

The Illustrated Student: Creating a Taxonomy of Imagery Derived from a First-Year Visualisation Exercise

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ABSTRACT

In 2019 the University of Technology Sydney developed a research project to assess the variety of students' state of mind in their first year. The context was implementing transition pedagogy and determining if it was possible to visually map the range of student responses to transition from high school to university. The aim was to be in a better position to anticipate transition challenges for our students. The methodology involved asking first year students across all faculties to express their experience of their first year at university in a drawing, accompanied by a Likert scale self-assessment with an optional text reflection. The data gathered comprised over 550 drawings. Further, we documented and compared a range of examples of this type of research in other institutions. We noticed images common to all the different research projects appeared. The question we asked ourselves was whether it is possible to develop a taxonomy of images which could be relied upon in subsequent iterations of the exercise. We wanted to know whether we could create categories of symbols or images which could be objectively understood. The key outcomes were despite common use of images in these projects there are challenges in creating such a taxonomy. Interpretation is subjective and a classification system might be observer constructed, and not reflect the subject's true intention. While our own data included the Likert scale and the opportunity to add text to the response, the triangulation is only apparently helpful in determining meaning because the difficulties remained. The added information does not overcome the inherent subjectivity of interpretation. The importance of this paper is it is an admission the exercise does not establish an ability to develop a definitive taxonomy. Instead, it cautions against an attempt at a taxonomy because it risks being ultimately unfaithful to the data.

Keywords: Transition Education-Drawing

1 Introduction

The University of Technology Sydney has a First and Further Year Experience program to facilitate successful transition of students from school to university based on transition pedagogy principles. Transition pedagogy involves acknowledging the challenges a student might face in moving from school to university or undergraduate to postgraduate studies. It describes practices which may be implemented to accommodate the diverse backgrounds of students to ensure success and engagement through different modes of welcome, induction and support. A challenge is tracking a student's response to transition and determining whether existing strategies are effective. In the two years prior to Covid, UTS ran a major research project to enable students to reflect on their first year of university. It involved first year students across most faculties being asked to illustrate their experience of first year expressed in a drawing.

2 Why Visualization?

Using drawings as a method to record student experiences is comparatively new in tertiary education research. In the late nineties there was suspicion of this less formal method for eliciting information as



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being too subjective, yet valuable insights were gained from architecture students which may not have been as readily apparent from a text survey [1]. Drawings have been a non-intimidating method to gauge the impact of the AIDS epidemic on children in South Africa [2]. In a PhD project, first year US college students were divided up, and invited to draw posters in their groups to illustrate aspects of their social lives while studying [3]. Again, the value in these drawings research was the ability to establish the context of the student experience in the way that solely text responses could not have.

More recently international students transitioning to higher education in Scotland were also surveyed by using collaborative drawings rather than individual visualisation exercises [4]. The term ‘rich pictures’ was used. The rationale was to overcome language and culture barriers by the use of the drawings. This approach overcame the subjects’ reticence based on their own perceived lack of creativity or drawing skills but nevertheless maintains the advantage of immediacy and tangibility in the creation of images. The resulting illustrations were in the form of stories rather than symbols or metaphors. A more expansive approach labelled ‘digital story telling’ has encouraged first year students to express themselves in five-minute videos relying on images, photos and text to illustrate their first-year experience [5]. The task prompted students to develop a narrative of their story so far using this multimodal approach. The advantages included providing a voice for the marginalised. These videos could be a combination of both fact and a constructed reality which means there are elements which may be symbolic or metaphorical in the same way drawings might be.

Overall, it appears from the literature that the advantages of visualisation of experience include they can provide deeper information than text only responses, and they can overcome barriers to communication which may be based on class, age, culture or race. Further it is not necessarily a disadvantage that a subject is not a skilful drawer. They point is the ability to communicate an analogue which conveys a response to an experience, and this does not depend on the subject’s drafting skills. Further to this, and perhaps more fundamentally, it has been argued that our natural mode of thought is metaphorical, and that language, thought processes and expression of concepts are necessarily metaphorical [6]. Urry is writing here specifically in the context of reclaiming social science from a strictly positivist critique and re-asserting the power of metaphor in conveying novel approaches to analysing the impact of globalisation. While Urry is asserting a specific context for the use of metaphor, the general principles of how we think and communicate are still relevant to this project. If we accept the essential premise regarding metaphors and language, rather than text being a privileged medium for gathering data, a visual representation of a state of mind or experience could be preferred. Visualisation is a mechanism not only to overcome cultural differences but should be seen as the primary form of personal expression.

In this paper our proposition is that surveying students by allowing them to express themselves visually may be a more effective way to capture aspects of a student’s experience of university, and may be more illuminating than simply a transcribed interview. A concern is that interpreting them may be too subjective. That is, attempts to derive meaning may not fairly reflect the intention or feelings of the students. And that there is more certainty in texts. After all, it is skills in textual expression which enables students to be selected for university in the first place. Nevertheless, the advantage in drawing is a combination of the richness contained within the images as well as the expectation that there will be shared meanings [1]. If shared meanings can be identified and the drawings are able to represent in some ways a common language of symbol and metaphor, then there is the potential to extrapolate from the data methods of capturing student responses in subsequent surveys.

