Pushing Metacognition: An Evaluation of the Use of Process Interviews as a Means of Talking to International Students about their Learning

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ABSTRACT

Conducting research into how students learn is exceptionally difficult. The metacognition required for a student to explain their learning process necessitates drawing on complex conceptual ideas. For international students who are not operating in their first language, the vocabulary involved in such explanations forms a further obstacle. My doctoral action research required the elicitation of explanations from postgraduate international students about the ways, and the extent to which, the use of visual metaphors in lectures contributes to understanding abstract concepts. This was achieved using *process interviews*. The interviews, conducted in small groups, involved a staged process in which participants completed tasks, then described and evaluated the outcomes from them. While the metacognitive demands were not completely removed, the use of process interviews generated rich data that provided valuable insights into the students' learning and the circumstances in which visual metaphors helped to unlock meaning. Although presenting the findings from the research is beyond the scope of this paper, it is asserted that these insights would not have been possible without the use of process interviews. This paper provides an evaluation of process interviews as a data collection method.

KEYWORDS

action research, interviews, metacognition, noticing, process interviews, thinking aloud

Introduction and context

My doctoral research has involved evaluating the use of visual metaphors in lectures delivered to international students. More specifically, I am? interested in the potential effectiveness of using visual metaphors to help unlock the meaning of abstract concepts. Unlocking meaning in real time will help contribute to the accessibility and meaningfulness of lecture content and thus improve the quality of the learning experience.

The participants in my research were international postgraduate students who, as part of a preparatory programme for their future master's studies, were completing a module that introduced them to the academic subject of Management. I am the module leader for this course. Successful completion of the programme is a condition of progression to their chosen master's course. Over 95 percent of the students who take the module are from China. Research has identified this group of international students as one that finds acculturation to and assimilation into western higher education particularly challeging. For these students, accessing learning has linguistic challenges

(Tung, 2016; Wang, 2018), involves overcoming cultural obstacles (Caprar, 2017; Maggs, 2018), and for some may result in high levels of stress and feelings of isolation (Clarke, 2018).

The findings from my research suggest that, when embedded into lectures, visual metaphors can be a powerful way to help unlock meaning, but that certain types of images have more impact than others. However, it is not the intention of this paper to present the findings but instead to evaluate the use of process interviews as a data collection method.

Methodology

My methodology has been an action research approach. Action research is a form of practitioner research that aspires to achieve positive change and an improvement in practice (Norton, 2018). It can be distinguished from other forms of practitioner research by the way in which the researcher moves through iterative cycles of critical reflection (McAteer, 2013). Remaining flexible and open to change while moving through multiple cycles is regarded as a key feature of good quality action research (Wyse et al., 2018). *Change* might be characterised by changes in practice or in approaches to research and research methods, the latter being the focus of this paper.

The four cycles in my action research aligned with the delivery of the introductory Management module to four cohorts of students. The course is eleven weeks in length. In total, 120 students participated in the research, all but four of whom were Mandarin speakers.

Research Methods

Over each of the eleven weeks of the course two lecture recordings (of between 30 to 45 minutes each) were released. By embedding questions into the recordings, I was able to monitor students' engagement and follow up with any who were not viewing them; engagement was excellent, with almost all students watching the recordings in totality. The lectures exposed students to visual metaphors. These images were displayed when an abstract concept was being introduced. For example, I used a photograph of a group of ants working together to reach a leaf when introducing the concept of teamwork.

The four cycles of the research can be divided into two phases: Phase 1 was composed of Cycles 1 and 2 and Phase 2 of Cycles 3 and 4. Phase 1 made use of focus groups as the principal data collection method. The limitations of this approach meant that I needed to rethink how I could collect meaningful and useful data, resulting in the development of a more structured approach in Phase 2 using process interviews.

