

WELSH BACCALAUREATE QUALIFICATION



1.
Collecting
Data



2.
Presenting
the results

DEVELOPING AND USING INVESTIGATIVE AND ENQUIRY SKILLS

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DEVELOPING AND USING INVESTIGATIVE AND ENQUIRY SKILLS

1. INTRODUCTION

These guidance notes had their origins in a number of WBQ INSET meetings, the focus of which was the Individual Investigation and key skills. During these meetings it was suggested that some of the problems that challenge learners working on both the WBQ Individual Investigation and key skills portfolios are also experienced by many students at all stages of education and training, even at post-graduate level. It was decided, therefore, to investigate the ways in which teachers currently approach such learner-centred activities and see if there are any strategies that appear to produce better results than others. Examples of these could then be provided for the use of teachers and learners, with guidance on:

- how individuals appear to acquire and use investigative and enquiry skills;
- how these skills can be developed effectively.

These guidance notes are, therefore, written for both partners in the learning process – teachers and, through them, the learners.

They look at:

- the nature, context and scope of investigative and enquiry skills;
- current approaches to delivering these skills;
- a possible learning programme leading to their effective delivery;
- some useful resources for teacher and student.

None of this report would have been possible without the contributions of the members of the Investigative and Enquiry Skills Working Group. The WJEC and the WBQ wish to thank the members of the Group who used their experiences in developing skills-based teaching programmes and assessing these skills in a range of school and college-based examinations to produce the information and ideas from which this report was drawn. The membership of the Working Group is given on page 18.

Finally, the WJEC wishes to thank the Head Teacher and the Geography Department at Leiston High School, Suffolk for permission to use the Coursework booklet reproduced in **ANNEX 2**.

2. THE CONTEXT OF INVESTIGATIVE AND ENQUIRY SKILLS

The starting point in any discussion must be the 'context' in which these skills are set and acquired. A review of the literature suggests a number of different approaches to what constitutes the 'context' of these skills. For example, it is sometimes suggested that they merely form a subset of thinking skills and enquiry generally. Such advocates suggest that this approach requires us to consider skills as part of:

- the 'wholeness' of a person.
- also, to be effective, it must be acknowledged that skills of any sort are pretty worthless if the learner has neither the inclination nor 'the good sense' to use them, i.e. learners should be encouraged to develop a general 'disposition' to think 'better'.

If this approach is adopted then it could allow the teacher to *'promote an enquiring mind and a capacity to think rationally ... (and the resulting) curriculum should enable learners to think creatively and critically, to solve problems.'* (Key Stages 1,2, DFEE and QCA 1999).

But what are 'investigative' and 'enquiry' skills? Do they include the following?

Enquiry skills enable learners to:

- ask relevant questions;
- pose and define problems, plan what to do and how to research;
- predict outcomes, test conclusions and improve ideas.

Creative thinking skills that enable learners to:

- generate and extend ideas;
- suggest possible hypotheses;
- apply imagination to their thinking;
- look for alternative outcomes.

Reasoning skills that enable learners to:

- give reasons for opinions;
- draw inferences and make deductions;
- use precise language to explain what they think;
- make judgements and decisions informed by reasons and evidence.

Information-processing skills that enable learners to:

- locate, collect and recall relevant information;
- interpret information to show they understand relevant concepts and ideas;
- analyse information, e.g. sort, classify, sequence, compare and contrast;
- understand relationships, e.g. part/whole relationships.

Evaluation skills that enable learners to:

- evaluate information;
- judge the value of what they read, hear and do;
- develop criteria for judging the value of their own and others' work or ideas;
- have confidence in their judgements.

The question now arises – ***'How best can such skills be integrated into and so form part of a student's 'learning programme', in such a way as to ensure that students have the inclination and good sense to use them?'*** The next section tries to answer this.

3. A POSSIBLE LEARNING PROGRAMME

This Section looks at what kinds of teaching strategies will help students to develop the skills they need. The WBQ curriculum offers two ways forward –

- either as a complete integrated programme in which the skills are developed in a coherent and planned way, and feature as a part of the learning and curriculum, when and as needed during the learning process; or
- as a set of special discrete 'inserts' into existing courses, such as the WBQ Core or a student's Option programmes, or as 'stand alone' inputs.

Whichever strategy is adopted, it should address not only the development of specific investigative and enquiry skills but also the development of the entire complex of process skills that are needed for learners to understand, appreciate and practise learning. In other words, the more learners understand the issues and processes involved, the more effective learners they become. The following are the most important components of both approaches to the development of a contextualised skills-based curriculum and would allow learners to acquire the skills itemised in Section 2.

- As far as possible, students should learn 'by doing or experiencing', that is, experientially, how we pose questions and conduct investigations. Every effort should be made to make the learning activities meaningful to the learner. Authenticity will come from the reality of the tasks and from the techniques and tools that learners are able to use.



Learning by doing: what's the context, what learning is taking place?

- Students should move from the known to the unknown and from the simple to the complex. In other words, there should be a gradual increase in sophistication and complexity within the learning programme while, at the same time a decrease in the supportive 'scaffolding'. Ideally, this means a developmental sequence that begins with exploratory, qualitative analyses, then advances to measurements and data sharing and analysis, and concludes with open-ended enquiry. They should also exhibit greater autonomy in learning.
- The curriculum should allow the learners to place their work in meaningful, relevant and accessible contexts, for example, by focusing on studies in their own communities, moving on to wider world issues – but all the time being able to see a relevance to them.



Collecting data in the local area – using relevance as a means to move outwards

- The learning programme should guide students from qualitative observations to the collection of data, measurements, recording and monitoring
- The programme should include opportunities for learners to develop skills that include framing questions for enquiry, developing methodical research plans, identifying sources of relevant information and developing experimental strategies.
- This kind of approach to learning will allow learners to acknowledge the value and advantages to be derived from 'working with others'. Planned, collaborative working allows learners to work in teams where they can share and rotate tasks whilst at the same time being charged with collaborative

decision-making and analysis. *'By learning how to work productively in teams, students are preparing for broader, more sophisticated cross activity collaborations.'* (*'Developing Skills of Investigation: Boris Berenfield and Elizabeth Chapman*)



How does this activity explain and help the development of 'teamwork'?



Teamwork: a means to an end

These points may be summarized in the following five-step model of an approach to carrying out an investigation, an individual piece of research, or attempting to solve a problem:

Step 1: Choosing an Issue

Students often need guidance on how to best choose an issue to investigate, for example:

Generating initial ideas: by, for example, *identifying student interests/concerns; reviewing local newspaper stories for a week or a month; a teacher-led tour of the neighbourhood.* Then, **choosing an Issue:** *this can be considered individually or, if working in groups, through general discussion.*

Step 2: Defining the issue or problem

Although the ultimate aim of most exercises is to come up with a view, a solution or conclusion, the problem/issue-definition stage is extremely important. Until they have some experience, learners may have trouble focusing on the issue/problem definition. They may find it frustrating not knowing what to do next. Stress that this step is necessary and should not be ignored for the more interesting steps of choosing a title and taking the next step.

Step 3: Searching for evidence, solutions or conclusions

This step involves understanding alternative views and a range of possible solutions/conclusions. The process involves encouraging creativity and then returning to the definition stage to learn more about what the conclusion may entail. Searching for solutions or conclusions can occur at two levels: identifying broad solutions to an issue and identifying solutions to which the individual and the group may contribute.

Step 4: Evaluating options and conclusions

Once learners have identified a range of solutions or conclusions, you can then help them consider the constraints and possibilities of each and the values and interests they serve. At this point the teacher's role is to support the learners' in the evaluation process.

Step 5: Taking action

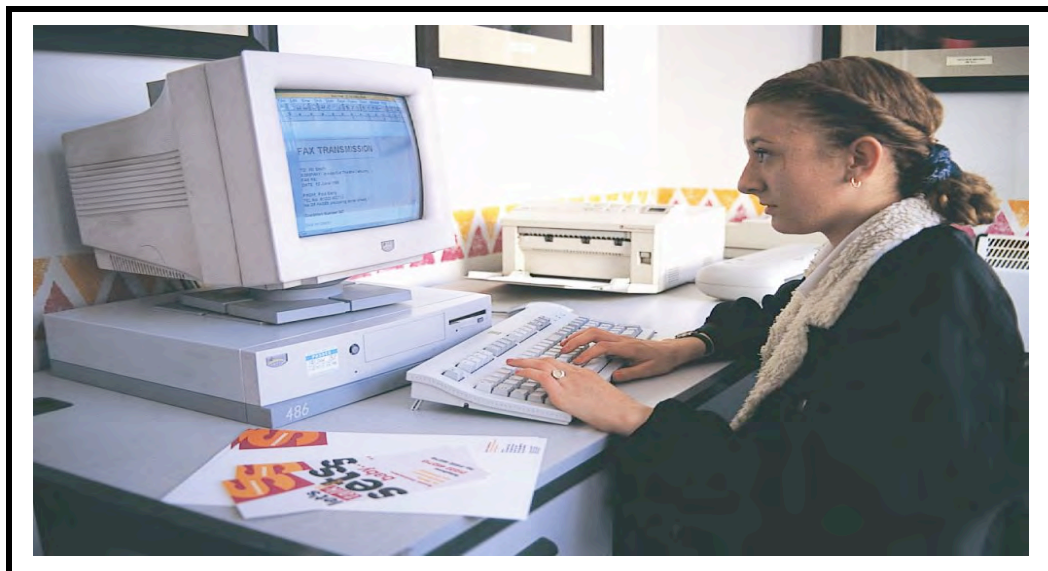
This involves understanding what types of changes are possible to resolve the problem or address the issue, how the learner can contribute, and, if appropriate, do so.

