representative; |
| Grade 4 | • Understand what is meant by a sample and a population;<br>• Understand how different sample sizes may affect the reliability of conclusion drawn; |
| Grade 5 | • Select and justify a sampling scheme and a method to investigate a population, including random and stratified sampling;<br>• Stratified sampling:<br>○ Know the definition and state it in term of population, fraction, percentage or ratio.<br>• Random sampling:<br>○ Know the definition of random sampling;<br>○ Use random numbers to get a sample; |

| Representing and interpreting data (estimated teaching hours, 7-9) | |
|---|---|
| Grade 1 | • Produce/interpret (read off frequency values, calculate total population, find greatest and least values:<br>○ Dual/comparative bar charts;<br>○ Composite bar charts;<br>○ Line graphs; |
| Grade 2 | • Writing questionnaire questions to eliminate bias, and on timing and location of survey to ensure samples Is representative; |
| Grade 3 | • Recognise simple patterns, characteristics and relationships in bar charts, line graphs and frequency populations. |
| Grade 4 | • Compare the mean and range of two distributions, or median or mode as appropriate;<br>○ Produce and interpret pie chart:<br>○ Find the mode and the frequency represented by each sector;<br>○ Compare data from pie charts that represent different sized samples’ |
| Grade 5 | • Estimate the median from a histogram with equal class width or any other information, such as the number people in a given interval;<br>• Comment on trends in time series data; |

| | |
|---|---|
| Grade 6 | • Produce and interpret frequency polygons for grouped data:<br>  ○ From frequency polygons, read off frequency values, compare distributions, calcite total population, mean, estimate greatest and least possible values (and range);<br>• Produce frequency diagrams for grouped discrete data:<br>  ○ Read off frequency values, calculate total population, find greatest and least values; |

| Representing and interpreting data (estimated teaching hours, 4-6) | |
|---|---|
| Grade 2 | • Draw and interpret scatter graphs; |
| Grade 3 | • Identify outliers and ignore them on scatter graphs;<br>• Explain an isolated point on a scatter graph;<br>• Distinguish between positive, negative and no correlation using lines of best fit, and interpret correlation in terms of population;<br>• Interpret scatter graphs in terms of the relationship between two variables;<br>• Understand that correlation does not imply causality and appreciate that correlation is a measure of the strength of the association between two variables and that zero correlation does not necessarily imply 'no relationship' but merely 'no linear correlation'. |
| Grade 4 | • Draw the line of best fit on a scatter diagram by eye, and understand what it represents;<br>• Use a line of best fit, or otherwise, to predict values of a variable given values of the other variables; |
| Grade 5 | • Interpolate and extrapolate apparent trends whilst knowing the dangers of so doing. |

| Average and range (estimated teaching hours, 6-8) | |
|---|---|
| Grade 1 | • Work out time taken for a journey from a timetable and time calculations using am and pm as well as 24 hour clock; |
| Grade 2 | • Design and use two-way tables for discrete and grouped data;<br>• Use information provided to complete a two-way table;<br>• Design and use data collection sheets for grouped, discrete and continuous data;<br>• Sort, classify and tabulate data and discrete or continuous quantitative data;<br>• Construct and interpret stem and leaf diagrams (including back to back diagrams), find the:<br>  ○ Mode<br>  ○ Median<br>  ○ Range<br>  ○ Greatest and least values |

| | |
|---|---|
| | • Calculate mean average, find median and mode from small data set; |
| Grade 3 | • Compare two distributions from stem and leaf diagrams (mode, median, range)<br>• Recognise the advantages and disadvantages between measures of average;<br>• Calculate the mean, mode and range from a frequency table (discrete data);<br>• Use a spreadsheet to calcite mean and range, and find median and mode; |
| Grade 4 | • Construct and interpret grouped frequency tables for continuous data;<br>o For grouped data, find the interval which contains the median and the modal class;<br>o Estimate the mean with grouped data;<br>o Understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values. |

