Using Rich Pictures in Information Systems Teaching

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ABSTRACT: *The Rich Picture (RP), as described in Peter Checkland's Soft Systems Methodology, is a flexible graphical technique used to represent a situation, problem or concept. In a university teaching environment which aims to encourage students to adopt deep learning (seeking meaning) approaches when learning about information systems, the RP is proving to be a useful technique. The use of and reaction to RPs by third year university students are described and illustrated.*

Keywords: Rich Picture, deep learning, information systems teaching.

INTRODUCTION

The Rich Picture (RP) is a flexible graphical technique which may be used as part of the Checkland Soft Systems Methodology (SSM) (Checkland 1981, Checkland et al. 1990, Davies et al. 1991, Dunning-Lewis 1992, Wilson 1990), with other information systems (IS) methodologies or approaches, or as a stand-alone method of representing a situation, problem or concept. Figure 1 shows a student drawn RP of a sports club.
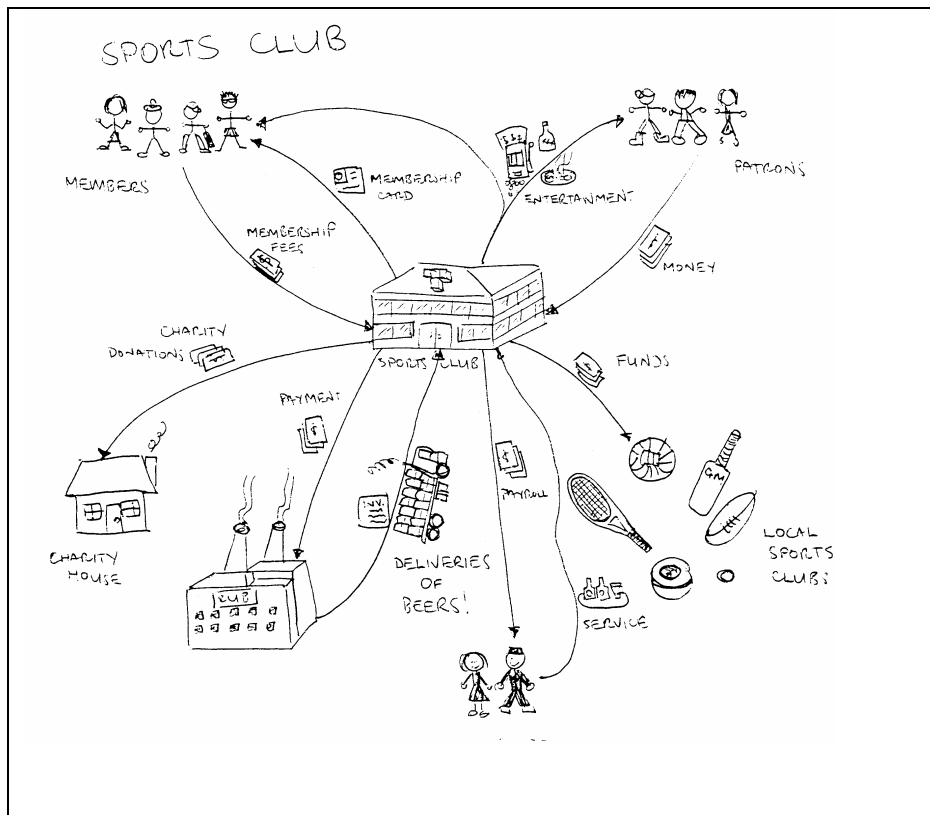

Figure 1: An example of a Rich Picture

This paper proposes a new role for Rich Pictures, as a teaching and learning tool, particularly in the realm of information systems. In the following sections of the paper, characteristics of Rich Pictures and the nature of Deep Learning are described. Experience of the practical use of RPs to encourage deep learning is then illustrated, and finally some implications for IS teaching are offered.

Characteristics of the Rich Picture

The RP is perhaps the most flexible and universal communication tool available. Unlike most graphical techniques used in IS, such as data flow diagrams (DFDs), 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 RP may make it less threatening than a more formal graphic technique such as DFDs. Its advantages 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.

In addition to their use as an IS development tool RPs are being used in the third year subject Information Systems Practice (ISP) at La Trobe University, Bendigo to encourage students to use deep learning approaches.