The remainder of this section follows through these ideas by suggesting that the approach to the Individual Investigation or portfolio should be based on the premise that teaching and learning should encourage the acquisition and development of skills so that learners apply them to the Individual Investigation almost automatically – they become, as it were, transferable skills. This means that the learner almost automatically draws on skills acquired in the whole range of learning experiences.

There is a danger, however, that a list such as this remains a list of words or simply theory. The example¹ that follows attempts to make the whole process 'real' by presenting a group of post-16 school or college learners with a practical problem to be resolved. It is based on the assumption that most problems in the real world have a number of possible solutions that are dependent upon available information and the individuals taking part. It also allows them to develop and use investigative and enquiry skills. By thinking through ill-structured problems, students are able to expand and refine their knowledge through self-directed searches for information, active discussion with others, analysis of conflicting ideas and appeals, and decision-making. The **evaluation criteria** or '**performance checklist**' included at the end of this activity can be used for learner assessment. It has proved useful to students to post a copy of this checklist in the classroom for them to use as a guide to **your** expectations.

The Problem: The learning activity scenario

The problem to be 'solved' centres on the interest of a school, college or training provider in delivering courses over the internet. Learners would be able to take these courses without attending school or college, assessing the information from their home computers and communicating with their teachers and classmates through email. Due to the fact that not all learners have access to home computers (although they are available in most libraries), and because learners would not need to be physically present in class, the suggestion is an important issue. The parties affected by this decision would be learners, parents, faculty leaders or tutors, and the business community. **Learners are required to assume that they are part of a company that has been asked to investigate the issue and come up with a recommendation to present to the school, college governors, training provider or local education committee.**



Starting the work: working alone?

¹ This activity was developed by Bettina Lankard Brown, 1998, and quoted in The Keynet Project, Trainer's Guide. A Project funded through the Leonardo da Vinci Programme

Operational Steps

Step 1

Have the learners working together in groups to identify a hypothesis for the problem solution. **Group discussion can be used as a strategy for compiling a list of questions relative to the problem.**

Step 2

Identify the roles of problem solving groups. Explain that there will be 'x' teams of investigators to prove or disprove the hypothesis, with each group representing one of the four types of 'stake-holders people' from, business and industry, school, college, faculty, learners and parents. One member of each team should be chosen by the team members as the panellist who will represent them at the public forum to be held in 2 weeks at the education committee meeting. **Encourage learner self-selection of internet user roles based on the focus of their interest.**

Step 3

Describe each team's responsibility, which is to gather information on support or rejection of the hypothesis. Each panellist's responsibility is to present her/his team's rationale for or against censorship of internet usage in the school, college or training area. **Engage in 'scaffolding' by helping learners to connect their responsibilities to various methods of application. For example, use questioning to help them clarify their roles and ways to perform them, letting their responses direct the way to offer leadership.**

Step 4

Initiate the research part of the investigation by guiding the four groups to appropriate resources, including the internet. Additionally, provide the teams with background information on censorship and the learners right to know. **Provide primary sources, along with manipulative, interactive and physical materials to encourage enquiry.**

Step 5

Discussion with learners about other methods of obtaining information, such as interviewing community members, conducting surveys and personally soliciting opinions of parents and learners. **Guide learners in ways to structure questions to use in interviews. Circulate among and coach learners as they attempt to follow your model.**

Step 6

Engage learners in critical thinking and reasoning. Have team members work together to identify the facts and values that surround the problem and develop criteria to evaluate the appropriateness of information available on the internet. **Explain that because social issues are often the basis for ill-structured problems, learners should give special attention to values - ethical, economic, moral, legal, environmental, health and safety-related values when devising problem solutions. Ask open-ended questions such as ‘What is important to the learners, parents, school/colleges and community?’. ‘What ethical issues are involved in the decisions?’**

Step 7

Help problem solution by having team members work together to identify possible solutions to the problem and prepare a rationale supporting or rejecting the censorship of Internet usage. Prompt learners to relate the value principles they used to guide their decisions and offer facts to support those principles. **Ask leading questions such as ‘What information is reliable?’ ‘What are some possible options to the issue of internet courses?’ ‘What will happen if . . . (pros and cons)?’**

Step 8

Direct learners to make a decision based on the consensus of the four groups. **Monitor the exchange of information and discussions among learners and guide them toward conflict resolution if necessary.**

Reflective Practices

Have learners discuss the importance of various perspectives on internet courses obtained through their research. Ask them to identify how the omission of one of those perspectives might alter the decision they make.

Have learners identify how values (medical, academic, family) influence decisions about which solutions to ill-structured problems are the ‘best’ ones. Ask them to offer examples of how bias is reflected in the way data are interpreted.

Engage learners in discussion of how each type of information is important to consider in solving an ill-structured problem.

Evaluation

Involve learners in debriefings about the team activity:

- *‘What was the most difficult for you in the team activity?’*

- 'What was one of the most positive things to come from your team interactions?'

Performance Checklist

Part 1: To what extent were these **guidelines** for team interactions followed?

Item:

The specifics of the problem were clearly identified by the team

Always/Sometimes/Rarely/Never

Sufficient information was gathered for review

Always/Sometimes/Rarely/Never

Several perspectives to the problem were considered by the team

Always/Sometimes/Rarely/Never

The pros and cons of each recommendation were presented

Always/Sometimes/Rarely/Never

The solution was unanimously selected

Always/Sometimes/Rarely/Never

Part 2: Identify the extent to which the following **practices** were evident in your team interactions:

Demonstration of good listening skills

Always/Sometimes/Rarely/Never

Free submission of ideas for group consideration

Always/Sometimes/Rarely/Never

Demonstration of respect for the opinions of others

Always/Sometimes/Rarely/Never

Active consideration given to all suggestions

Always/Sometimes/Rarely/Never

Negotiation with others to reach team agreement

Always/Sometimes/Rarely/Never

Such an exercise allows learners to get used to a range of opportunities and contexts within which they can acquire and use investigative and enquiry skills. This exercise could form a useful part of a WBQ induction programme, at the beginning of the course.

4. USEFUL RESOURCES

In the course of the Working Group discussions it was obvious that members were able to draw upon a range of practical experiences based on teaching and assessing investigative and enquiry skills. It was also clear that these fell naturally into two groups – resources that target the teacher and those that were intended for the student. The remainder of this section considers the nature of these two types of resources. The results of the work of members are presented in **ANNEX 1** and **ANNEX 2** and, it is hoped, will prove useful to teachers and learners.

(a) For the teacher

Where do we start? What is the context? If we are coming to investigative and enquiry skills through an Individual Investigation, for example, the first thing to do is to find out what is meant by an 'Individual Investigation'. This should be an easy task because it tells you in the WBQ Specification. So, what is it?

An Investigation requires the learner to select an issue for study, for example, what can be done about housing problems; or the advantages and disadvantages of students doing part time work; or the influence of newspapers and television on people's lives, including the individual learner's life. The learner could consider the issue in Wales, or a part of Wales, and perhaps a part of England or France or the USA. Or they may be interested in some other issue they have talked about in the WBQ course. Whatever the origin of the interest, ideally, the issue selected should allow the learner to (a) find out information, (b) analyse it, (c) present it in statistics or diagrams, and (d) draw some conclusions about what was discovered. It should be pointed out that the Investigation will be assessed so that credit is given for doing these things. Finally, it should be emphasised that the Investigation can be presented either in a written form or by giving a talk.

It could now well be the moment to introduce your learners to the range of skills developed and used in the Individual Investigation and other aspects of the WBQ. Bearing in mind the issues raised in Section 3, let us imagine you are now ready to discuss with your learners their selection of a topic for their Investigation.

This discussion may be given some concrete form by using the explanatory notes and 'hints' given in **ANNEX 1**. These are the kind of comments and suggestions that could well feature in a lesson or discussion, or even a session forming part of an induction programme, about acquiring skills.

(b) For the Learner

The example of a 'student guide' reproduced in **ANNEX 2** is the kind of learner-centred booklet that could both allow the teacher to illustrate the points being made during learner-preparation time. It also provides the student with an accessible *aide memoir* that can be a frequent reference point for a range of queries relating to investigative skills. The 'Guide' was developed for use by GCSE Avery Hill Geography students by the Geography Department at Leiston High School in Suffolk.



A little revision first: 'What part do each of the above activities play in investigative and enquiry skills development?'

An important point to raise with students:

The Investigation must include a bibliography/references. But more than this – all quotations and references must be acknowledged. Downloading from the internet must include an exact reference to its source and the author. Unacknowledged insertions constitute plagiarism.