Both the focus groups and process interviews were recorded and transcribed. The text was then analysed using thematic analysis (Braun & Clarke, 2021). Thematic analysis allows a researcher to identify meaningful themes and patterns across a large dataset to answer their research questions (Braun and Clarke, 2006). I had a large quantity of transcript data, supplemented by other smaller data sets such as written feedback from students and the results of seminar activities. The ability to apply latent and semantic coding (Braun and Clarke, 2006) was helpful. In some places meaning was explicitly stated by participants, allowing for semantic coding. However, given the complex metacognitive nature of the process interviews, I also attempted to interpret meaning in many passages from the transcripts; these latent codes were an essential part of the analysis, revealing subtle aspects of visual metaphor interpretation. Using latent codes fits closely with a constructivist approach, where meaning is built by the researcher through their interpretations of data and patterns within it (Braun and

Clarke, 2006).

a) Phase 1: Encountering the challenge of metacognition

Conducting educational research with international students often involves overcoming linguistic and cultural obstacles (Welch & Piekkari, 2006). These obstacles may be partially overcome by researchers asking questions in the participants' own language, which was not a realistic option with my research, or striving to achieve linguistic simplicity and clarity with questions. When the research involves asking students to talk about their learning processes the situation becomes even more demanding as it requires them to draw on complex conceptual ideas and to articulate their thoughts using sophisticated language and vocabulary. Asking students to talk about their own learning is a challenging, metacognitive task (de Blume et al., 2017); it is a situation in which the participants are being asked to think about their own thinking and, moreover, to evaluate it critically.

In the first phase my primary data collection method was to employ focus groups. I hoped to make use of focus group dynamics to generate discussion and interaction and to produce data in a way that might not be possible in individual interviews (Greenbaum, 2003; Kidd & Parshall, 2000). I used slides from the lectures to help stimulate discussion, a technique acknowledged to be effective within the context of focus groups (Mann, 2016; Xerri, 2018). Most of the focus groups were composed of three participants.

The focus groups were useful because they confirmed that my students liked and enjoyed the use of visual metaphors in lectures and were in broad agreement that they were helpful in supporting their understanding. It was apparent, however, that participants were ill-equipped to explain their deeper thinking processes and could provide only superficial justifications for *why* the approach was helpful. I wanted to know more about why it was helpful, and in what ways it would have the greatest impact. For example, were particular types of images more useful than others and, if so, why?

As an adjunct to my core research, during Cycle 2 I conducted individual semi-structured interviews with Chinese students who were in the second term of a master's course in Education. A central feature of the interviews was to discuss the ways in which the students interpret the difference between knowledge and understanding, and to talk about how they learn, both in and from lectures. The participants in these interviews offered interpretations of knowledge and understanding that differed enormously and were often contradictory (for example, in terms of which were more challenging and how each could be demonstrated). Questions about how they learn resulted in vague responses, clumsy explanations, and poor-quality reasoning. Even postgraduate students who had undergraduate qualifications in Education and, for some, years of practical teaching experience, found metacognition difficult or impossible. It should be noted that the participants in these interviews had a strong command of English, so language itself was not an obstacle to communicating their thoughts.

b) Phase 2: Pushing metacognition

To help overcome the problems outlined above, I decided to take a more practical and active approach to data collection in Phase 2. By asking students to perform cognitive tasks in the context of semi-structured group interviews, describe the outcomes, and then explain them, I hoped to provide scaffolding for the articulation of their thoughts. This approach, using *process interviews*, has its foundations in the notion of the *discipline of noticing* (Mason, 2002) and the technique of *thinking aloud* (Priede & Farrall, 2011). The approach also has similarities to *photo elicitation* as it makes use of images as stimulus material (Harper, 2002).

The *discipline of noticing* makes a distinction between objectively providing an *account-of* a situation or outcome, and *accounting-for*, in which a participant provides evaluation and justification (Mason, 2002). I felt that in Phase 1 my participants had only been able to articulate their *account-of*; there was little critical appraisal of the reasons why images were helpful to achieving understanding.