3 Gathering the Data

First year students from across UTS faculties were the subjects of a research project to explore the experience of their first year at university. Students were assessed in their classes. As time was taken from a formal lesson the importance of the task was established. There were three elements in the data gathering. One was demographic information including whether they were a first-year student; and whether they were from a local Australian or international cohort. The survey was anonymous, and the age and gender questions were optional. There was also a Likert scale which enabled students to record a degree of positive or negative feelings towards their first year of studies. This proved useful in assessing the nature of the images.

The second element was the drawing itself. This was generated by an open prompt: 'You can do your visualisation however you wish. There is no right or wrong. The aim is for you to create a representation of your experience, whatever this may be...'

Over 550 drawings were collected over a period of twelve months. They were scanned, numbered, organised by faculty and printed and bound. We have both digital and hard copy access to all the materials and spreadsheets cataloguing the provenance of each drawing.

The third element was an opportunity to use text on another page to further elucidate the meaning of a drawing. Few students took up this opportunity which may suggest they considered the image on its own was sufficient.

4 Classifying the Drawings

The question for us is whether going through over 550 drawings we can derive a taxonomy of images or symbols which can be relied upon in subsequent applications of the exercise. A taxonomy could be useful as a way of quickly analysing drawings made by new intakes of student, or it may lead to the creation of a range of symbols which can be selected by students to quickly indicate their state of mind, or it could be used as part of a relational database to quickly retrieve responses of a particular category in the current and subsequent data. When similar exercises have been run in other institutions, common images amongst them have arisen such as a roller coaster⁴ or octopus (multi-tasking). It is this apparent shared meaning which encouraged delving further into the nature of the data we had collected.

There have been previous attempts to loosely classify drawings. In the Berg survey of international students in Scotland, categories were divided into *social*, *cultural*, *academic* and *economic* themes. From the drawings it seemed that *economic* focused on financial privations, *academic* looked to reveal the pressures of study, *social* featured family, friendship and homesickness whereas *cultural* alluded to religion, weather and interactions with police. The authors identified a reference to the weather common to the students and assumed it represented a negative response. Note that the students had come from a range of other countries to Scotland. There is also a list of other common themes which included: missing family and friends; nature; travelling; Haggis; loneliness, language and accent barriers and daily living expenses.

It could be asserted that these are literal rather than figurative representations of experience. The drawings in this research project are less a metaphor illustrating internal lives but representations of common touchstones of practical experience when on exchange in Scotland. It may be that drawings done in a group setting necessarily have to rely on non-figurative depictions to better illustrate shared experience. An

⁴ It would be difficult to discount the enduring influence of the 2000 Ronan Keating release 'Life is a Rollercoaster'. Not only was it a global hit but is now a retail muzak staple.

individual's drawings completed alone may be more likely to convey abstract and idiosyncratic responses. If drawings are more metaphorical than literal, as they are in our UTS project, despite there being shared imagery, there are challenges in attributing certainty in meaning. Even if common images can be identified when surveying the data classification is not necessarily straightforward. Seemingly related images may have contrasting meanings. Money can represent a debt burden or an aspiration. A clock can represent incessant deadlines or work life balance. A roller coaster can convey stress as well as exhilaration. A winding path through a mountainous landscape can represent barriers and hurdles to overcome as well as a motivation.

5 What is an Image?

The starting point must be identifying the data we are viewing. This involves asking what is the nature of the representation? The students had complete flexibility in the way their visuals were composed or created. For example, is it a symbol or a metaphor? A symbol is a concrete object which can represent an abstract idea. For example, a crown can represent a monarchy, or a butterfly can represent transformation. It is an image of something which conveys something else by convention. Whereas a metaphor is a figure of speech that describes something by saying it is analogous to something else. An obvious example is the idea first year at university is like a roller coaster ride. A symbol is more likely to have a shared or established meaning. A metaphor can have a shared meaning but it is also as likely to represent a unique creative, idiosyncratic perspective. It is helpful to distinguish between the different types of image because it may have an impact on meaning. We need to ask ourselves if they are symbols or metaphors. Do they represent a single concept or does the image comprise discrete elements which speak to each other to convey a meaning? Does a drawing represent a static mood or state of mind, that is, simply a snapshot? Does it do them justice to understand them as only reflecting a current mood? Or can a drawing encompass a more complex representation such as an extended narrative?

A series of images leading to success can tell the story of student's aspirations. Or the drawings can be literal signs. A student is happy because they have a secure life with home and family and money or a student is struggling because of poverty or an impossible study, work, life balance. Images including knives or a hangman's noose may convey self-destructive impulses. It is likely not all student subjects have commenced the drawing exercise having a final concept of the nature of the representation in mind. Some of the drawings can be seen as a concatenation of symbolic, metaphorical and literal illustrations. Internet memes and emojis are also present in the data. This makes classification a challenge.

