

Using Generic 'Diagramming' Software as a Research Tool

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Research Methods, Information Technology, Data Analysis

This paper will look at ways in which generic 'diagramming/flowcharting' software can be used to support the research process. It will show how it can help with the organisation and processing of information. The uses described include, graphical representation of results of literature searches to show inter-relationships, flowcharting the research process to ensure clarity, organising contacts database graphically to enable faster access to data and identifying inter-relationships.

The paper puts these uses in the context of a research project in to the use of the Internet and multimedia in schools. It concludes that this type of generic software, while not suitable for all, can offer those who like to visualise information many advantages over either paper or more usual graphics programs.

Introduction

This paper is primarily an opportunity to share with colleagues a computer software tool, which I have found useful in organising, analysing and representing information. The tool is a 'generic follow charting/diagramming tool' the name of the one described here is VISIO, however there are other makes which have similar functionality¹.

The examples used to illustrate some uses of these tools come from my main research project, ARKive Education Research Project. This aims identify the key factors affecting the design and use of a large electronic database on endangered species and habitats for use in schools over the Internet. My Research has included interviews with school teachers, pupils and advisors; observation of pupils using CD ROMs and the Internet; literature reviews of relevant work; questionnaires and interviews investigating children's ideas about endangered species.

General Description

Fig 1 Shows the main screen of the programme is divided into three main parts, the drawing page, the 'shapes template' and the menus/button bars. At the most simple level one can use the mouse to point to a shape and 'click and drag' (click and hold on the left mouse button and move the mouse cursor onto the drawing page).

¹ eg Flowcharter 7 (Micrografx) and CorelFLOW 3 (Corel Corporation)

Once placed these can be moved and reorganised by clicking and dragging again. The shapes can be linked together (see fig 2) and once joined, if individual shapes are moved they remained joined. Shapes can contain text that is generally entered by 'double clicking' on the shape (pointing to the shape and clicking the left mouse button twice in quick succession), text is then entered using the keyboard.

The shapes are provided in groups contained in 'templates' (see fig 1) there are a variety of templates provided eg. basics geometric, flow diagram, mind mapping and office layout. The templates attempt to provide the type of shapes most commonly required. However it is possible to produce your own shapes and add them to templates or make up your own templates from the shapes others for specific jobs (this is the way I personally work).

At a slightly more advanced level, shapes can be created and tailored to your own needs, for example the 'literature search' in example 1 below. Shapes can contain data for example names and ISBNs of the 'objects' they represent. You can then create a report based on the shapes in a diagram: for instance you could create a report of all of the books on a diagram with full bibliographical data and print it off or transfer it to a spread sheet or database program – or in fact visa versa.