Deep Learning

Many published studies have demonstrated that students' learning approaches can be categorised as surface or deep. Deep learning approaches are characterised by an intention to seek meaning and to establish relationships between areas of knowledge. Surface learning approaches, in contrast, aim solely to memorise and reproduce knowledge, usually for exam or other assessment. (Marton and Säljö: 1984, Prosser and Trigwell: 1999). Only deep learning approaches have been found to lead to high quality learning outcomes. For example, Prosser et al. (1989) showed that of 16 first year physics students only those students who actively sought to change their conceptions of subject matter were able to do so.

How can students be encouraged to use deep learning approaches? McKay et al. (1997: 66) found, in a study of Hong Kong students, that 'Students can be encouraged to assume a deep learning approach if the contextual factors associated with a student-centred approach are in place'. These factors have been described by Jackson (1997) as including choice, self-evaluation, variety, feasible workload and feedback. Gibbs (1992) concludes that students need to perceive that (a) the course is well organised, with clear goals, (b) students are responsible for their own learning, with some control over content and approach, (c) the workload is manageable, (d) help in learning is provided and (e) assessment tasks require the demonstration of understanding.

Encouraging students to adopt a deep learning approach requires an integrated program, including curriculum design, appropriate teaching philosophy and technique and a supportive learning environment, preferably consistent over more than one subject. It is important that the act of learning is integrated with the content (Marton et al. 1996). RPs can be used to support several of the features of deep learning, for example; by integrating content and learning process, offering choices in style of creation and use of the RP and providing a basis for obtaining feedback from clients, other students or the teacher, on understanding of a problem or design of a proposed solution. The use of RPs to support these features of deep learning is described in the next section.

Experience with 3rd year IS Students at Bendigo

The subject ISP is taken by students from a variety of degree programs, although most are enrolled in the Bachelor of Computing or the Bachelor of Business, or both. All students enrolled in ISP have completed two earlier IS subjects based on the Systems Development Life Cycle. The final IS subject aims to encourage students to reflect on the nature of systems concepts and practice, to apply their knowledge to a practical systems development problem and to relate the systems theory and techniques learnt so far to current practice in industry. Students' attention is directed to the imperfect nature of current practice. Current journals, other media sources and case study based class and assignment exercises are used, individually and in groups to support the subject's objectives.

Students emerge from their first two IS subjects with good technical skills but a restricted view of the nature of systems (Cope: 2000) and no idea of the 'soft' 'hard' conception dichotomy which underlies problem solving approaches. The Checkland methodology recognises the 'soft' nature of IS problems, allowing for human factors and a flexible approach, as opposed to the engineering sourced 'hard' approach to defining problems which leads to rigidly defined solutions (Checkland 1981). The SSM, then, is an ideal means of extending the students' view of systems at this stage of their development and the RP is introduced in this context. Students are encouraged to use the RP, not only in its standard SSM role, but also as a technique for communication with other students or clients and as a personal learning tool.

The RP is usually the first unregulated graphic communication technique the students have encountered during their course. Initially they see it as amateurish and are puzzled by the absence of rules for its use. Most of their first attempts look like DFDs (their most confidently used graphic technique until now) but it takes only a couple of drawing experiences for students to embrace the freedom and flexibility of the RP and to perceive its power as a communication tool.

When asked to draw a RP of the subject ISP, students revealed a considerable amount about their understanding of the subject and their approach to it. Figure 2, drawn by two students in week 5 of the 13 week semester, shows a complex view of their interaction with the subject and their view of learning. Both concrete and abstract elements appear, showing structure, sequence, content, emotion, progression and humour. Students with a more superficial view of learning draw RPs which clearly show a knowledge transfer view, with the lecturer at the centre of the picture, and students at the periphery, while facts flow from lecturer to student. Discussion with the students confirms that the RP accurately reflects their view.

As well as a tool for reflection on their learning, the RP is used by students as part of SSM in their major assignment, a group project to produce a systems proposal for a fictional small business. Over the semester each team of four conducts fact finding interviews with the clients (role played by the teacher) progressively validating their findings and building their understanding of the case, using RPs and Root Definitions (another technique of the SSM). Because the assignment is conducted over most of the semester, students repeat activities, build knowledge, reveal and correct errors, progressively match practice with theory (which also unfolds over the time) and gradually complete the whole picture with its subsystems and interdependence. This experience helps students to build up a repertoire of systems skills, individually and as a team.

For the teacher-researcher the views of learning displayed in RPs can be quite revealing. Using interviews to elicit students' perceptions of their learning is difficult, time-consuming and coloured by personal interaction, students' (and sometimes researchers') imperfect verbal skills and the complexity and ambiguity of spoken language. Although the RP is also subject to interpretation and may lack explanation, it affords a comprehensive view of the subject, and can be augmented by discussion with its creator/s.