Process interviews also have similarities with *thinking aloud*, a verbal protocol analysis technique popularised through the work of Ericsson and Simon (1998), which draws on earlier work by Newell and Simon (1972) on cognitive information processing. The thinking aloud approach assumes that recalling information from working memory, in the moment of experience, is likely to yield better quality research results and richer data than if a participant is attempting to retrieve data from long-term memory (Fonteyn & Fisher, 1995; Willis, 2004). It has been demonstrated to be highly effective in a cognitive interviewing context where a deeper understanding of participants' thought processes is desired (Priede & Farrall, 2011). For Ericsson and Simon (1998), a particular strength of the thinking aloud protocol is the way that it slows down cognitive processing to enable a more investigative approach. I had felt that Phase 1 participants had been too quick to assert that the use of visual metaphors was 'very useful' (to use their words) but were reluctant or unable to give the matter any deeper analytical or evaluative consideration.

If, for example, a researcher wished to know why students were engaging in mathematical reasoning in a particular way, the most logical way to contextualise a meaningful discussion would be to move through three stages: ask the student to complete a calculation; ask them to *describe* or present their results; then ask them to *explain why* they obtained their results. It is the final explanatory stage that builds upon the previous two. By asking someone to perform a complex task, they must think about it. Asking them to reflect upon this thinking while it is still present in their working memory may help them to retrieve key features, experiences, and insights in a more meaningful way. Performing *actions* makes the discussion less abstract, and more concrete. Process interviews are still interviews but are punctuated by tasks that the participants complete to provide experiential context for questioning and allowing for thoughtful reflection while the task and its outcome are fresh in their minds.

Using a semi-structured group format for the interviews retained the flexibility and dynamics of a focus group but with a structure based around the tasks. I realised in Phase 1 that the focus group participants were most animated and articulate when they were handling or discussing artefacts, for example images of lecture slides. I decided that building tasks into the interviews would create a process through which participants could raise their own self-awareness of how they were learning from the images. As with the focus groups, most interview groups were composed of three participants.

In Cycle 3 I used four tasks in the process interviews. Half the interviews were held face-to-face and half via Zoom, the latter being with participants completing the course online and located abroad. For the face-to-face interviews I produced laminated cards of the images/lecture slides and printed out the templates. After each task had been completed, I took a photograph of it, ensuring that the image was labelled with the name of the group. In the online interviews I used Google Slides that, when shared with participants, enabled them to manipulate elements in a similar way to the face-to-face participants. I encouraged the participants to converse freely in Chinese (almost all were Mandarin speakers) while completing the tasks as a group and, if necessary, to seek clarification for the meaning of words, either using translation apps on their phones or by asking me.

The four tasks are described below:

1. Twelve abstract concepts were selected (these had not been used in the lectures). On cards, six visual metaphors were placed alongside six of the concepts, with the remaining six concepts having a non-metaphorical/business image. The participants were asked to place the cards along a *continuum of difficulty* which ran from very difficult to explain to very easy to explain. The ability to explain a concept is regarded as a fundamental dimension of understanding (Wiggins et al., 2005).

2. Ten images were selected from those that had been used to explain concepts in lectures. A variety of types of images were selected (for example, images involving humans and images involving animals). The participants were asked to match the images with the concepts.

3. Nine further images were selected from the lecture slides; again, a variety of types were selected. Participants were asked to sort these into a diamond nine template. The template was labelled *most useful* at the top and *least useful* at the bottom. Diamond nine exercises have been used successfully by other researchers and have been shown to be helpful where participants might have difficulty finding the language and vocabulary to explain the choices they are making (Bullivant et al., 2022) or where collaboration in decision-making requires dialogue between participants (Clark, 2012; Niemi et al., 2015).