So a bibliography is important. What is a 'bibliography'? It is a list of books, articles, maps, notes, statistical tables etc. that you have used to help you write your Investigation.

An example of a basic bibliography is given below.

Title of Individual Investigation:

“How healthy are children’s diets in Wales and the USA?”

www.alternative-healthzine.com 13/01/2005

www.bupa.co.uk 27/01/2005

www.healthscout.com 27/01/05

www.iom.education 13/01/05

www.kidshealth.org 13/01/05

www.lonelyplanet.com 27/01/05

www.news.bbb.co.uk 13/01/05

www.nutrition.org.uk 13/01/05

www.obesity.org 27/01/05

Schulte-Peevers A, Peevers D, Keller N, Gierlich M, McNeely S, Lyon J, Wheeler T, (2000) Lonely Planet California and Nevada (Second Edition), Lonely Planet Publications, Melbourne, Australia

A point about the context of skills acquisition within the WBQ

The WBQ allows learners to draw their Investigations from any part of the WBQ Core, that is, PSE, WRE, WEW, and the key skills. Clearly there will also be opportunities for many students to draw upon their Optional Studies, such as Health and Social Care, Hair and Beauty, the Sciences, History, Geography and Construction. In these cases, the 'practical'-based programmes will provide different opportunities to the more academic programmes but each is equally relevant and realistic.

5. THE WAY AHEAD

An investigation of possibilities

As background to a consideration of the whole issue of ways of improving learner acquisition and development of investigative and enquiry skills, a group of individual teachers looked at how these are dealt with in a range of GCSE/GCE and vocational programmes, across the age ranges 14-19. When these reports were brought together, a number of general conclusions were drawn which provide some insight into possible ways of improving both learning and mastery. Chief among these were:

- Generally, there appears to be little or no attempt to develop an **integrated approach** to the planning of programmes in which learners build up skills mastery, and in which they are able to **progress** from one level to another. Rather, each stage of education or training appears to be ‘self-contained’, with little acknowledgement of what happens before or after the current one. Even where some programmes or courses do attempt to achieve this progression, it was largely restricted to specific course or programme skills rather than to the development of transferable skills.
- There is limited evidence of the development of **investigative and enquiry skills programmes set within either specific or general contexts**. This usually results in learners being unaware of the ways in which they can use skills gained in one context in another. Rather, they re-learn skills again and again, usually without fully appreciating their transferability.
- Examples of ‘good practice’ are usually associated with **specific courses**, such as geography or biology where enquiry and investigative skills are central to that subject’s aims and objectives, or **vocational programmes** that are heavily dependent upon the use of these skills both within the curriculum aims and as strategies for learning; it is especially significant where key skills are central to success in the learning process.
- In most examples, the use of enquiry and investigative skills was considered **only in the context of either coursework or practical work, and portfolio development**. It rarely featured in advice on teaching-learning strategies generally.
- **There was a very close relationship between learner success in investigative and enquiry skills and the timing of the introduction of key skills programmes into a course or programme**. Most successful strategies based this introduction upon a carefully planned ‘induction programme’ in which the ideas of enquiry and investigative learning are related to the idea of checking if a skill will have general applicability.
- **All too often, successful strategies and programmes are associated with the enthusiasm and expertise of an individual teacher**, and whether a teacher has had experience of delivering key skills when they were integrated into a learner’s main programmes of study and training.

With these findings in mind it is possible to suggest an action programme to improve the mastery of investigative and enquiry skills which would be applicable to most teaching-learning situations.

A possible way forward?

- **There needs to be a whole centre policy and strategy for dealing with investigative and enquiry skills in a coherent way**, in which learners are

encouraged to see how skills developed in one context may well be applicable in another, and that they are not limited to coursework or portfolio work.

- Centres need to ensure that there is **careful planning** to encourage **progression** between stages of learning and training.
- Ideally, learners appear to benefit if centres organise **induction programmes** during which learners are provided with opportunities to understand the ‘why’ of investigation and enquiry skills.
- It is important that teachers and learners are provided with **appropriate teaching and learning materials**, in particular, materials such as included in **ANNEX 1** and **ANNEX 2**, and examples of learners’ work, such as portfolios using a range of appropriate skills.
- There should be opportunities for the **evaluation of the programmes, materials and responses of learners** to the overall learning programme.
- **‘Working smarter’ strategies** could allow teachers and learners to appreciate the value of the greater use of investigation and enquiry skills in a generic and transferable way.

In many respects, the WBQ Individual Investigation is an ideal opportunity to begin the process of considering afresh the most appropriate way of ensuring learners are able to make the best use of what they learn and the skills they acquire and develop.

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MEMBERS OF THE WORKING GROUP

Paul Jones	Principal Moderator, WBQ
Gill Miller	Chief Examiner, GCE World Development
Clare McRobbie	Cathays High School, Cardiff
Berni Tyler	Pembrokeshire College and WBQ Foundation Level Development Officer
Linda Coollidge	Ysgol Brynhyfred, Denbighshire
Jane Carver	Coleg Gwent, Ebbw Vale Campus
Huw Cripps	Cardinal Newman Catholic School, Rhondda Cynon Taf
Glyn Owen	Ysgol Morgan Llwyd, Wrexham
Kim Morgan	WBQ Development Team
WBQ Officers:	Peter Davies, Richard Carter

ANNEX 1

SKILLS – FROM TOPIC SELECTION TO FORMING CONCLUSIONS

Choosing a Topic you are interested in

Your Investigation gives you the opportunity to study and research an issue or topic in detail and, in the process, to learn something new. You will be spending quite a bit of time on it, so it's worth choosing a topic in which you are interested and that you will enjoy working on. Your topic might be based on one of your personal interests, or on something that is in the news at the time. Or you might choose to investigate something that is to do with the WBQ Core, your main subjects or programme.

But you also need to choose a topic that will allow you to develop your skills of investigation, and you will want to show how well you can do. So it's worth spending a bit of time deciding what will make a good topic for you. Talk to your teacher about your ideas.



Talking to the learners about possible topics

Ask yourself the following questions:

- **Is there something interesting to be discovered?**

Doing an investigation means setting out to find something new. So it's worth thinking of a topic where there is something already known, but where you can think of something new that can be discovered by investigating a bit more.

- **Is there relevant evidence that you can get hold of?**

There's a bit of a system to doing an investigation, and that's because your findings have got to be sound enough to convince somebody else who reads your report. The most important part about the system is the primary and secondary **evidence** or **data** that you collect - this needs to be obtained in such a way that your results and findings can be trusted. Depending on the topic, the evidence can be of many different types - facts drawn together in a way that has not been done before, or opinions that have been gathered from people who have a view on the matter, or even measurements that you have made.

- **Can you summarise what you want to investigate into a simple form of words?**

You don't want your investigation to be jumping here, there and everywhere. So that you can do it in the time available, it needs to have a clear purpose and a structure. So, it can be very helpful if you can sum up what you intend to do into a question that you want to answer, or a statement that you want to investigate whether it's true or not.

- **Will the evidence be of a kind that you want to work with?**

Some kinds of investigations will lead to data, numbers and diagrams. Other investigations will be more to do with drawing together some findings from what people have said or written. You might find it useful to think about this at the start, so that you don't have any surprises later.

Setting the scene - what is already known?

On almost any topic you can think of, there will be something that has already been said or written. In setting the scene for your own investigation, it is helpful to make use of what you already know. You can think of this as being a section which gives the "background". In writing it, the most important skill is that of drawing together some background information in an interesting way for your reader.

This information might be drawn from all kinds of places. In some cases, maybe the background information comes from just one place - perhaps a newspaper article, specialist magazine, information leaflet or web-site. In other cases, there may be lots of previous references to the topic, and you might want to draw on several of these.

In situations where there is a lot of background information, you will obviously need to be careful not to make this section too long. Remember that this only sets the scene, and is not the main part of the investigation. The skill you will need here is that of writing a fair and balanced account of what is already known. If there are different views on something, you should try to reflect those different views in your summary.

In writing this section, remember to stick to what is already known. You should not be gathering new evidence for this section - that comes later.

Collecting evidence or data

The title of the Investigation is important. It tells the reader about something which is going to be **tested** or **investigated** to see, for example, if it is true or false. A **hypothesis** or a **question** is a good way to start because it provides a goal to aim for. It also suggests what type of evidence will be required to prove or disprove it. There are many different types of evidence that may be collected. For example, by

- **accessing** the internet, or **researching** in the library, among books, newspapers and magazines;
- **designing** a questionnaire and using it with colleagues within school or college, or in the community;
- **interviewing** people – structured and semi-structured interviews;
- **taking photographs, using a video recorder, drawing/painting.**

Ideally, a number of these methods should be used in collecting your data. The work can be made easier by working in pairs or groups.



Drawing, painting, discussing in a group

It is important that records are carefully kept of any data collected. These are usually collected together in an **appendix** or an **annex**.

Finally and important, your teacher will make a 'risk assessment' of potential problems that may arise before you go out to collect data.

How do I present my Results?

The way in which you present your results depends totally on the nature of the evidence you've got. The skill you need is to select the right tools for the job.

- **Numerical Results**

Some investigations produce evidence that is very numerical - counts of people, costs or financial data, measurements and quantities, or historical statistics. In these situations you are likely to be using tables and diagrams to summarise the data and present it to your reader.