For the student the RP can provide an easily accessible record of her/his ideas at a particular time, as well as a basis for elaboration. Students say that they find RPs helpful in summarising and revising systems topics as part of exam preparation. They also enjoy using them and find them helpful in groupwork, both in class and for their major assignment. Most students prefer them to other techniques such as concept maps and DFDs.

Comments made by students about the RP include:

- They're actually enjoyable to do. You can actually let yourself be distracted and draw a little picture of a person delivering something or this and that and you know .... and, I dunno, when you're feeling happy about yourself and you're enjoying what you're doing you tend to learn it a little better, other than rote learning. (K)
- *Rich Pictures.* They were interesting. To start off with I thought 'well, what's the point of drawing pictures?' but they really do help you understand how things work out. You can sort of draw a picture, it's easy to follow. You don't have to be a fantastic artist or anything and it's sort of fun. *Right.* And

that does help you learn. You sort of think 'OK, well this goes here and yep OK this would connect this', or,' I haven't got this' and you sort of work out where it all fits so it does help a lot with a system of any description I think. (D)

- Well, I think it's like rich pictures enable you to put your thoughts in ... everything on the piece of paper, whatever you want to put in. No restriction for you, you can draw men, a computer, data flowing to somewhere, so it's not restricted ... you have no boundaries on drawing what you want to do.
  How does that compare with other techniques you've used like data flow diagrams or just writing it out in text?
  It's a bit restricted coz like when you put it in text you have to make it clear what the sentence is, more construct what people can understand. But when you look at a picture of people would just think they understand or you would even if you draw a rich picture you can put in some text and make people more understand .... a data flow diagram ... it's more rigid, it's more, you have more procedures than rich picture. A rich picture you can just put everything you want, non specific .... (A, an ESL student)

The experience gained in using RPs at Bendigo provides insight into the characteristics of the RP and suggests some general implications for its use in teaching. Both of these factors are explored in the next section.

Using Rich Pictures in Teaching and Learning

The RP can be used to teach, to learn, to communicate or inform and as a basis for negotiation in a process of achieving understanding and agreement. These functions can be performed by drawing or viewing the RP, usually in an iterative process. The RP can be used alone, in conjunction with other techniques or as a transition to another form of representation.

Particularly valuable aspects of the RP include the following

- It provides an overview of a topic with little/no reliance on text
- It enables modularisation
- It shows relationships and interdependence. It can show hierarchy. For a complex situation, more than one RP can be used, showing equal or hierarchical relationships.
- It can reveal lack of understanding or misconceptions
- It forms a basis for discussion and negotiation leading to refinement of ideas – even the mode of representation is negotiable and it can be augmented or modified by any participant with the agreement of the others
- It shows the individual student how others see a topic and enables several views to be easily compared.

In class the RP can be drawn by one or a small group of students. The RPs can then be shown to other groups and individuals, becoming the stimulus for class discussion. This enables students to test their own views against those of their peers, to pick up ideas they may have missed, to reveal different perceptions, to allow misunderstandings to emerge for clarification and to generate issues for debate.

Figure 2, a complex RP drawn by two students, illustrates most of the features that can be used. In drawing RPs students normally use some of these features, but only the most reflective learners produce such a range.

Components of Students' Rich Pictures

- Symbols (hats for roles in case study)
- Realistic icons (people, books)
- Concrete aspects (exam)
- Text (explanation, thoughts)
- Cognitive aspects (development of understanding)
- Conflict (crossed swords)
- Emotion (satisfaction, puzzlement, humility)
- Abstract concepts (modules forming whole, deep thinking)
- Metaphor (quantum leap)
- Progression (muddle to clarity)