4. In seminars (prior to the interviews) students had been asked to find images to match abstract concepts. These tasks, set as homework, had involved students working either alone or in groups to find images that matched concepts in management frameworks being explored that week; for example, Fayol's principles of management include concepts such as the highly abstract *esprit de corps*. This technique was a basic form of *metaphor elicitation* (Coulter and Zaltman, 1994), a method that has been demonstrated to be useful in providing insights into the thinking of participants.

In Cycle 4 an additional task was introduced. This involved viewing four different versions of the same image (with no annotations, annotated with name of concept, annotated with name of image, annotated with both concept and image). Participants were asked to place the four slides in order of usefulness.

After each task a discussion followed in which the participants were asked to describe and explain their choices. During these discussions the focus was maintained on the outcomes from the tasks. In this way, participants were reflecting on what their choices and decisions had been and were asked to explain *why* they had made them.

Evaluation of process interviews
**a) Using the tasks to stimulate discussion**
To understand the evaluation of process interviews as a research method, it will be useful to present some examples of completed tasks.

Figure 1 shows a completed example of the task in which participants arranged concepts along a continuum according to how difficult each would be to explain. This task took the longest to complete, possibly because it was the first that participants encountered. I was able to focus my interview questioning on why they had placed certain slides on the left (very easy to explain) or the right (very difficult to explain). In this way, our discussion was based around those choices for which participants had the strongest views and often the most meaningful explanations to offer. I was particularly interested in how the type of image used (metaphor or non-metaphor) affected their choices.

Figure 1. *Classifying concepts along a continuum of difficulty*

Figure 2 shows a completed example of the task in which participants were asked to match images with concepts. This task was completed quickly by most groups, perhaps because they were familiar with the images from the lecture recordings. By observing the participants completing the task I could see which images were being categorised as easy to match and which were categorised as difficult to match, the latter causing the most confusion or disagreement. By selecting images from each category and asking about why the matching process seemed easy or difficult I was able to elicit insights into characteristics of powerful and weak visual metaphors. Not all images were placed in the 'correct' location, which provided further useful context for discussion (for example, in *Figure 2* the images for competition and control were placed incorrectly by this group).
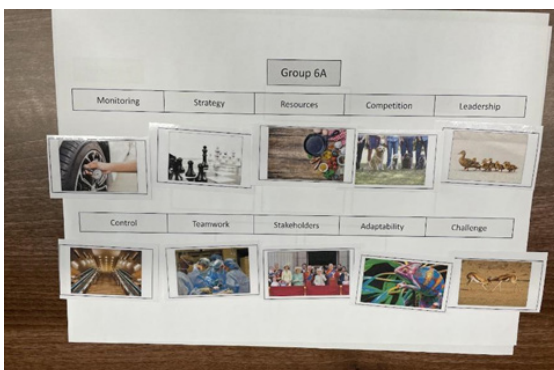
Figure 2. *Matching images with concepts*

Figure 3 shows a completed example of a diamond nine task. Conducting research with our own students always means that power issues may compromise the agency of the participants (Roos, 2021). Using a diamond nine template forced participants to de-prioritise some of their choices; they could not present every option as being very useful and had to categorise some options as being relatively weak. This provided a very useful context for discussion using the question prompt: *Why did you put this image at the bottom?* (i.e., least useful). This helped to overcome the potential problem of participants feeling obliged to assert that anything related to my teaching was without fault. The quality of discussion around the least useful choices was particularly high, helping to generate some valuable quotations for use in my thesis. When the interview transcriptions were subjected to thematic analysis, the passages related to what was least useful were relatively easy to code and to generate themes from (Braun & Clarke, 2021).

Figure 3. *Classifying usefulness using a diamond nine template*

The discussions based on the images from the metaphor elicitation tasks were highly productive and provided some fascinating cultural insights. It was interesting to hear about the processes that participants had used when selecting images and the contribution that the tasks had made to their learning (the revelation that metaphor elicitation could support learning is an issue that would be worthy of further research). In situations where thoughts and behaviours are complex or difficult to articulate, metaphor elicitation may be a useful way to expose participants' views, particularly views that might otherwise be obscured or hidden (Khoo-Lattimore & Prideaux, 2013).