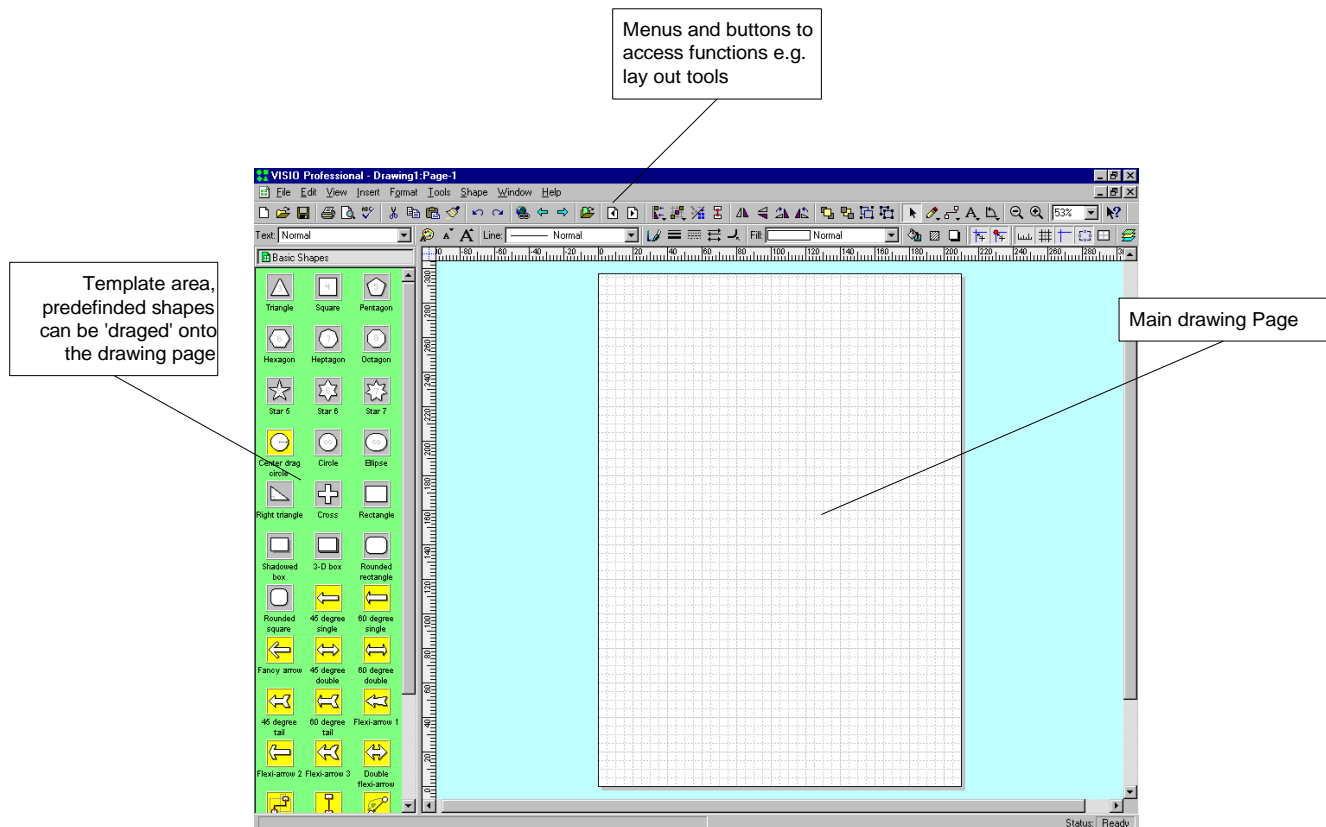


Figure 1 (Main Visio Screen)

At the most advanced level you can use Visio to create a 'computer program' to automatically create and manage the shapes and create reports on the basis of, for example, spread sheet data. An example might be the creation of a diagram of a research project team, with cross references to maps and interview schedules for each individual. Moving a shape on the diagram could then automatically change the data on the original spreadsheet and visa versa.

Examples

I include and describe three different types of diagram, although almost any type of diagram could be produced. These are:

1. visualising the results of literature searches
2. keeping track of contacts
3. representing the research process

1) Visualising the results of literature searches

Fig 2 shows a page of a Visio file I have used to visually represent a literature search on children's concepts about 'environmental issues'. This representation is based roughly on a 'mind map' type approach (Buzan 1995) I find this helps me gain a conceptual overview of the literature which I find extremely difficult using either physical index cards or a conventional computer database.

