

A New and Flexible Graphic Organizer for IS Learning: the Rich Picture

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Abstract

Graphic Organizers are "visual representations that are added to instructional materials to communicate the logical structure of the instructional material" (Jonassen, 1993). They are widely used in teaching at all levels. The Rich Picture, introduced by Checkland (1981) as part of Soft Systems Methodology, is now well established as a system development tool but has not yet been extensively used in teaching. Its basic characteristics, however, make it an ideal tool for teaching and learning about information systems, with the added benefit of providing insight into students' learning, for both students and teachers. Both undergraduate level students and their teachers are making increasing use of this flexible tool.

Keywords: Rich Pictures, Graphic Organizers, Information systems teaching

Introduction

Graphic Organizers (GOs) are helpful to learners in all disciplines. Particular disciplines benefit from particular GOs. This paper recommends the introduction of the Rich Picture as a valuable GO in the teaching and learning of information systems.

What are Graphic Organizers?

Graphic organisers (GOs) can be defined as "visual representations that are added to instructional materials to communicate the logical structure of the instructional material" (Jonassen et al, quoted in Trowbridge and Wandersee, 1997). They have been used to help readers with comprehension of text. Alvermann, for example (1981), examined their usefulness to year ten students in a reading task and found 'organizers facilitate recall performances when readers are required to reorganize information found in text but have no effect when reorganization is unnecessary' (p.47). She observed that the effect was independent of the skill of the reader.

Trowbridge and Wandersee (1997) point out that Graphic Organisers were originally intended to be produced by science teachers in the form of a hierarchy of concepts connected by unlabelled lines. This concept was extended by Novak and Gowin (1984) to produce the Concept Map, which has achieved wide acceptance in science teaching.

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As developing views of student learning have shifted the focus from teacher-centred to student-centred views of learning (Entwistle, 1998), concept maps are seen as a tool to be used by students in the construction of their own learning, rather than pre-defined structures provided by the teacher.

Why use GOs?

Referring to Ausubel's (1968) widely quoted proposition "Ascertain what the learner already knows and teach him accordingly", Mintzes states "Graphic organizers can help to achieve both of these objectives; they can assist in ascertaining what the learner already knows, and they can help organize instruction that builds upon and extends that knowledge." (Mintzes et al, 1998, p.329)

GOs currently used

As well as extensive use in primary and secondary education, a variety of GOs are used in tertiary level teaching of many disciplines. Information systems is of particular interest because it requires students to integrate many concepts and also because many GOs such as flowcharts, data flow diagrams and tables fill the dual roles of teaching/learning tools and professional development and documentation tools. This duality provides the IS teacher with an opportunity to integrate discipline learning with the individual student's reflection on his own learning. The characteristics of some GOs are summarised in Figure 1.

Most GOs are constrained in at least two significant ways; (a) rules about content, shape and/or relationship of symbols, labelling etc. and (b) concepts that are permitted to be represented by the GO (e.g. data flow diagrams permit only processes, data flows and data storage, flowcharts show logical steps in sequence). Rules about what can be included and the form it may take have both positive and negative effects. Students sometimes are inhibited by the need to get symbols and rules right, e.g. in using data flow diagrams although the rules are fairly simple, (four standard shapes and a few rules for valid connections), students can be diverted from the purpose of the diagram to an emphasis on the symbols and the rules of implementation. On the other hand, a known framework gives guidance, leading to security and confidence in using the tool and its absence provides an amount of freedom and autonomy that can be novel and frightening.

Graphic Organizer	Function	Reference
Concept maps	Show meaningful relationships between concepts	Novak and Gowin, 1984
Vee diagrams	Heuristic for understanding knowledge and knowledge production	Novak and Gowin, 1984
Charts	Concisely show relationships or change in limited number of relationships	Tarquin, P. and Walker, S. (1997)
Fishbone/skeletal illustrations	Illustrate one major idea	Trowbridge and Wandersee, 1997
KWL charts	Enable students to build on existing knowledge and interest	Tarquin, P. and Walker, S. (1997)
Flowcharts	Show logical or chronological sequence, including decision and repetition.	Tarquin, P. and Walker, S. (1997)
Maps	Enable navigation of physical environments.	Tufte, E. R. (1990)
Roundhouse diagrams	Show relationships in se-	Trowbridge and Wandersee,

	quence.	1997
Hierarchy chart	Shows inclusive relationships. Assists with top-down decomposition.	Whitten et al 1994
Venn diagram	Shows inclusive, exclusive and overlapping relationships.	Tarquin, P. and Walker, S. (1997)
Concept circles	Aid to reflective learning.	Trowbridge and Wandersee, 1997
Data Flow Diagrams	Widely used in IS.	DeMarco 1978