It's important to remember that each kind of diagram suits a particular purpose, so choose carefully the ones you use. For example, a **pie-chart** is excellent for showing how a single total is broken down into different elements or proportions. On the other hand a **bar chart** is often the best way of showing actual numbers in different categories and for making comparisons between two sets of similar data. If you have historical data covering several years, a **line diagram with the years shown on the horizontal axis** is the appropriate method of presentation. Several examples of diagram types are shown in the example of a student document in **ANNEX 2**. These can be drawn using a computer package, but of course it is also acceptable for you to draw them by hand.

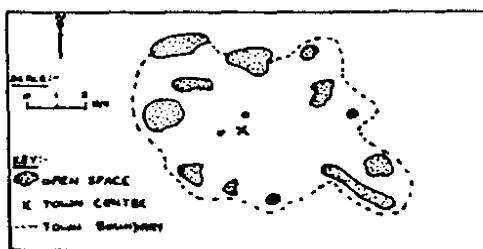


Fig.1 *A map to show the location of open space in a town.*

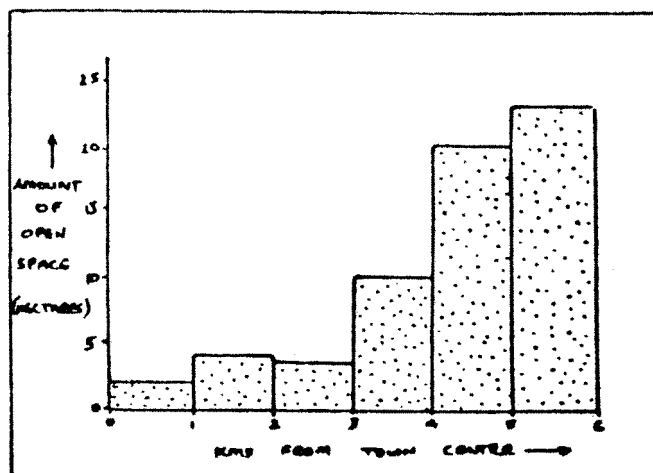
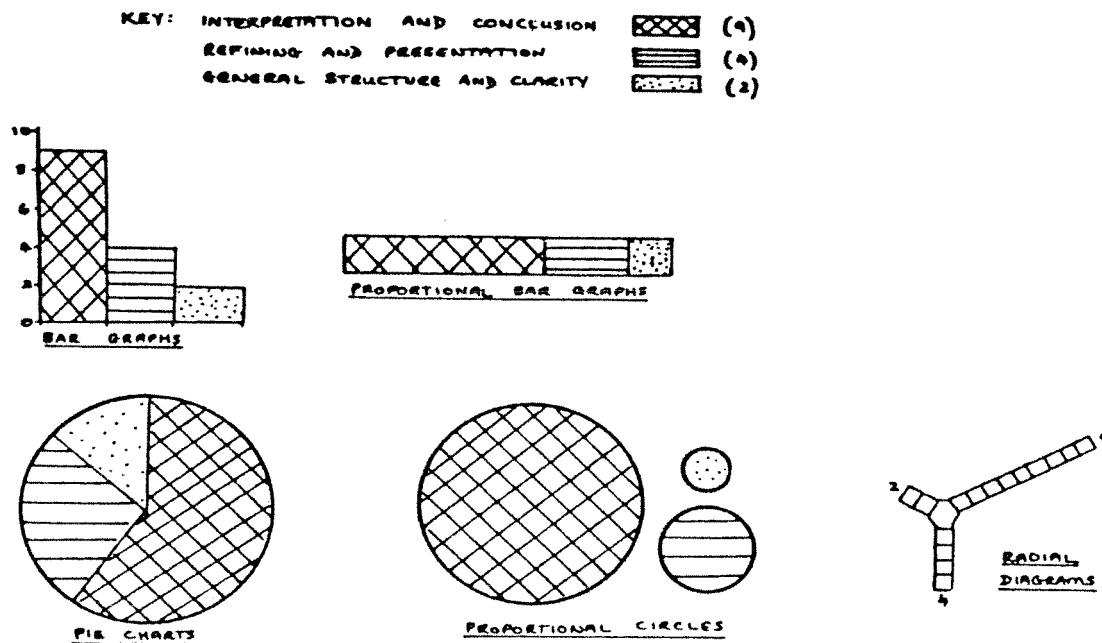


Fig.2 *A graph to show the amount of open space with distance from the town centre.*

Examples of the numerical representation of data : 1

Imagine that your course-work study is marked out of 15. There are different ways of showing this information:-



Examples of the numerical representation of data: 2

Can you think of any other types of diagrams that could be used?

- **Non-numeric results**

In many investigations, some or all of the evidence gathered will be in the form of **words** rather than numbers. This will be particularly so if you have collected views and opinions from people, or collected descriptions or facts.

In pulling together these kinds of results, it can be useful to read through all your evidence and then decide on each theme or what you want to write about. Within each theme, it can be helpful to think of more detailed “threads” which can help to sort the evidence into more manageable parts.

You will then need to draw together all the evidence that relates to each “thread”, and attempt to write a summary of this in a way which is interesting for the reader. Your summary is likely to be much clearer if you make a separate section for each main theme, within the evidence.

In presenting your results, you can give quite a full and detailed account. There will be a shorter section which follows in which you can highlight the main findings.

1. Look at the BEST SKETCH opposite. Decide which of the following DESCRIPTIONS is the best one. Why do you think it is better?

DESCRIPTION A:

"The drawing shows a load of old houses in bad condition. I think they look like a slum and they are not fit to live in".

DESCRIPTION B:

"The sketch (fig. 7) shows terraced, Victorian houses in poor condition. The dilapidated state is most noticeable in the crumbling brickwork and broken windows. The small gardens are overgrown and the surrounding walls are almost beyond repair. The area shows other signs of becoming unsuitable for residents. The roads are in poor condition and there is no provision for parking. It is unlikely that this area will improve unless a lot of money and planning time is spent in redevelopment."

Well the answer is obvious... but ASK YOURSELF WHY?

Non-numerical presentation

What do your results tell you?

After presenting and describing your results you should then write a fairly short summary that draws attention to the main findings.

For each main theme that you have investigated, you should briefly say what you have found, or what is your conclusion. You could very briefly say why you've reached that finding.

It's worth bearing in mind that not every investigation makes definite findings. Some things might remain uncertain, in which case you should say so. There is nothing wrong with saying that the investigation has not reached a definite finding, and that more information is needed. In fact, where possible, you should distinguish between what you believe to be very definite findings, and other things on which you are less sure. What you are now doing is

(a) drawing conclusions; and

(b) evaluating what you have found and the way you did it. Would you have done things differently?

Did you find any particular sources useful?

In this final section, you are listing the sources of information that you found useful when doing your investigation. It needs to be nothing more than that - just a list.

The list might include books, magazines, newspaper articles, websites. - whatever you found useful. The list is there as a reminder in case you need to go back to those sources again, but also for your reader to be able to do the same.

There is a particular style which it is helpful to follow, for instance giving the title, author and date for books and articles, and full addresses for Web-sites. Usually, these are listed alphabetically, and there are some examples given below.

Title of Individual Investigation:

“How healthy are children’s diets in Wales and the USA?”

www.alternative-healthzine.com 13/01/2005

www.bupa.co.uk 27/01/2005

www.healthscout.com 27/01/05

www.iom.education 13/01/05

www.kidshealth.org 13/01/05

www.lonelyplanet.com 27/01/05

www.news.bbb.co.uk 13/01/05

www.nutrition.org.uk 13/01/05

www.obesity.org 27/01/05

Schulte-Peevers A, Peevers D, Keller N, Gierlich M, McNeely S, Lyon J, Wheeler T, (2000) Lonely Planet California and Nevada (Second Edition), Lonely Planet Publications, Melbourne, Australia



Some vocational and practical contexts: 1



Some vocational and practical contexts: 2

ANNEX 2

A GUIDE TO SUCCESSFUL COURSE-WORK STUDIES

CONTENTS

Introduction

How Will Your Study Be Marked?

What Do We Mean By The Word 'Hypothesis'?