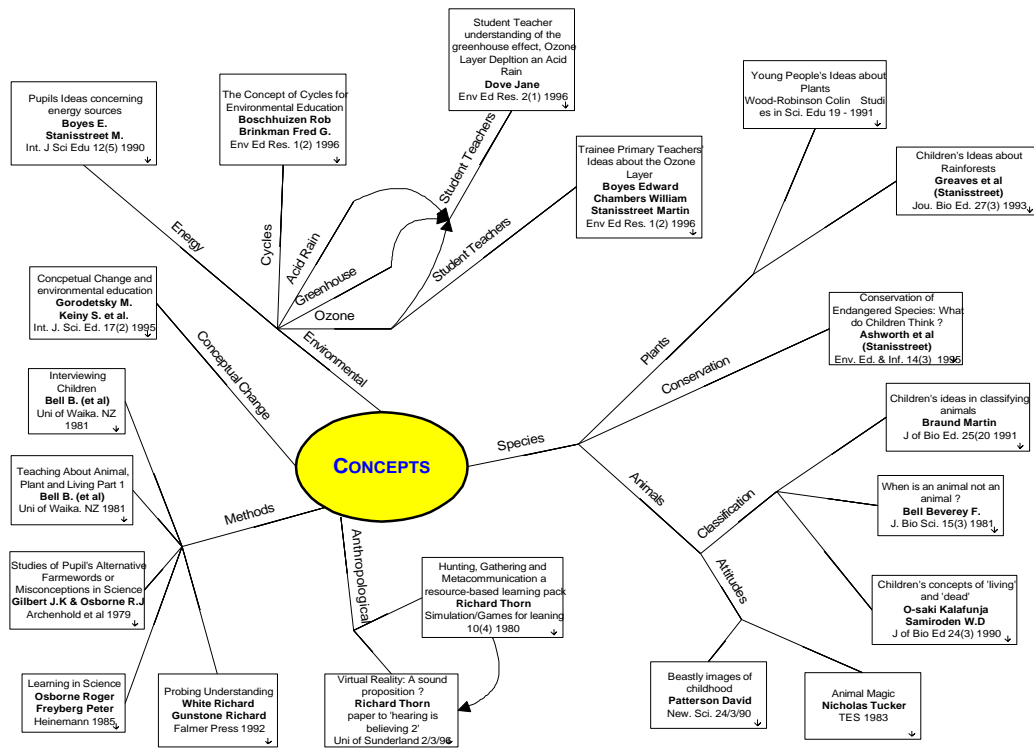


Figure 2 – Page of my literature search document

This page is accessed via a main page (see fig 3) which summarises the whole of the relevant literature. A 'double click' on the relevant word 'jumps' to the 'page' containing the detail of that section. Once on a sub-page such as fig 2, 'double clicking' on the centre 'jumps' to the main page. These 'links' between pages makes moving around the data very quick. Inter-relationships can be shown by using

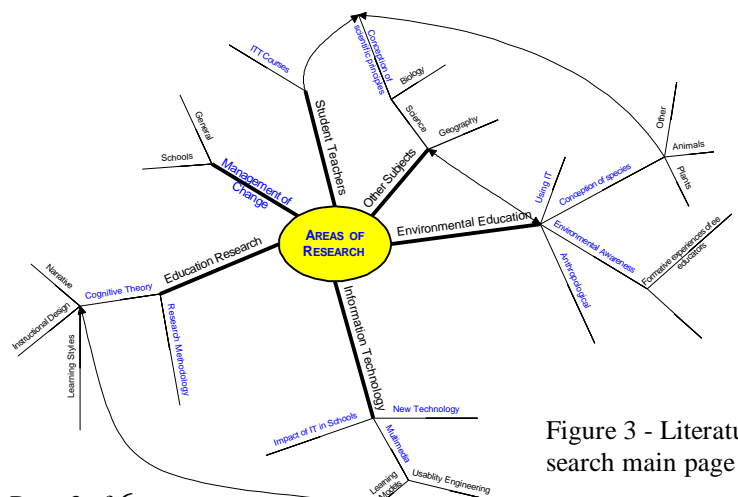
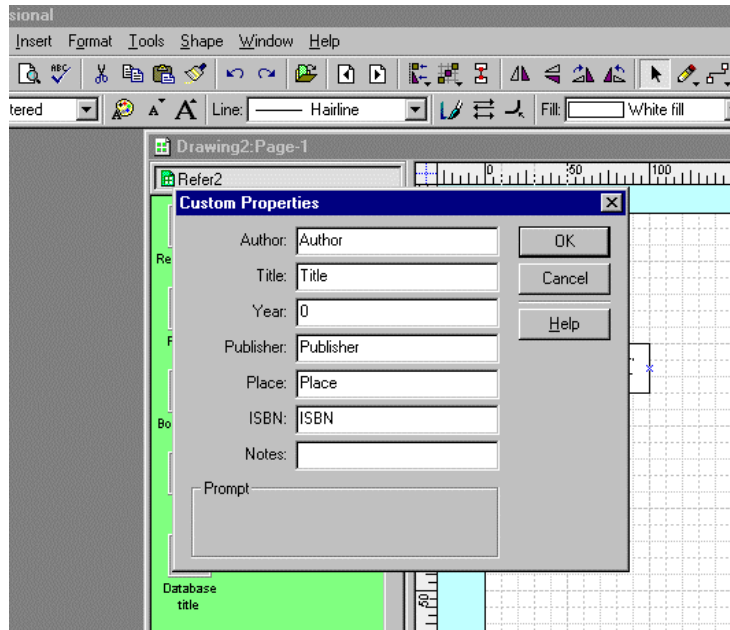


Figure 3 - Literature search main page

curved lines and arrows. Colour can also add information eg. boxes can be colour coded depending they are books, papers, conference reports or internet WWW pages ?



I originally used the shapes supplied with the product, however I realised that customisation of shapes is actually quite quick. I have developed a very simple shape which 'asked' for details about the publication as the shape is 'dropped' on the page (See fig 4). This makes entry of data much quicker and formatting automatic.

Figure 4 - dialogue box asking for details

2) Keeping track of contacts

Fig 5 shows the main page of my 'contacts database' it works on a similar line to example 1 above. Once again links between the main page and the detailed information on pages makes navigation. Fig 6 shows the detailed page for UWE (University of the West of England) page, I have removed the phone, fax etc... details. Here one major advantage for me is that I have an 'organisational' overview and can see relationships between people. I often call these up when I'm about to talk to people on the phone.