Figure 1. Characteristics of Graphic Organizers

The Rich Picture

In 1981, Peter Checkland and a group at Lancaster University (UK), began the construction of the Soft Systems Methodology (SSM). Checkland felt that the standard systems analysis and design approaches failed to recognise the variable nature of IS goals and were unable to deal with the socio-political factors that could make or break an information system. The Rich Picture (RP), a technique used in the methodology, is a freehand picture that can include any kind of figure or text. It may be used as part of the SSM (Checkland, 1981), with other information systems (IS) methodologies or approaches, or as a stand-alone method of representing a situation, problem or concept. Unlike most graphical techniques used in IS, such as the Data Flow Diagram (DFD), the RP has no rules or constraints. It can contain any kind of graphical representation. Text can be included if desired. Special symbols can be created and used with an added key, if suited to the particular need. It is so simple and universal that it can be used by anyone. Little artistic talent is needed, in fact the amateurish appearance of the diagram may make it less threatening than a more formal graphic technique such as Data Flow Diagrams. It can be used to represent both concrete and abstract entities and can be developed by individuals or groups. It is an excellent medium for communication and development of ideas and understanding.

Because the RP can accommodate graphic images, text, colour and standard or defined symbols its potential to represent information is illuminated by Tufte's statement "To envision information - and what bright and splendid vision can result - is to work at the intersection of image, word, number, art." (Tufte, 1990, p.9).

The RP encompasses functions of many other GOs; it can show hierarchy, inclusion, progression and various kinds of relationships. Now well established in the practice of systems development using the Soft Systems Methodology, the Rich Picture now offers itself as a new and useful tool of tertiary teaching and learning.

Although the RP exists on a two dimensional medium, various graphic techniques can be used to show perspective and change over time etc, to escape what Tufte calls "the two-dimensionality of the endless flatlands of paper and video screen" (Tufte, 1990, p.12).

Tufte states "The principles of information design are universal - like mathematics - and are not tied to unique features of a particular language or culture." (Tufte. 1990, p.10). Most university courses contain students from diverse cultural and language backgrounds, so techniques that minimise reliance on language or augment its use assist students to focus on the essential concepts of such tasks as representing an information system.

RPs have now been used for several years at second and third year level of some of our undergraduate courses and have proved popular with staff and students for both individual and group work within and

outside classes. They provide an accessible basis for inter and intra group discussions and development of ideas and facilitate teacher-student interaction, as the teacher can evaluate students' ideas and understanding more quickly than with text or verbal interaction alone. The drawings are easily amended and evolve as ideas develop.

In addition to assisting students with their IS learning the RP is particularly useful for teachers in investigating students' attitudes to their learning. Figure 2, drawn by a small group of third year undergraduates to represent an IS subject they were studying, shows the teacher, larger than the students and the focus of knowledge transfer. The right hand section of the drawing was added after discussion in which the students stated that they saw the process of learning as having knowledge poured into their open heads by the teacher. When it was suggested that they could participate actively they added a visit to the library. Even then, knowledge is shown as an entity that is transferred, without much apparent intellectual activity, apart from doubt, shown by "???".

Figure 3, however, drawn by a single third year undergraduate, shows more complex interactions, including personal intellectual activity separate from the teacher. Such pictures can provide the basis for a discussion between and among students and teacher and can be modified as views change.