| Cumulative frequency, box plots and histograms (estimated teaching hours, 6-8) | |
|---|---|
| Grade 5 | • Know the appropriate uses of cumulative frequency diagrams;<br>• Construct and interpret cumulative frequency tables;<br>• Construct and interpret cumulative frequency graphs/diagrams and from the graph:<br>• Estimate frequency greater/less than a given value;<br>• Find the median and quartile values and interquartile range;<br>• Interpret box plots to find median, quartiles, range and interquartile range and draw conclusions;<br>• Produce box plots from raw data and when given quartiles, median and identify any outliers. |
| Grade 6 | • Use statistics found in all graphs/charts in this unit to describe a population;<br>• Compare the mean and range of two distributions, or median and interquartile range, as appropriate;<br>• Know the appropriate uses of histograms;<br>• Construct and interpret histograms from class intervals with unequal width;<br>• From histograms:<br>o Complete a grouped frequency table;<br>o Understand and define frequency density. |
| Grade 7 | • Estimate the mean from a histogram;<br>• Estimate the median from a histogram with unequal class widths or any other information form a histogram, such as the number of people in a given interval. |

## 1.3. Post 16

| **UK** | **EXETER COLLEGE** | | | | | |
|---|---|---|---|---|---|---|
| **Key content** | **Learning objectives/Competencies** | **Subject (math, science etc)** | **Age/s** | **Teaching approach/methods** | **Technology tools used** | **Hours/Timing Approx.** |
| **Data handling** | • Formulate research questions that require data collection<br>• Collect data related to research questions; display data with frequency table | IT Level 3 | 16-18 | Lectures<br>Discussion<br>Q&A<br>Assignment | Interactive board<br>VLE (Moodle) | 9 hours |
| **Data analysis** | • Summarise and interpret data displayed in histogram, back-to-back stem and leaf, bar and pie charts<br>• Calculate and interpret the arithmetic mean, median and mode of a data set<br>• Calculate and interpret the range of a data set | As above | As above | As above | As above | As above |

| | | | | | | |
|---|---|---|---|---|---|---|
| | • Calculate and interpret the IQR of a data set<br>• Use arithmetic mean and range to compare and interpret data from two data sets<br>• Calculate and interpret the measures of central tendency and spread of data<br>• Calculate the standard deviation for a data set<br>• Interpret validity of data using standard deviation. | | | | | |
| **Probability** | • Probability sample spaces<br>• Probability trees<br>• Conditional probability<br>• Notation | As above | As above | As above | As above | 4.5 hours |

| | | | | | | |
|---|---|---|---|---|---|---|
| **UK** | **Exeter Maths School** | | | | | |

| Key content | Learning objectives/Competencies | Subject (math, science etc) | Age/s | Teaching approach/methods | Technology tools used | Hours/Timing Aprox. |
|---|---|---|---|---|---|---|
| **Sampling** | • Know and understand the terms population and sample<br>• Use a sample to make informal inferences about a population, recognising that different samples may lead to different conclusions<br>• Understand and be able to use the concept of random sampling; Understand and be able to use a variety of sampling techniques.<br>• Understand that diagrams representing unbiased samples become more representative of theoretical probability | A Level Mathematics | 16 – 18 | • Direct instruction<br>• Discovery work<br>• Group work<br>• Use of technology<br>• Practice problems | • Desmos<br>• Spreadsheets<br>• Programming (R)<br>• Graphical Calculators | 70 hours for the statistics content of A level Mathematics<br><br>Statistics makes up 18% of the marks in the Mathematics A level examination.<br><br>For further maths, students have some options and the amount of statistics will be either 0%, 16% or 33%.<br><br>Most students will take the middle option (in our school, we do not offer the 0% option and over three |