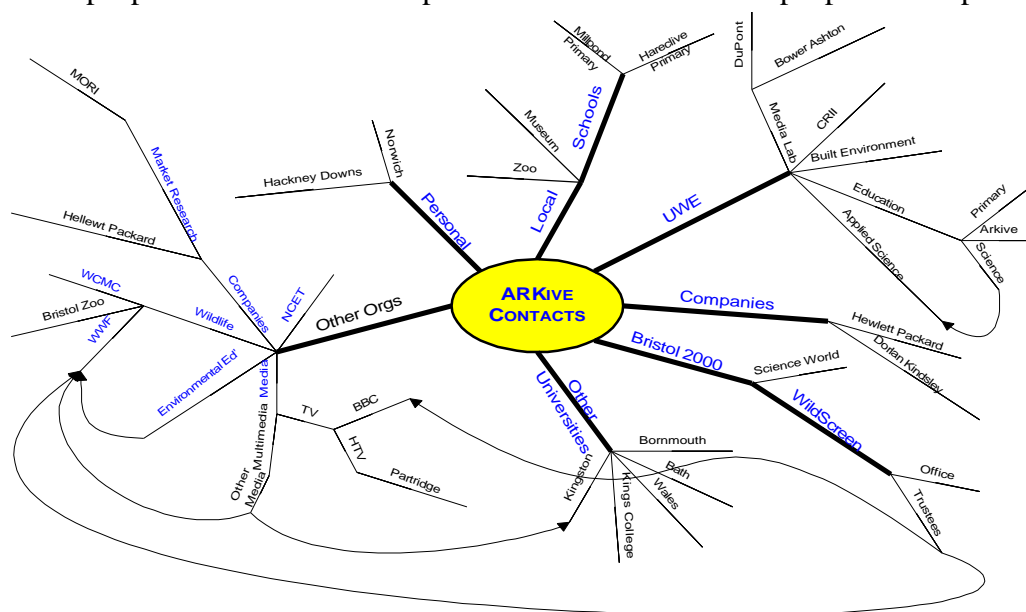
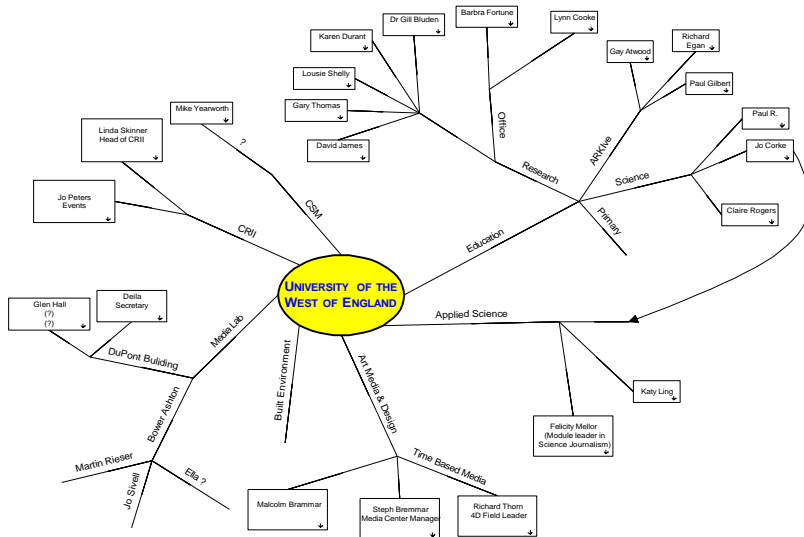


Figure 5 - Contacts main page



Links can also be made between the individual boxes with the information in them, so for example a person who in three different organisations can have entries on each page and 'double clicking' on their box would cycle through those pages.

Figure 6 - UWE contacts page

3) Representing the research process

When planning a part of the ARKive research project, I like to be able to visualise the process to be followed and to be able to keep track of where I am. Visio has helped me in two ways firstly it has a simple 'project management' template enabling depiction of the project as a Gantt (time/job line) diagram. Secondly it enables me to 'flowchart' the process in a way I can relate to (see fig 7)