Making Sense Of The Data

How To Present The Data

Diagrams And Sketches

Description And Explanation

And To Conclude

Course-Work Study Checklist

INTRODUCTION

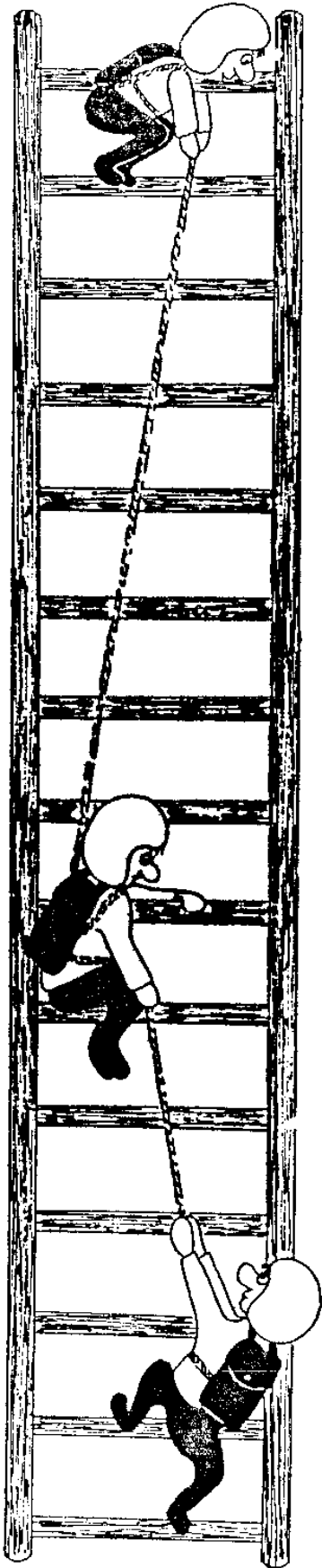
LEISTON HIGH SCHOOL

GEOGRAPHY

DEPARTMENT

This booklet is designed to help you produce a good course-work assignment. It will help you to devise a piece of work based on a geographical investigation and to lay it out for the best effect. It also gives hints on how the examiners will mark your course-work and how you can score high marks.





**INTERPRETATION &
CONCLUSION**



**REFINING &
PRESENTATION OF
DATA**



**GENERAL STRUCTURE
& CLARITY**

HOW WILL YOUR STUDY BE MARKED?

YOUR STUDY WILL BE MARKED OUT OF:- _____

_____ *Most important in your course-work study is the need to show your understanding of the information you have collected and to sum up the main points in a clear, concise manner.*

THIS IS WORTH	MARKS
---------------	-------



_____ *You also need to use a variety of methods to record your data such as good quality maps, relevant diagrams and sketches, well labelled photos, graphs etc. You must link your data to the written text.*

THIS IS WORTH	MARKS
---------------	-------



_____ *Finally, your course-work assignment must be neat, well presented, carefully thought out and organised.*

THIS IS WORTH	MARKS
---------------	-------

WHAT DO WE MEAN BY THE WORD "HYPOTHESIS"?

The word "HYPOTHESIS" sounds very complicated but in fact it is really quite simple. It is just a STATEMENT or IDEA about something which is then TESTED to see if it is true or false.

A hypothesis is a good way to start an investigation because it provides a GOAL to aim for. It also requires EVIDENCE to PROVE or DISPROVE the statement.



We often make hypotheses (statements) in everyday life without ever realising it... but do we always have the EVIDENCE to support our hypotheses?

1. Study the following statements and decide what information (evidence) you would need to collect to prove or disprove them?



Ipswich Town are a better football team than Norwich City



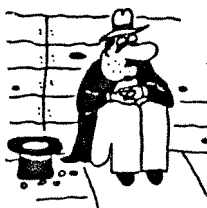
Maths is the best subject studied at school



McFly are the best pop group in Britain



Girls do better than boys at passing exams



Unemployment in Britain is caused by government policies



Public schools are better than comprehensive schools

2. Read the extract below:
- State the *HYPOTHESIS* of the article.
 - What *EVIDENCE* is used to support the hypothesis?
 - Does the evidence available *PROVE* or *DISPROVE* the hypothesis?
 - What is your opinion of the hypothesis made?

ELECTRICITY is already a necessity to modern life.

The standard of living we in Britain enjoy depends on this clean, versatile and flexible power.

Name almost anything you use in daily life and electricity will have made some contribution towards producing or operating it.

Start in your wardrobe — a

Electricity powers our everyday lives

shirt takes 54 units of electricity to produce.

Open your garage door and you'll see a car that needed 22,500 units to get it on the road. A washing machine takes another 2,100 before it arrives

in your kitchen.

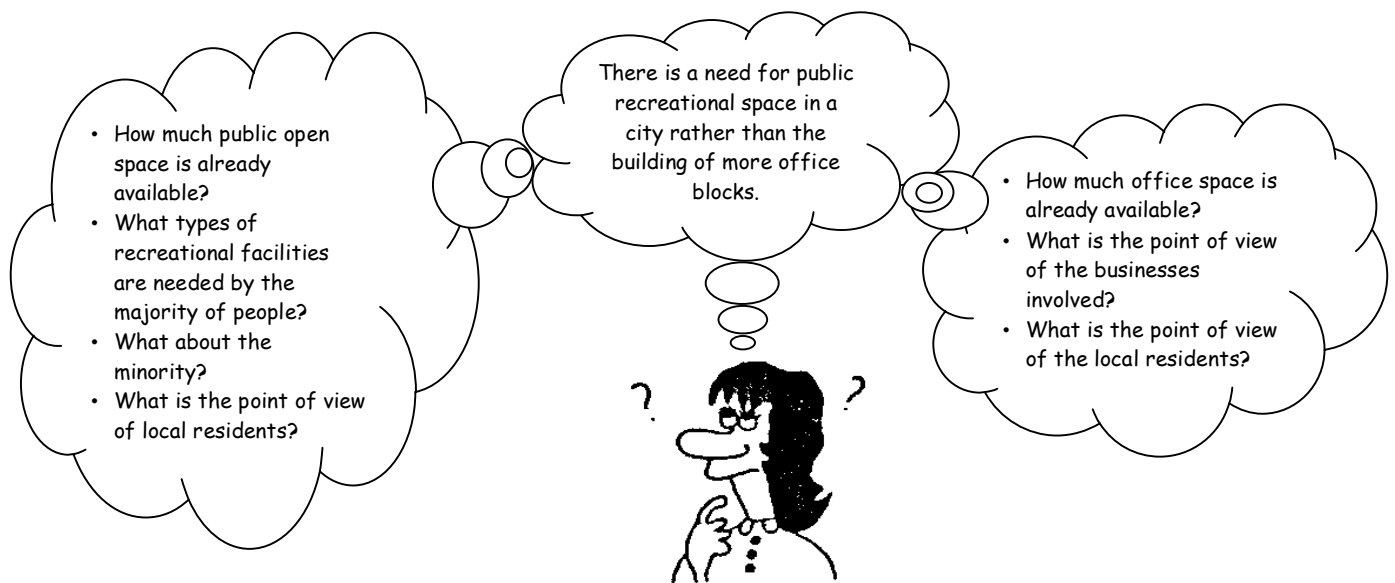
Take steel as an example of the kind of quantities of electricity required by heavy industry. In 1978 the manufacture of steel in the United Kingdom required 12,000

million units of electricity.

We will need new power stations to meet growing demand.

But planning for these new stations has to be done well in advance — each one takes eight to ten years to build — and built they must be if electricity is to be there in time to meet the rise in demand.

When deciding on a hypothesis make sure that you have an idea of what evidence you will need to prove or disprove your hypothesis.



3. Study the four geographical topic areas below. Decide on a possible hypothesis for each and the evidence you may need to investigate to prove or disprove your hypothesis.

- High density building policies in inner cities - land prices
- Economic need for more wind farms - effects of wind farms on the environment
- Coastal protection from sea erosion - human activities along the coastline

d) Pedestrianisation of a town centre - access to shops by trade vehicles

MAKING SENSE OF THE DATA



The next few pages are very important and your teacher will need to guide you through them. They tell you how to pick up the most marks for your course-work study.... i.e., INTERPRETATION.

When you have collected all of your information the first thing you have to do is to see if there are any...

"Patterns" & "Links"

Example 1:-

- You have collected information about OPEN SPACE in a town and then drawn a map like the one opposite to show where it is (see fig. 1).

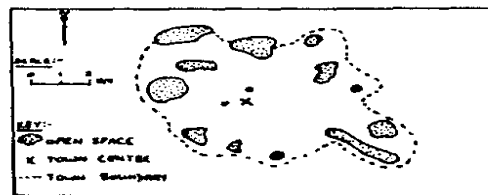


Fig. 1 A map to show the location of open space in a town.

- Having done this you would then DESCRIBE the map... But you need to go further than this and ask yourself....



... IS THERE A PATTERN?

- Just saying that "there is open space all over the town and you can see it on the map (fig. 1)" IS NO GOOD!