| | | | | | | |
|---|---|---|---|---|---|---|
| | distributions with increasing sample size. | | | | | quarters take the 16% option) |
| **Data presentation**<br><br>**(single variable data)** | • Be able to recognise and work with categorical, discrete, continuous and ranked data. Be able to interpret standard diagrams for grouped and ungrouped single-variable data.<br>• (Bar chart, dot plot, histogram, vertical line chart, pie chart, stem-and-leaf diagram, box-and-whisker diagram (box plot), frequency chart.)<br>• Histograms.<br>• Cumulative frequency diagrams.<br>• Describe frequency distributions. Symmetrical, unimodal, bimodal, skewed (positively and negatively). | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Data presentation**<br><br>**(bivariate data)** | • Be able to interpret a scatter diagram for bivariate data, interpret a regression line or other best fit model, including interpolation and extrapolation, understanding that extrapolation might not be justified.<br>• Be able to recognise when a scatter diagram appears to show distinct sections in the population. Be able to recognise and comment on outliers in a scatter diagram.<br>• Be able to recognise and describe correlation in a scatter diagram and understand that correlation does not imply causation. | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Summary measures** | • Know the standard measures of central tendency (median, mode, (arithmetic) mean, midrange) and be able to calculate and interpret them and to decide when it is most appropriate to use one of them.<br>• Know simple measures of spread (range, percentiles, quartiles, interquartile range) and be able to use and interpret them appropriately.<br>• Know how to calculate and interpret variance and standard deviation for raw data, frequency distributions, grouped frequency distributions.<br>• Be able to use the statistical functions of a calculator to | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | find mean and standard deviation.<br>• Understand the term outlier and be able to use standard formulas to identify outliers<br>• Be able to clean data including dealing with missing data, errors and outliers. | | | | | |
| **Probability** | • Be able to calculate the probability of an event.<br>• Understand and use the concept of a complementary event.<br>• Be able to calculate the expected frequency of an event given its probability.<br>• Be able to use appropriate diagrams to assist in the calculation of probabilities. E.g. tree diagrams, sample space | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | diagrams, Venn diagrams.<br>• Understand and use mutually exclusive events and independent events<br>• Be able to use Venn diagrams to assist in the calculations of probabilities.<br>• Know how to calculate probabilities for two events which are not mutually exclusive.<br>• Be able to calculate conditional probabilities by formula, from tree diagrams, two-way tables, Venn diagrams or sample space diagrams.<br>• Know that P(B\|A) = P(*B*) implies *B* and *A* are independent. | | | | | |
| **Probability Distributions** | • Understand and use Binomial distribution, | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | including calculating probabilities from formula and using technology, including cumulative probabilities; use mean of Binomial; model with Binomial<br>• Discrete probability distributions: use probability functions, given algebraically or in tables. Understand the term discrete random variable; be able to calculate probabilities for simple discrete distributions<br>• Normal distribution: simple properties of the distribution, including location of mean and points of inflection; standardise a | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Normal variable using mean and variance; calculate and use probabilities (using technology); use the Normal to model situations | | | | | |
| **Hypothesis testing** | • Understand processes and language of hypothesis testing, including null and alternate hypotheses, significance level, 1 and 2 tailed tests, critical values<br>• Hypothesis test for the proportion in a Binomial distribution, including finding critical region<br>• Hypothesis test for the mean of a Normal distribution, including known variance, or | A Level Mathematics | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | unknown variance and large sample<br>• Hypothesis testing for the significance if a correlation coefficient | | | | | |
| **Discrete Probability distributions** | • Poisson distribution<br>• Geometric distribution<br>• Discrete uniform distribution<br>• Understand and use mean and variance of a discrete random variable<br>• Linear functions and combinations of discrete random variables<br>• | A Level Further Mathematics | | | | 120 hours for the Statistics component of Further Mathematics A Level |
| **Bivariate Data** | • Calculate (using technology), use and interpret pmcc and Spearman's rank correlation coefficient<br>• Calculate and use regression line (y | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | on x and x on y), including residuals<br>• Hypothesis test for pmcc and Spearman's | | | | | |
| **Chi$^2$ Test** | • Apply and interpret Chi$^2$ test to contingency table<br>• Apply and interpret Chi$^2$ test for goodness of fit or uniform, binomial or Poisson model | | | | | |
| **Continuous probability distributions** | • Understand and use concept of a continuous random variable<br>• Use probability density functions: calculating probabilities, sketching, using properties; finding mean and variance; finding mode and median<br>• Understand and use cumulative distribution | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | function: find pdf from cdf and vice versa; find median and percentiles<br>• Normal distribution: use linear combinations of independent Normal random variables; interpret probability plot to decide if Normal model is appropriate, including interpreting output from Kolmogorov-Smirnov test; construct confidence intervals using Normal distribution<br>• Central Limit Theorem: understand and use distribution of the sample mea, including standard error of the mean; understand how | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | and why CLT may be applied | | | | | |
| **Expectation Algebra** | • Be able to find the mean of any linear combination of random variables and the variance of any linear combination of independent random variables.<br>• | | | | | |
| **Confidence Intervals** | • Use Normal and t distributions to construct and interpret a confidence intervals<br>• Construct and interpret a confidence interval for the difference in mean of two paired populations using Normal or t distribution | | | | | |
| **Hypothesis testing** | • Hypothesis test for the median of a population using the Wilcoxon signed rank test, | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | knowing that this is an example of a non-parametric test<br>• Hypothesis test for a mean using Normal or t distributions | | | | | |
| **Simulation of random variables** | • Know that spreadsheets can be used to simulate probability distributions, and be able to do so for discrete and continuous uniform distributions and Normal distributions.<br>• Know that simulations can be used to approximate probability distributions and to estimate probabilities, including in situations where the theory may be technically difficult. Be able to interpret output from spreadsheets | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | investigating such situations. | | | | | |