Figure 7 - Staff interviews flow diagram

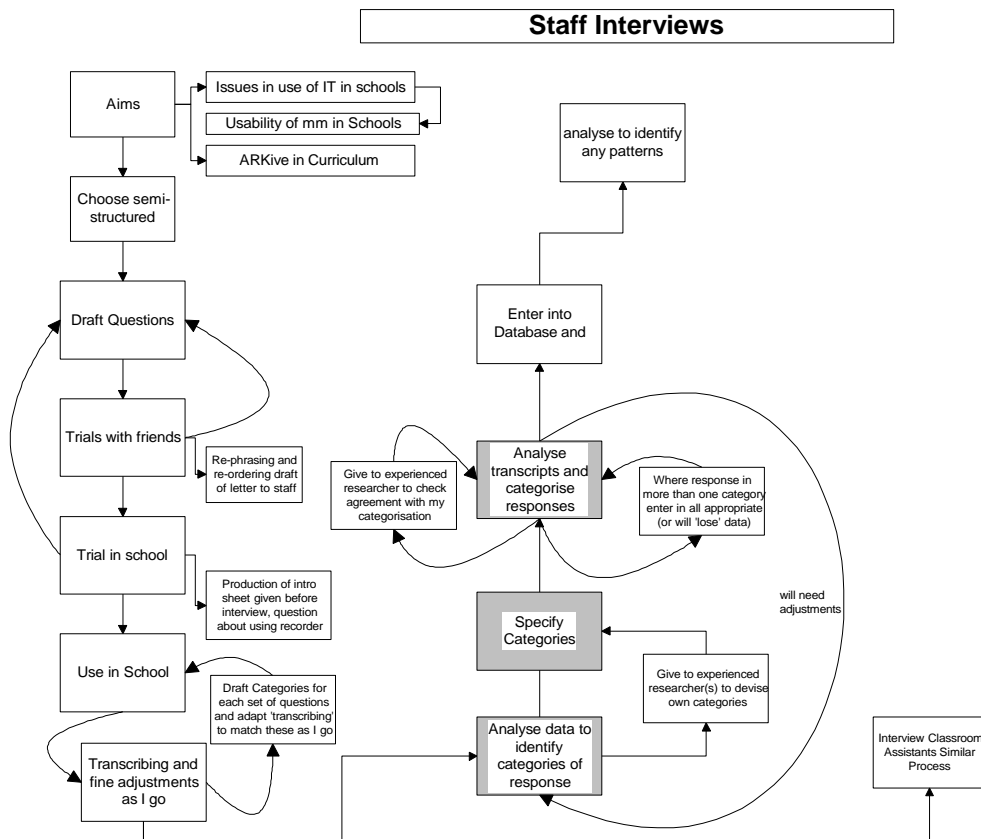


Fig 7 shows one early flow diagram representing the process for some teaching staff interviews conducted as part of the ARKive research project. Such diagrams are easy to create once lines/arrows are linked they move with the boxes, making rearranging the diagram easy. The boxes represent 'stages' in the process, the arrows the 'direction of flow'. The grey boxes represented the current status of the project. These diagrams enable me to plan and refine my research rapidly. It also enables me to give others an effective summary/overview of my research.

So what are the advantages ?

Using this kind of computer application has helped me considerably in organising and visualising information and research processes. I have given only three examples I have many others including Internet World Wide Web (WWW) page design, database entity relationship diagrams and the production of diagrams/maps for questionnaires. I have found the diagrams particularly useful in communicating ideas to colleagues.

I have found considerable advantages of this type of software over other 'specialist' applications, of which I also have a range and significant depth of experience. However there are also disadvantages and trade-offs with regard to functionality. The table below gives a personal view of some of these. In the future the trade-offs may well be overcome as, for example, databases allow more flexible data visualisation and data entry tools and general purpose 'paint' and 'drawing/flowcharting' applications begin to merge their functionality.

Some advantage and disadvantages of VISIO¹ over alternatives		
	Advantages	Disadvantages
1. Compliment or replacement to using paper	Making changes is easy	Some people prefer using paper
	Text is legible	Computer screens are not very large so managing large diagrams is problematic
	They can be e-mailed, transferred electronically	It is not easy (or advisable) to work at a computer monitor for sustained periods
2. Ease of use	Creation of a very wide range of diagrams is easy.	Once learned specialist applications may be faster and easier for a given type of diagram
3. General purpose application Vs lots of specific applications	There is no need to learn to use flowcharting, project management and database software if you are only using these at a low level	Complex functions are missing or difficult to implement eg, automatic updating of databases and tracking of projects
4. visualisation of information and processes	able to quickly produce diagrams to help visualise data and processes	Visualisation is got at the cost of data management and analysis power. It must be used in conjunction with analysis, data management applications.

References:

Buzan, Tony. 1995, Use your head 3rd revised ed. BBC