- Start looking for any "PATTERNS".
- Can you see that there is more open space near the edge of the town than in the centre? Perhaps a graph would show this more clearly (see fig. 2):-

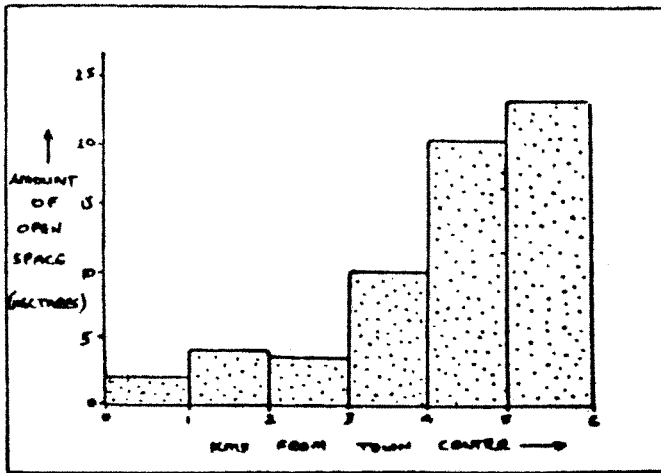


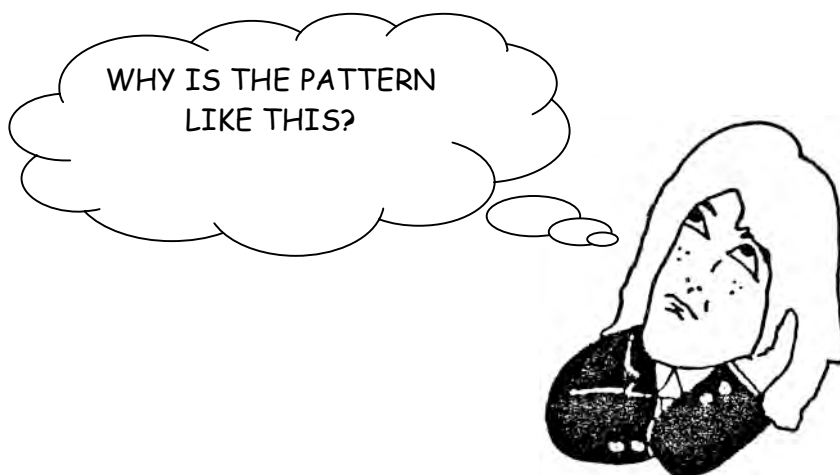
Fig. 2 A graph to show the amount of open space with distance from the town centre.

- From the graph in fig. 2 you can see that the amount of open space increases as you move away from the town centre... this is just ONE PATTERN that can be found from the information in figs. 1 and 2.

- You can now write about this using the information from fig. 2:-

"4kms from the town centre there are over 20 hectares of open space, whereas within 1km of the town centre there are under 3 hectares of open space."

- Having written about this pattern you then need to ask yourself...



After finding "patterns" in your information you then need to look for "LINKS".

Example 2:-

- Data has been collected on different countries regarding the number of cars and wealth of the country. A graph of the number of cars against wealth of a country can be drawn:-

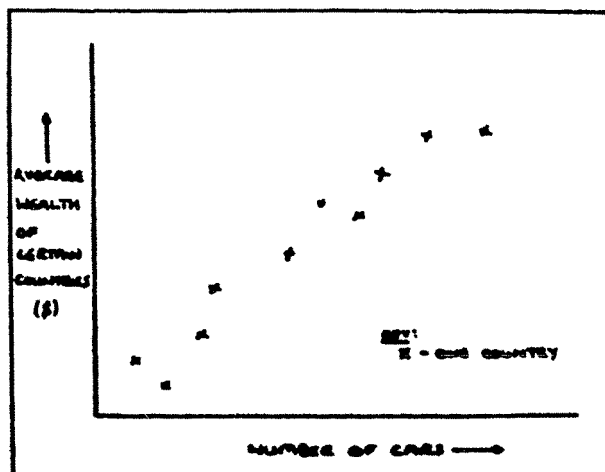
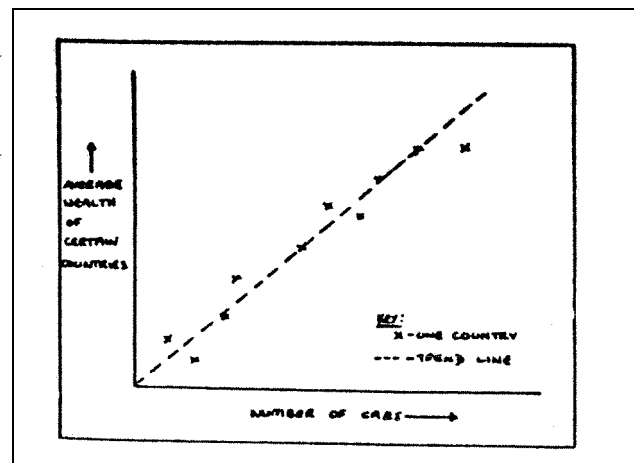


Fig. 3 A graph to show the number of cars in a country and its average wealth (\$)

- Can you see a LINK between the wealth of a country and the number of cars in that country?

- Study fig. 3. Are the points placed 'anywhere' on the graph or is there a definite "pattern" to them?
- The DOTTED LINE shows that most of the points seem to be near this line - the line is called a TREND LINE - it shows the general tendency of the points.



- The information can be interpreted by seeing the LINK between the data:

"The graph shows that, in general, the more wealthy a country is, the more cars that country will have."

So far we have looked at PATTERNS and LINKS. Now we need to look at...

"Groups" & "Changes"

Example:-

- You have information on the wealth of various countries and the length of life of the people in these countries (LIFE EXPECTANCY).
- The information can again be plotted on a graph (see fig. 4).
- From the graph you can see that there are "GROUPS" of countries i.e., India, Bangladesh and Ethiopia form one group.

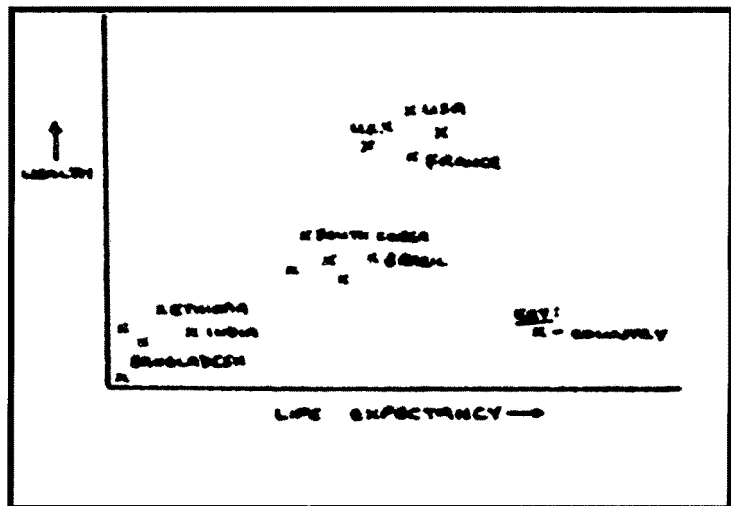
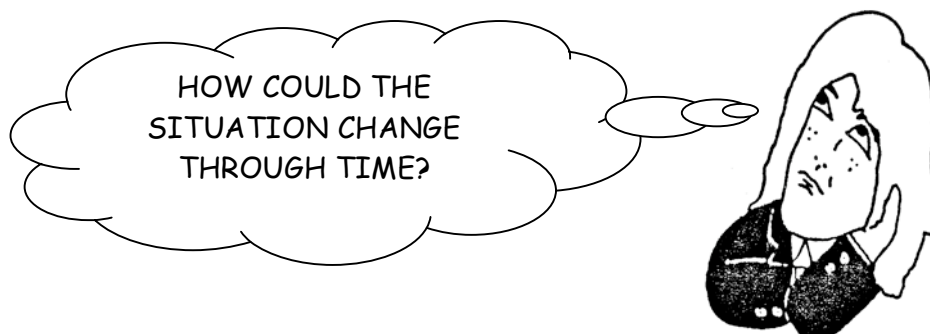


Fig. 4 A graph to show the life expectancy and wealth of various countries.

- By looking at which countries are in certain "GROUPS" you may also see a "PATTERN".
- "GROUPS" can show "PATTERNS":

"People living in countries like Ethiopia, Bangladesh and India ("Less Economically Developed Countries" - LEDC) tend to be poorer and have short life expectancies compared to people living in countries like the U.K., U.S.A. or France, ("More Economically Developed Countries" - MEDC).
- Now that you have found the "LINK" you need to ask yourself...



- "CHANGES" can affect "PATTERNS" and "GROUPS" and are therefore important to look at when carrying out a course-work study.
- "CHANGES" give us a:



- Using fig. 4 one could therefore say that:

"As a country becomes RICHER and the LIFE EXPECTANCY of the people INCREASES, then the country will move upwards from its group to other groups."

This shows a 'CHANGE THROUGH TIME'.

Finally in our INTERPRETATION, we need to study how people feel about various things. We need to look at people's ...

"Views"

Example:-

- You have collected information about coastal erosion and you now need to examine the 'VIEWS' of the people.