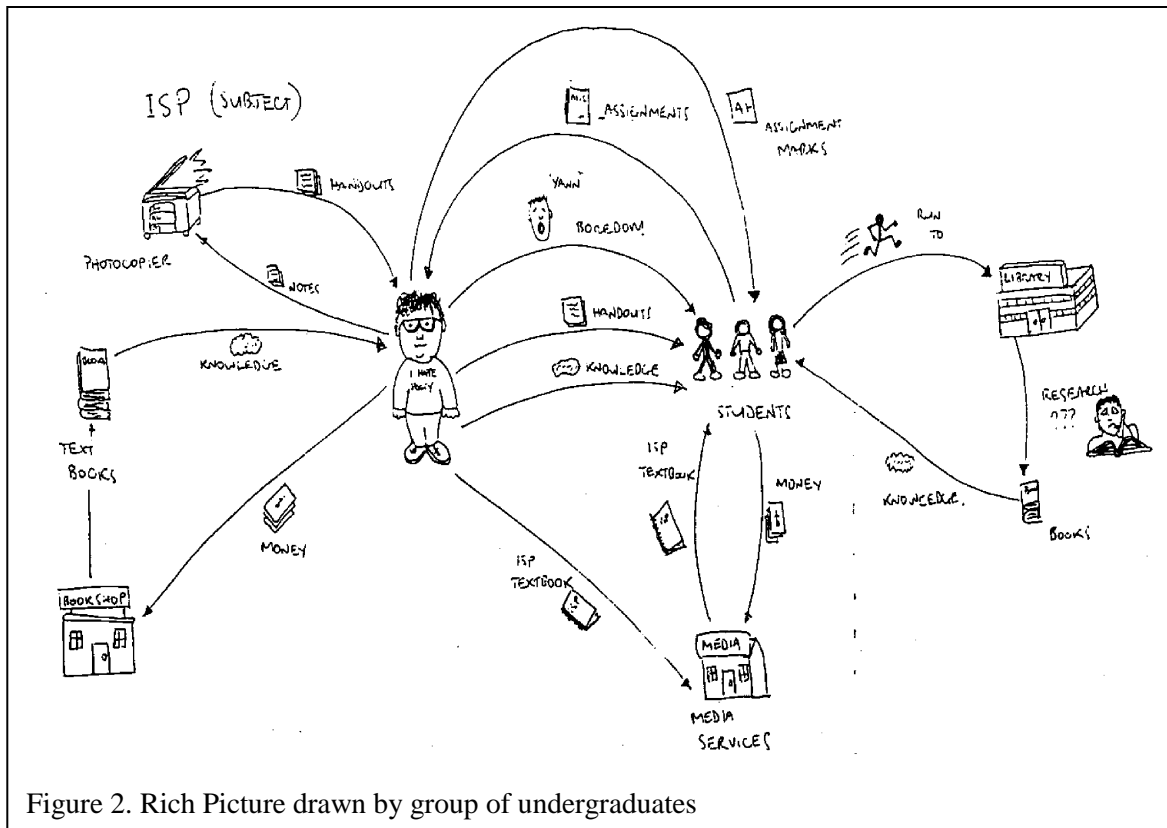
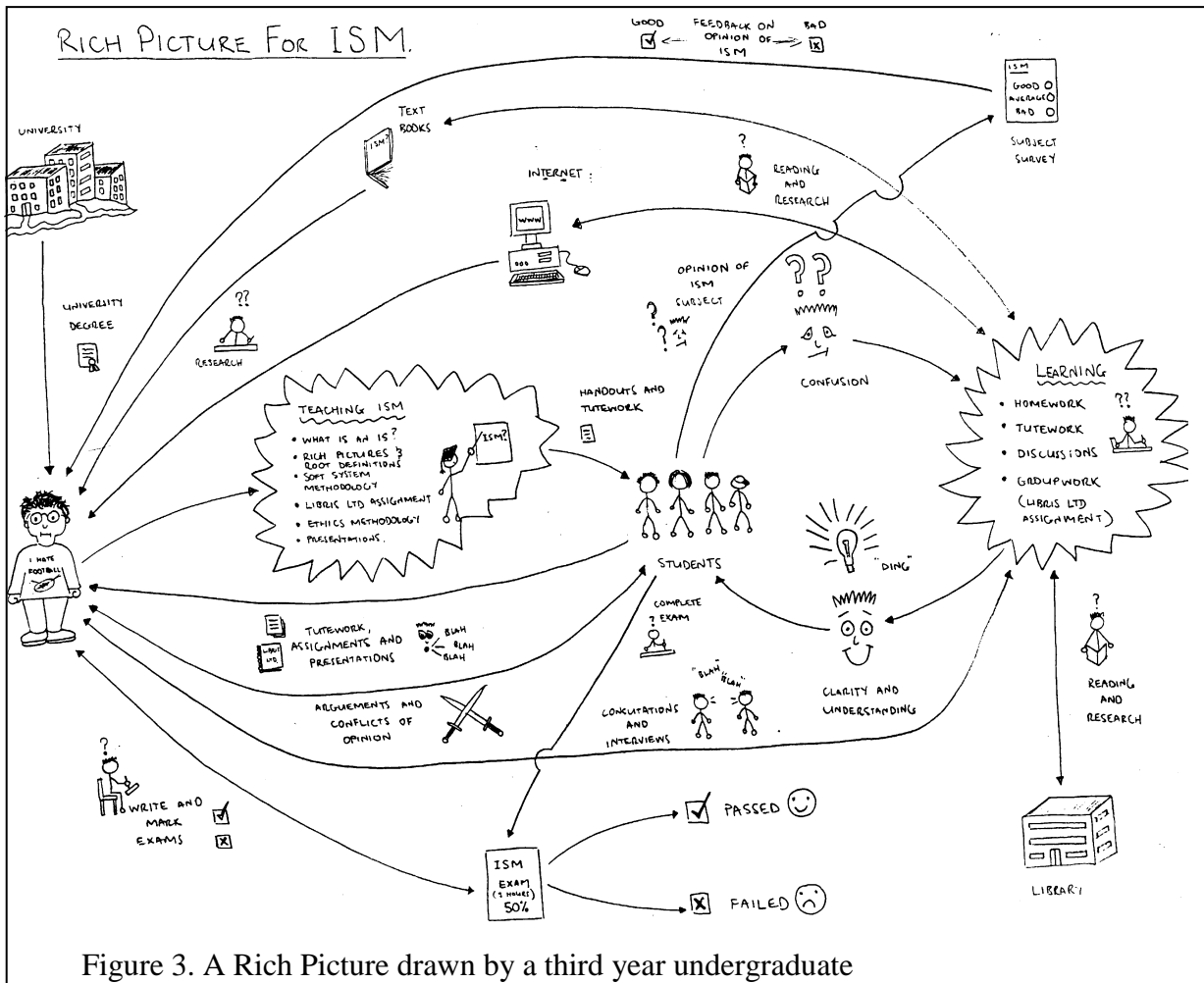