## 2. Web resources related to the teaching and learning of Data analytics in the UK

| **Website** | **Descriptions** | **Resources** |
|---|---|---|
| ProCivicStat (http://community.dur.ac.uk/procivic.stat/) | "ProCivicStat supports statistics teaching that enables students to engage with current social issues." | It has the following information for the teaching and learning of statistics:<br>• CivicStatMap – a database of teaching and learning material to support innovative teaching practices in high schools and universities<br>• Call for Action that incorporates Recommendations for Action<br>• Conceptual framework mapping the skills and knowledge required for understanding civic statistics<br>• Review of dynamic visualisation tools, open access analysis tools, and relevant sources of data<br>• Publications and academic papers |
| Statistics in Your World (https://www.stem.org.uk/resources/collection/3443/statistics-your-world) | "Statistics in Your World is the series title for the teaching material developed by the Schools Council Project on Statistical | Resources are available from the website. |

| | | |
|---|---|---|
| | Education for students aged 11-16. The Project's material links together the statistics used and taught in different disciplines - geography, science, social science, the humanities, and mathematics. The material helps students to develop an insight into the statistical problems of everyday life. It adopts a balanced approach to the teaching of statistics by emphasizing the practical background of statistical investigations and the inferences that can be drawn from them, as well as introducing students to basic statistical techniques." | |
| Teaching Statistics Trust (http://teachingstatisticstrust.org.uk/) | Teaching Statistics Trust activities include:<br>• publication of the journal Teaching Statistics<br>• promoting statistics in schools, colleges and society<br>• funding initiatives in statistical education | Teaching Statistics journal: https://onlinelibrary.wiley.com/journal/14679639 |
| RSS education section: http://www.rss.org.uk/RSS/Influencing_Change/Education/RSS/Influencing_Change/Education.aspx?hkey=fb2c3bd0-b4ff-4167-abd7-efb4f874882f | "Our interest in promoting statistical education has two main strands: our policy work seeks to influence the education curriculum, particularly in secondary schools. We also support teaching through a range of resources. Our work in this area is overseen by our vice-president for education and statistical literacy, supported by our Education Committee and our Education Policy Advisory Group." | Some resources are available from: http://www.rss.org.uk/RSS/Get_involved/Promote_statistical_careers/Hands-on_statistics/RSS/Get_involved/Promote_stats_careers/Hands-on_statistics.aspx?hkey=93c109ac-98bd-40ac-be0e-4e9fcfd482a9 |
| International Centre for Statistical Education (closed but the website is alive http://www.icse.xyz/) | "Based at Plymouth University in the School of Computing and Mathematics the ICSE aims to develop innovative projects that enhance statistical education in schools, colleges, universities and the workplace, as | Link to some resources: http://www.icse.xyz/?p=575 |