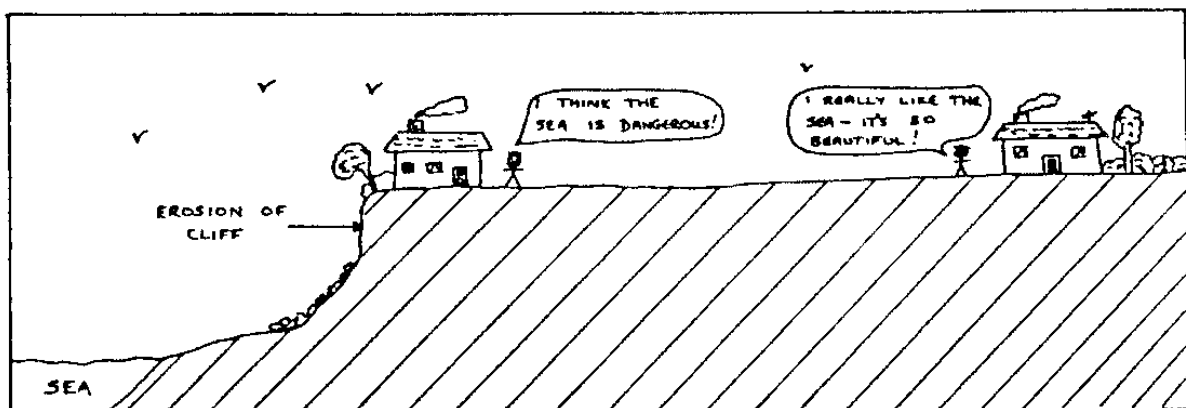
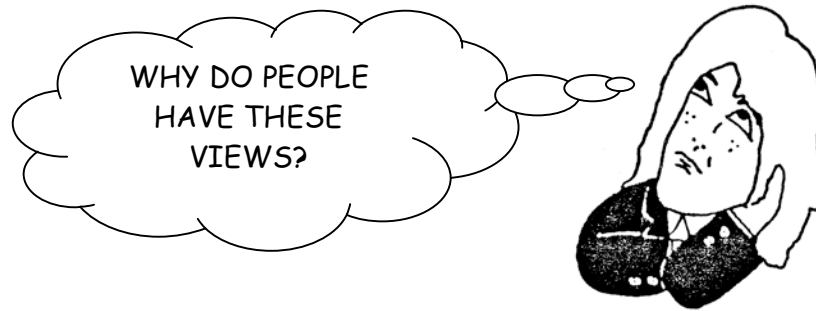
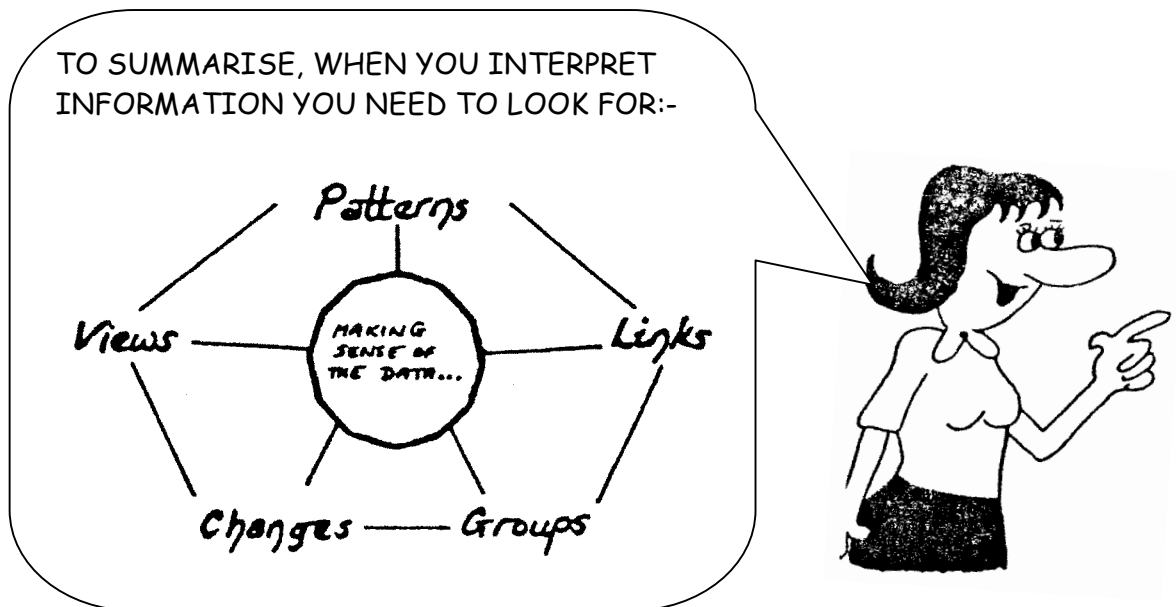


Fig. 5 A study of people's views on cliff erosion

- Once you have collected the 'VIEWS' of different people you need to ask yourself...



- In fig. 4, the different 'VIEWS' are due to the fact that the two people live at different distances from the coast and see the coast in different ways. One person sees the erosion caused by the sea as a "DANGER" because he is directly affected. The other person lives some way from the sea and is not affected by sea erosion. He sees the sea as being "NO DANGER" and enjoys it.
- Their 'VIEWS' have been influenced by 'DISTANCE FROM THE SEA'. Here you have INTERPRETED their 'VIEWS'.



HOW TO PRESENT THE DATA

Data collection, if done properly, should take up a considerable amount of time. Once collected, you need to decide exactly what information is really RELEVANT for your course-work study and the best method of PRESENTING the information.

The way that you process your data will depend on what you are trying to show in your study. There are many different ways of presenting your data, some of these include:-

• *Graphs*




• *Tables*

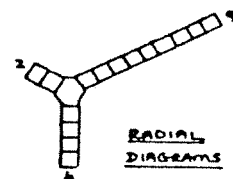
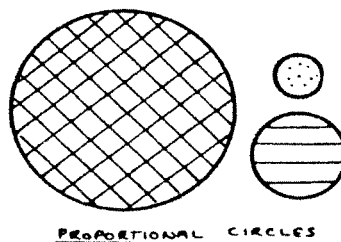
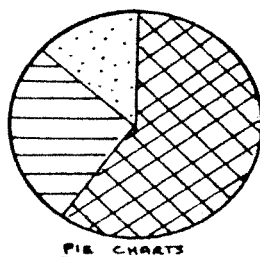
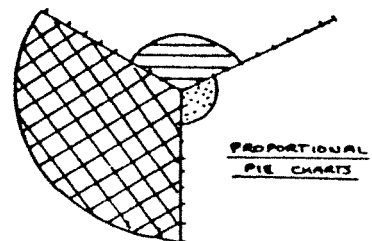
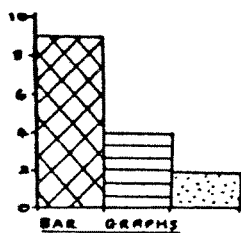
• **Maps**

• **Statistical Calculations**

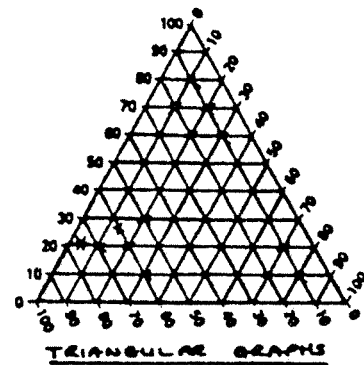
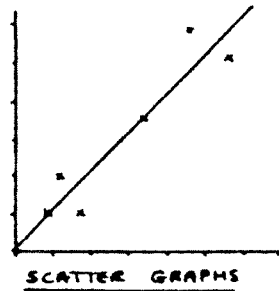
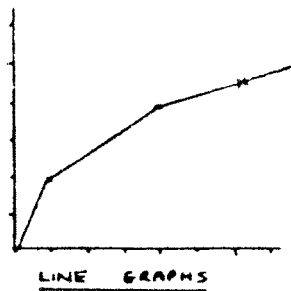
Graphs:-

Imagine that your course-work study is marked out of 15. There are different ways of showing this information:-

KEY: INTERPRETATION AND CONCLUSION  (4)
 REFINING AND PRESENTATION  (4)
 GENERAL STRUCTURE AND CLARITY  (2)



Other graphs include:

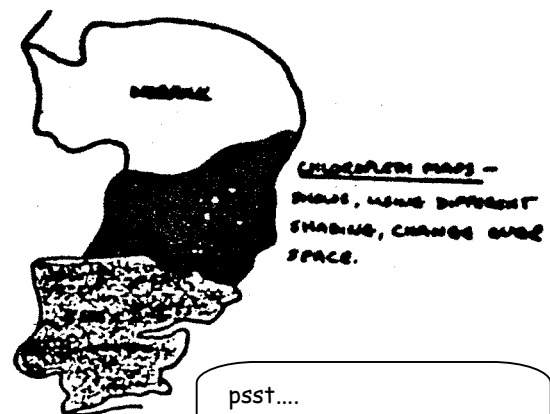
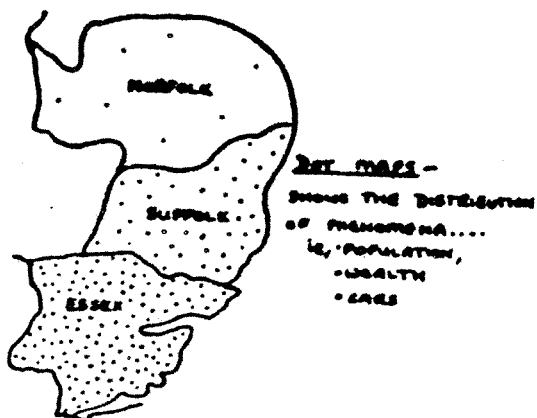


Maps:-

Make sure that your maps

- are placed in a frame or box
- are labelled with small, neat, horizontal, capital letters
- have a heading
- have a key
- have a North point
- have a scale
- are large and uncluttered.