Figure 2. Rich Picture drawn by group of undergraduates



Students' and Teachers' Reactions to the RP

After initial hesitation because of fear of inadequate artistry or the perception that the RPs look too amateurish to be a useful formal tool, most students readily adapt to using them, both individually and in groups. Those teachers who have now been using them for several years regard them as an excellent teaching tool.

Comments students have made about RPs include:

In the rich picture you feel free to, I dunno, express it in your own words in a visual way or something, which helps...I tend to find more ideas as I'm doing the rich picture, it leads to other things. I can sort of get all my ideas for the exam down on paper (A)

They help me express myself, express something, help me learn something in a way that I can understand it which is useful (B)

A rich picture summarises everything and goes into enough depth as I need to take it. (C).

For a more detailed description of students' reactions to them, see Horan (2000).

In summary, benefits of the RP as a GO for students include:

- It is graphic. Most students prefer pictures to text, and can absorb more from a picture of a complex subject than from a text description.

- Little artistry is needed. An amateurish picture, once taken seriously, invites participation from non-experts.
- It is language independent (except for text content). This may be helpful for the viewer and/or the creator.
- It can be as comprehensive as required, representing a minor function up to an entire system.
- It is modifiable. Additions or amendments are easily made to any part of the picture.
- It is usable by an individual or a group, although the initial construction is awkward for more than two people.
- No expertise is needed to interpret it.
- There are no restrictions on content, except those of the cultural environment.
- It can show conflict, emotions, politics etc.
- It provides a basis for communication and negotiation.

(Horan, 2000, p.258)

Conclusion

The Rich Picture is a flexible accessible tool for teaching and learning about information systems, and additionally provides a basis for reflection on learning. It is a valuable addition to the range of graphic organizers already in use.

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Biography

Pat Horan is a Senior Lecturer in the Department of Information Technology at La Trobe University, Bendigo. After programming in the days when mainframe Cobol was king, she moved into tertiary IT teaching, evolving through technical and advanced education colleges to university. Her current research interest is how students learn about IS and her ongoing PhD study is in this field. In addition to students her interests include animals (especially dogs, cats, goats and horses), opera, cryptic crosswords, films, red wine and bemused observation of the antics of politicians and university management