| | | |
|---|---|---|
| | well as establishing a range of 'tools' and utilities that develop statistical understanding." | |
| Stats4school http://www.icse.xyz/stats4schools/ | "stats4schools is about helping teachers and pupils to get more from statistics. For pupils, we have datasets you can download and include in your own projects, free of charge. For teachers, we have lesson plans and worksheets, which you are free to download and use in class. stats4schools is managed by the independent Office for National Statistics, and includes data from across government." | Lesson plans and sample data are available from: http://www.icse.xyz/stats4schools/lesson_ideas/default.html |
| Problem solving approach http://www.icse.xyz/psa/ | "In 2005 and 2006 the Royal Statistical Society Centre for Statistical Education (RSSCSE) undertook a review of the statistics and data handling content of GCSE to determine what should be retained as part of the core curriculum for mathematics and what may be beneficially seeded for delivery through other subjects, particularly science. As part of this review the Centre worked with experienced teachers to develop a set of eight exemplar classroom teaching and learning resources. These resources use a statistical problem solving approach and, in addition, an online assessment to assess understanding of the problem solving cycle was developed and successfully trialled. You can view the publication here at amstat. The resources have been highly acclaimed by teachers who have used them in class and they can be found here, on this website." | They made 11 recommendations for the teaching and learning of data handling and statistics: http://www.icse.xyz/psa/outcomes.html<br><br>Resources are also available from: http://www.icse.xyz/psa/resource0.html |
| Censusatschool https://censusatschool.ie/en/home | "The Royal Statistical Society Centre for Statistical Education (RSSCSE) started the | By using https://censusatschool.ie/en/get- |

| | | |
|---|---|---|
| | CensusAtSchool project in 2000 in conjunction with the National Statistics Office in the UK. The project, originally a one-off, was linked to the UK population census of 2001. It has now developed into a dynamic, ongoing and exciting initiative running in a number of countries." | data/random-data-selector we can download data around students in several countries (height, age, etc.) |

## 3. Students' attitudes towards statistics – initial survey results

In 2017-18, we conducted initial surveys of students' attitudes towards statistics and their interests in weather. This survey did not aim to develop measurements for these aspects, but simply grasp some picture of our students at this stage.

92 KS3 students (Y9) answered a set of questions in their attitudes towards statistics (1 as strongly agree & 5 as strongly disagree.). The following table summarises the results.

| Question | KS3 |
|---|---|
| I find it difficult to understand concepts related to data, graphs and tables | 3.43 |
| I feel insecure when I have to do problems related to data, graphs and tables | 3.41 |
| I am interested in using data, graphs and tables | 2.86 |
| I enjoy taking lessons related to data, graphs and tables | 2.89 |
| I work hard in my lessons related to data, graphs or tables | 2.37 |

| | |
|---|---|
| I study hard for test problems related to data, graphs or tables | 2.67 |
| Skills related to data, graphs or tables make me more employable | 2.54 |
| Skills related to data, graphs or tables is not useful to the typical professional or jobs | 3.3 |

90 KS5 students (Y12-13) answered a set of questions in their attitudes towards statistics (1 as strongly agree & 5 as strongly disagree.). The following table summarises the results.