It is unusual for students' early attempts at drawing RPs to include many of these components. However, when an evolutionary approach is adopted, so that ideas can be tested, modified and augmented, not only do the RPs become more sophisticated but the essential requirement for deep learning to occur, that the content and learning process be combined (Marton et al. 1996) becomes integral to the process.
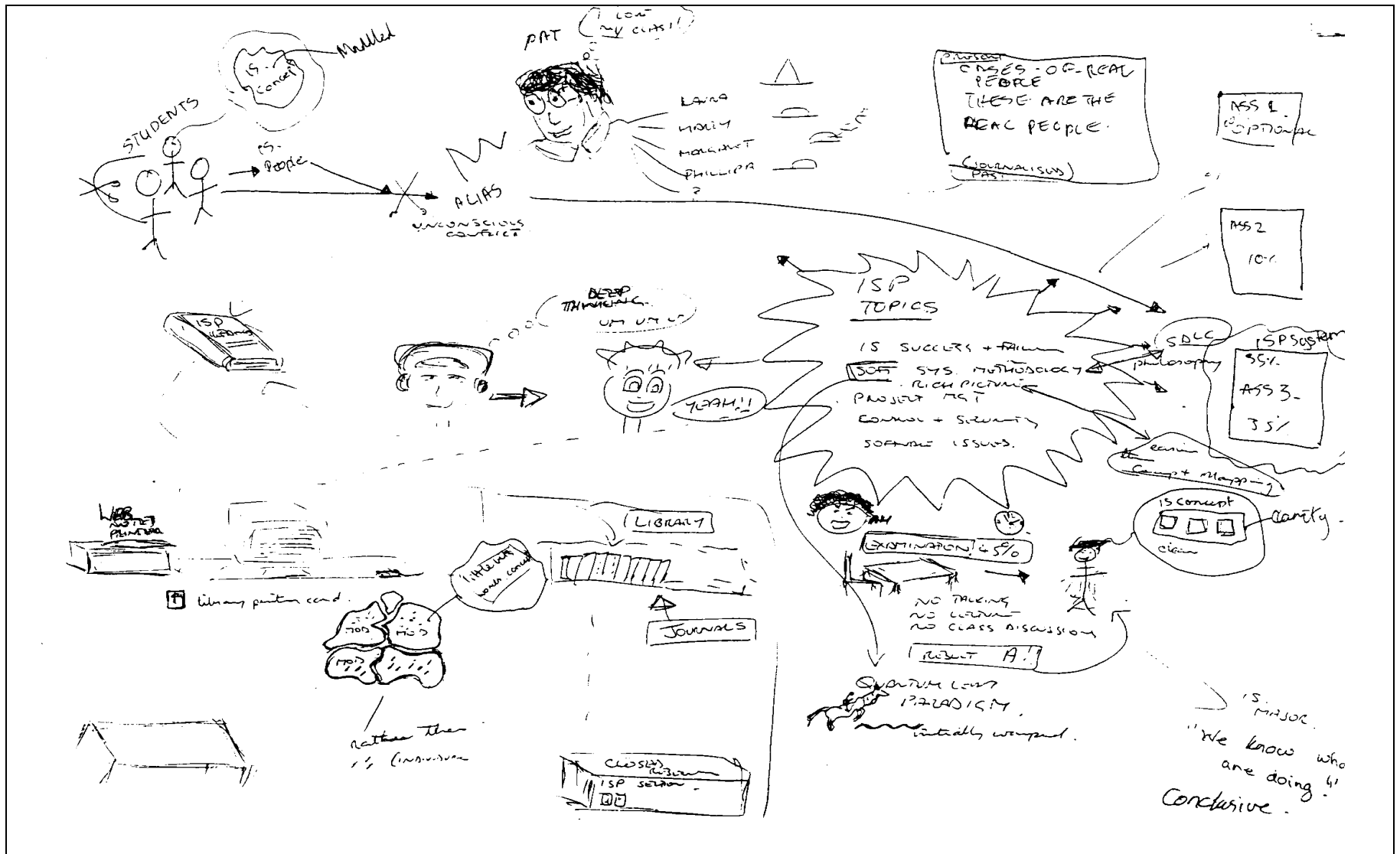
Figure 2: Rich Picture of ISP drawn by two students

It has long been known (Paivio et al 1968) that pictures are more readily remembered than text and some students mention that RPs help with recollection for exam preparation. The role of visual components of the learning environment in deep learning will be the subject of future study, especially with respect to RPs.

CONCLUSION

The Rich Picture is a flexible graphical technique which may be used effectively for a number of purposes, including phases of Systems Analysis and Design (SAD) projects, (especially communication between client and analyst). It is a versatile technique in tertiary students' learning about IS, performing two roles, one as a systems technique and the other as a learner-managed component of the learning process. The two roles blend well. The flexibility and freedom from the constraining rules found in most other graphical techniques allow learners to vary their use of the RP and encourage them to reflect on and manage their own learning. The concreteness of the technique encourages group discussion and participation, and is particularly valuable for case based systems exercises. In a teaching environment which aims to encourage students to adopt a deep learning (seeking meaning) approach, the RP is proving to be a useful technique and research into its effectiveness as a general teaching and learning tool is continuing at Bendigo.

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