There are many types of maps which can be used in your course-work study:



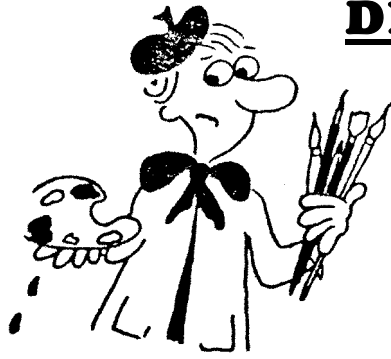
psst...
What's wrong with these maps? !!

Plus

- ISOLINE MAPS
- FLOW LINE MAPS
- show changes over space
- show movement or flows

For further details and explanations ... ASK YOUR TEACHER!

DIAGRAMS AND SKETCHES...



Cartoons

Photos

Drawings

Field Sketches

USELESS AT ART? -

Don't worry - you can still pick up top marks for field sketches!!

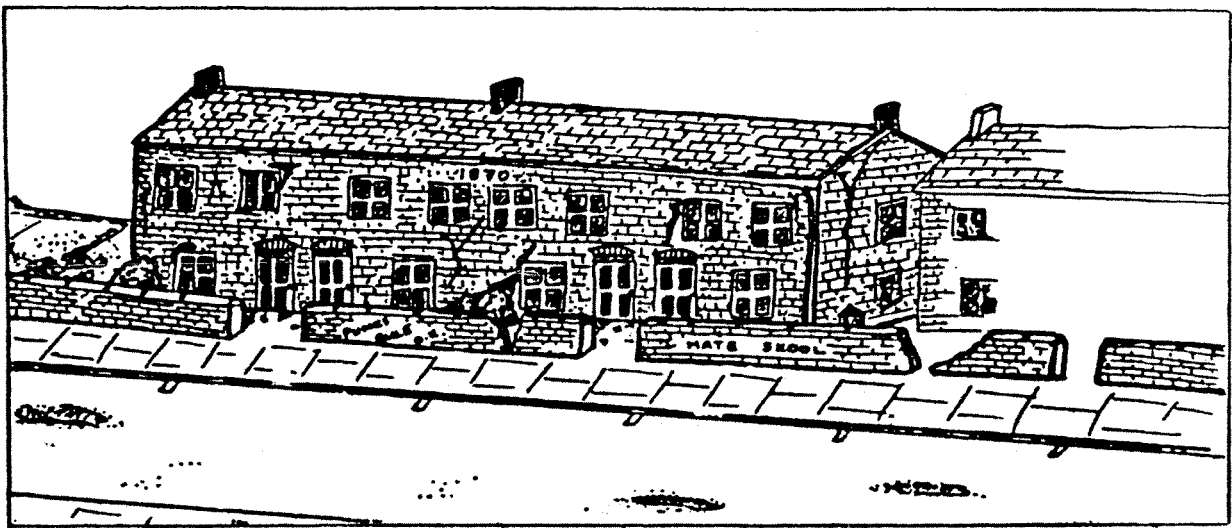


Fig. 6 Old housing in London

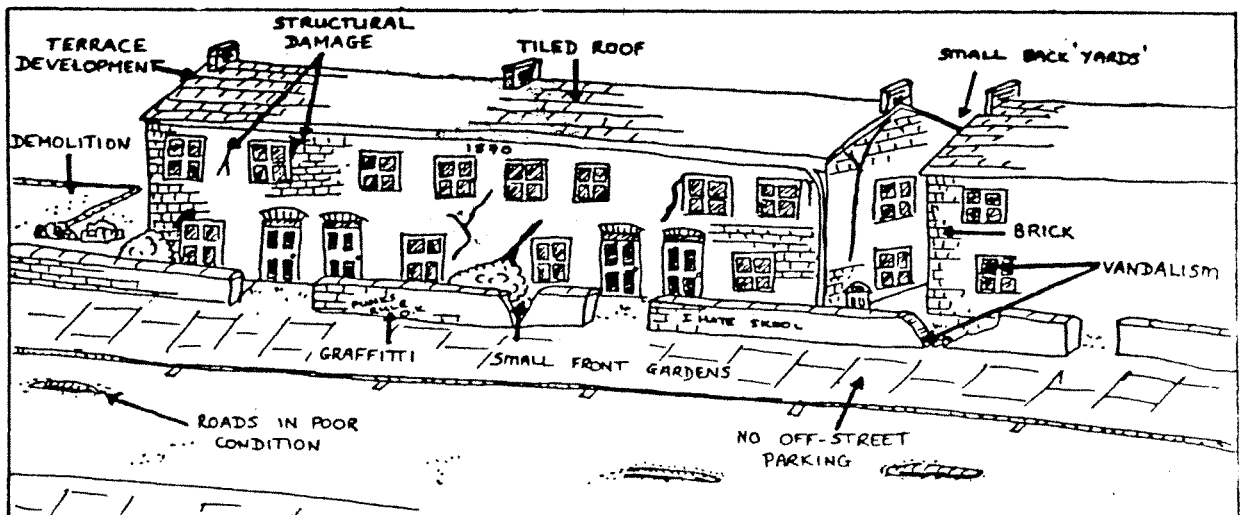


Fig. 7 Victorian housing in Nottingdale, London

Which sketch will pick up the most marks..... WHY?

...DESCRIPTION AND EXPLANATION

In your study it is important that you DESCRIBE things CAREFULLY.

1. Look at the BEST SKETCH opposite. Decide which of the following DESCRIPTIONS is the best one. Why do you think it is better?

DESCRIPTION A:

"The drawing shows a load of old houses in bad condition. I think they look like a slum and they are not fit to live in".

DESCRIPTION B:

"The sketch (fig. 7) shows terraced, Victorian houses in poor condition. The dilapidated state is most noticeable in the crumbling brickwork and broken windows. The small gardens are overgrown and the surrounding walls are almost beyond repair. The area shows other signs of becoming unsuitable for residents. The roads are in poor condition and there is no provision for parking. It is unlikely that this area will improve unless a lot of money and planning time is spent in redevelopment."

Well the answer is obvious... but ASK YOURSELF WHY?

GOOD STUDIES DO NOT STOP HERE... they go on to EXPLAIN why such descriptions can be made

eg. "The area is run down because:-

- (i) it suffers simply from age - it is over 100 years old.
- (ii) when property remains empty it is a target for vandals - this soon makes the problem even worse.
- (iii) the roads and parking are poor because the area was designed at a time when the car had not been invented.

ETC.....ETC.....ETC..... The More Appropriate Explanation, The Better

REMEMBER: **Describe** carefully then **Explain** why you can make such observations. This applies to SKETCHES, DIAGRAMS, GRAPHS, MAPS, STATISTICS etc.

... AND TO CONCLUDE...



IT IS IMPORTANT THAT YOU'VE READ
THIS BOOKLET CAREFULLY BECAUSE

... YOU WILL WRITE A BETTER
COURSE-WORK STUDY AS A
RESULT!



All good studies end with a CONCLUSION... a summary of all the work included.

The conclusion for this booklet could be:

"This was an attempt to show how to write a good course-work study. You were told how the people who will mark your study (the examiners) give their final grade. It is NOT simply about a neat, weighty piece of work!!!

It became clear that to do a good study you have to use different methods of illustration (drawings, maps, sketches, graphs etc) and that you need to challenge or support the title, (the hypothesis). You were also told a very important piece of information: to look for "patterns", "links", "changes" and "groups" in your data. You also need to fully describe and explain things.

Finally, this booklet attempts to show you how to present your study. You need an introduction, well structured chapters and a conclusion. A title page, contents page, appendix and bibliography will also add to the presentation of your course-work study."

Always end your course-work study with a BIBLIOGRAPHY and an APPENDIX.

A BIBLIOGRAPHY is a list of books, articles, maps, notes etc. that you have used to help you write your study.

An APPENDIX contains information which you have collected about your study - information which is RELEVANT, but information which, if added to your study, would spoil the flow as you read it, (e.g. tables of fieldwork statistics, actual questionnaires etc.)

.....AND FINALLY.....



COURSE-WORK STUDY - CHECK LIST

✓ when
completed

1. Title Page

The following things must be considered:-

- a) *The Study Title - either the hypothesis title or a simpler version*
- b) *Your name*
- c) *A colourful, presentable picture, sketch or map connected with your study*

2. Contents Page

This should include the chapter headings and page numbers.

The contents page will be the last thing you do even though it goes at the front of your study.

You could also add a contents page of your illustrations.

3. Introduction

This should include:-

- a) *An outline of what you're going to do in your study*
- b) *The location of your study area*
- c) *How you collected your data*

Introductions should be short and clear. It should be no more than 2 sides of writing

4. Individual Chapters

These will depend on the study you are doing but they are always:-

- a) *about a specific part of your study*
- b) *built upon the preceding chapter in a logical manner*

Chapters must include:-

- a) *sub-headings*
- b) *labelled diagrams, photos, sketches etc. with reference numbers*
- c) *A variety of information possibly from fieldwork or from other sources (ie, books, newspapers etc.)*

The last chapter should include a summary of data collection methods.

5. Conclusion

This needs to be brief and to the point. It should include:-

- a) *A summary of all results and findings*
- b) *A personal comment about your title ie, do you challenge or support the hypothesis and the reasons for your decision.*

6. Appendix and Bibliography

P.S. Don't forget to number your pages and read through your study before handing it in!