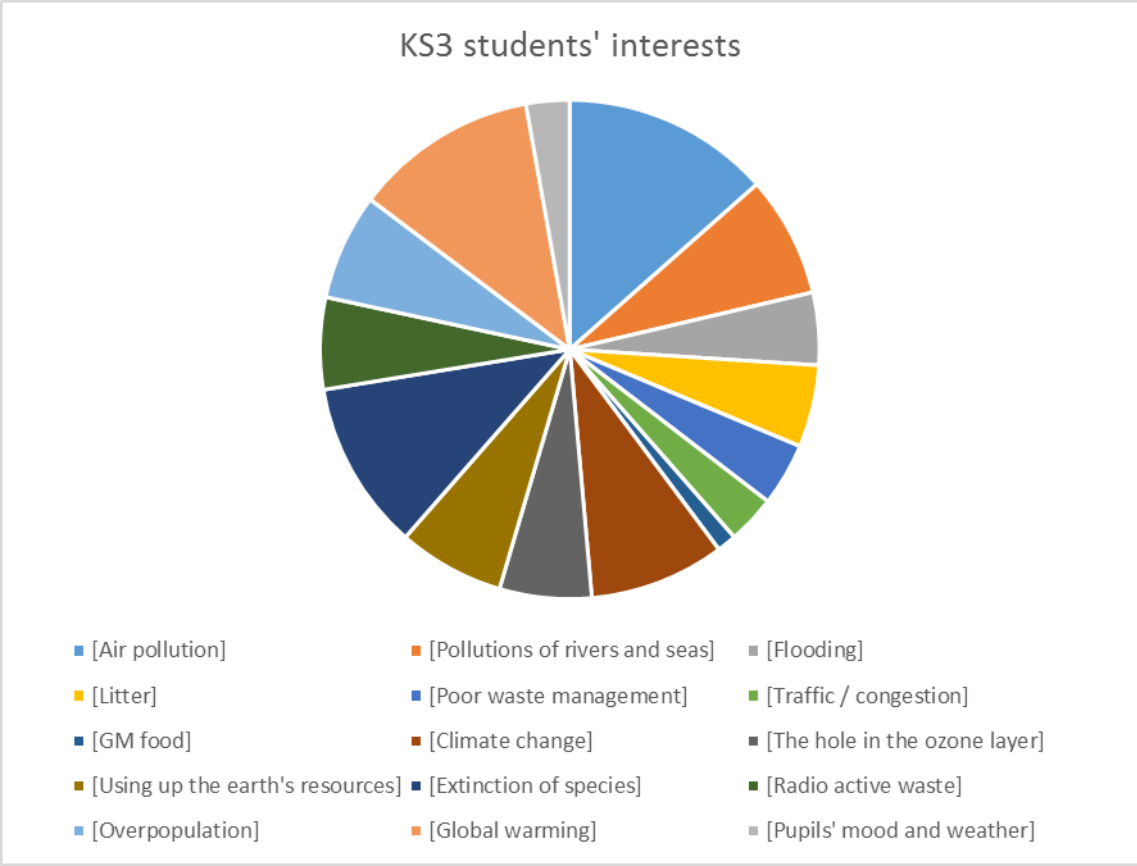
| **Question** | **KS5** |
|---|---|
| I find it difficult to understand statistical concepts | 3.61 |
| I feel insecure when I have to do statistics problems | 3.86 |
| I am interested in using statistics | 2.4 |
| I enjoy taking statistics lessons | 2.57 |
| I study hard in statistics lessons | 2.17 |
| I study hard for every statistics test | 2.75 |

| | |
|---|---|
| Statistical skills make me more employable | 1.94 |
| Statistics is not useful to the typical professional or jobs | 4.12 |