Having a photograph or Google Slide of each completed task was useful when transcribing the interview recordings as it was possible to refer to them for clarification. Without these records it would have been difficult to understand which images participants were referring to in their explanations.

b) Some unanticipated advantages of Zoom interviews
The pandemic forced many researchers to shift their data collection protocols online. While Zoom-based interviewing offered locational flexibility for interviewers and participants and afforded other benefits such as video recording of interviews, for some the experience was not as satisfactory as traditional face-to-face interviews (Oliffe et al., 2021). Key reasons for this view are that online interviewing reduces the ability of the interviewer to read the non-verbal signals of participants and that, when interviewing a group, the dynamics are poor (Boland et al, 2021).

I had anticipated that I would experience these problems. Half the interviews were conducted via Zoom. As my process interviews involved a staged series of tasks, I thought that this might be exceptionally difficult and clumsy to execute in an online environment. However, I found that there were distinct advantages to taking the interviews online. While the participants completed the tasks using the Google Slides, I put them in a breakout room. This meant that they could communicate fluidly in their first language. When the participants were interviewed face-to-face, despite being encouraged to speak in their first language (for almost all, Chinese), they frequently attempted to speak in English—I assume out of politeness to me. While participants discussed the tasks set in the breakout room, I was able to watch them completing the tasks on Google Slides and bring them back into the main room when a task was complete. In each case at least one participant was able to articulate the group's answers to my questions. A group consensus was more evident, and the quality and depth of answers was often better than in the face-to-face interviews.

c) Administration of the process interviews
Preparing materials for the process interviews was time-consuming. It was important to ensure that

materials were labelled with group names, so that I could take photos of completed tasks for later analysis. I had been concerned that some of the participants might regard the tasks as 'childish' and not take them seriously; this was, most definitely, not the case. All those interviewed completed the tasks enthusiastically and surprisingly purposefully.

The groups were created for them to work in collaboration on a summative assessment (a management report). When deciding upon the composition of the groups I attempted to place students with people they had not been working with in the seminars and in such a way that groups were mixed in terms of ability in English. In this way, every group had a student who was fluent in English and/ or was confident and assertive. As a result, in the group interviews, when language issues became a problem, there was normally a participant who could translate and communicate with me on behalf of others in the group. I should note that of the four non-Mandarin speakers, three were placed in the same group thus maximising the opportunities for first language discussion while completing the tasks.

Ultimately, using process interviews resulted in many lively discussions with participants. They had something concrete to talk about, rather than attempting to draw on vague or unreliable memories and experiences. The data generated illuminated the types of images that had most impact and, more importantly, why.

Conclusion

Asking students to explain how they learn places them in an uncomfortable and unfamiliar position. The language of metacognition is neither intuitive nor simple. For international students the extra linguistic obstacle makes such conversations exceptionally difficult if the interviewer is not using their first language. Towards the end of each interview, I asked participants whether they had ever been invited by teachers, in high school or university, to talk about their learning. None had.

By using process interviews I created breathing space for participants to flex their cognitive muscles and to actively rehearse the issues I wanted to discuss. The obstacles of language and the metacognitive demands of explaining learning are not entirely overcome but are lowered. Based on the tasks they complete in the interview, participants have something to present to the researcher, talk about, explain, and use to evaluate. Fresh from processing their thoughts, the conversation can remain focused and purposeful.

In the future I would like to use process interviews as a data collection method in other research projects. For example, I am interested in how students conceptualise effective teamwork when completing group-based summative assessments. Reflecting on teamwork is another example of a challenging metacognitive task and would therefore be a suitable context for using process interviews.

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