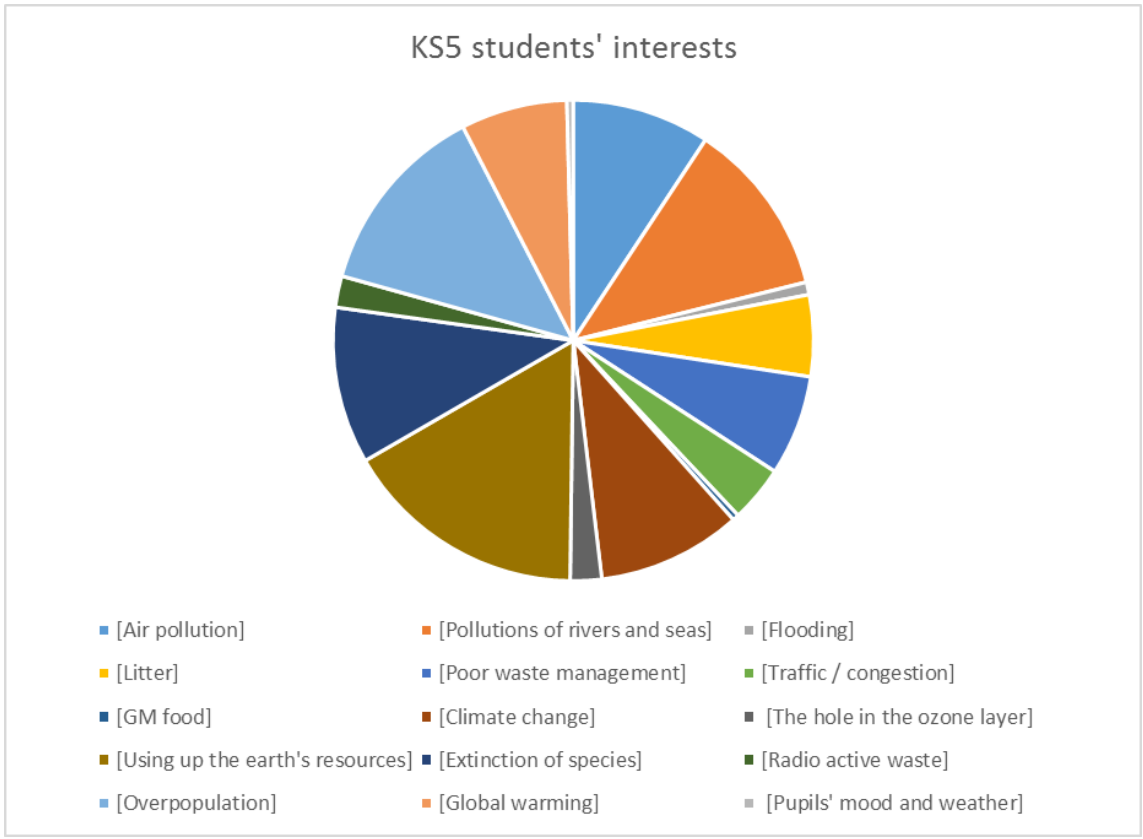
Our students have relatively low anxieties and rather positive attitudes towards studying statistics, but their attitudes towards using applying and resilience can be improved. Perhaps it would be really useful if they can appreciate how knowledge and techniques related to statistics can be used in every life and jobs.

## 4. Students' interests in weather

92 KS3 students (Y9) asked to choose 3 topics which they were interested in. The following pi chart summarises the results.




90 KS5 students (Y12-13) asked to choose 3 topics which they were interested in. The following pi chart summarises the results.


KS5 students' interests
[Air pollution]
[Pollutions of rivers and seas]
[Flooding]
[Litter]
[Poor waste management]
[Traffic / congestion]
[GM food]
[Climate change]
[The hole in the ozone layer]
[Using up the earth's resources]
[Extinction of species]
[Radio active waste]
[Overpopulation]
[Global warming]
[Pupils' mood and weather]