6 Classification Methodology

Because our data included a Likert scale and an opportunity to add text to the response the triangulation has been helpful in determining meaning and establishing categories. Nevertheless, a linear indication of the student's mood is not necessarily a precise guide to meaning. The Likert scale is inexact. It is a continuum without any other explanation, except for the drawings. Apart from representation of the images and the Likert scale there is an element which helpfully narrows down the scope of interpretation which is the research is an enquiry into the experience of first year tertiary students. This acknowledgement of the particular circumstances of the subjects lends itself to a classification template which has been suggested in the literature [1].

It is useful to consider first if the image refers to *self*, that is whether the drawing is a representation of the student themselves, either on their own or together with classmates. These drawings may help us understand how the student is feeling, whether they fit in or feel out of place, if they have concrete goals or if they are lost or struggling. Perhaps the image is instead referring to the *course*, that is the environment in which the student is studying. There may be frustrations with the content or structure of a course. there

may be difficulties with facilities provided. For example, in one course, it appears the available software was not industry standard, and was not user intuitive. Or students might realise too late that a course is expensive and may not lead to employability.

And finally, whether the image places the student within their study *progression*—that is the stage where the student is in their studies and how the progress towards the completion of their qualification is represented. The illustrations of progression are less common in first year students but some have a longer term view and are able to extrapolate from what they are engaged in now to what will be happening in later years or on graduation.

The *self*, *course*, *progression* categories help guide the analysis, identify common use of images and justify interpretation. Our overall approach was to create a table. The first column of the table listed descriptions of images or combinations of images. For example, a table we are working from has an expanding list which includes:

Universe/stars/galaxy; Stick figures; Stick figure narratives; Computer games/gamification; Violence/self harm; Cliffs/chasms; Emoji; Internet memes; Litotes [this is the red circle with the line through it to convey a prohibition]; Clouds/rain/thunderstorms; Computer screen/clock; Path/pathways; Hurdles/barriers; Maze; Desk; Self-portrait; Eyes/bloodshot eyes; Rollercoaster/an undulating line; Mountains/steep hill; Politics/ideology.

This is just a small sample of working descriptions. It can be seen from the list there has already been an attempt to group like images together. Over time these descriptions will be rationalised. For example, eyes/bloodshot eyes and self-portrait may be classified as a single category. Perhaps path/pathways and mountain/steep hill should be similarly combined. As with any taxonomy a challenge is defining the top level or refining the dictionary or thesaurus.

And of course grouping together images may in itself distort any interpretation. For example, while universe, stars and galaxy may appear as equivalents, a universe might connote insignificance, stars, wishes or aspirations, and a galaxy a far off fantasy. One student had drawn an image of the big bang. The student's annotation was 'Explosive thinking creation with some doubt and confused' [sic]. The universe as an analogue for the violence and chaos of creation may not sit well with an assumption that the universe, stars and galaxy correlate with the expansive emptiness and quiet of space. The classification of objects may not correspond with the respective student's state of mind.

Bloodshot eyes may specifically convey desperation or exhaustion or self-destructive habits while a self-portrait might illustrate a more rounded view of self. The classification process necessarily has to start somewhere and the possible contradictions only become apparent as the activity progresses. While fitting student drawings within these categories the drawings are also identified by a unique number. This helps with the management of the data overall and facilitates relational manipulation. Then an annotation is made as to whether the subject matter refers to *self*, *course* or *progression*.

With many drawings there are overlaps. The drawing can reveal aspects of self and course, or course and progression, or all three. Then a further annotation involves establishing if the image can be interpreted as literal or figurative; a symbol or a metaphor, a snapshot of time or place, or represents a broader narrative. Another approach to analysis is to divide images into representation (that is identifying what is portrayed); abstraction (identifying the concept or emotion the illustration may represent); symbol (whether there is common meaning able to be attributed to an image established by convention) [7].

As part of the process determining meaning we also needed to establish if the image reveals a positive or negative response either from the image itself or a combination of the image and the Likert scale and/or

any accompanying text. As we have worked through the data, new categories of image suggest themselves. In this process there are subjectivities, equivocation and uncertainty. But as the process continues patterns may emerge. The danger here, again as mentioned above, is the patterns will be constructed by us and perhaps not reflect the true meaning of the images. Here are some annotated examples of entries to make the process described above more clear.

6.1 Maze

Mazes are a recurring theme in the drawings. The maze image conveys that studying a new discipline is a puzzle where the objective is hidden and the process of finding it involves a process of trial and error to establish a pathway, in or out.

Table 1: Maze annotations

Maze	#529	Maze with reward on completion. Maze placed on graph with time and comprehension as axes.	Neutral	self/course/progression.
Maze	#547	Non-linear maze with one entrance but three different exits 'Degree', 'Beers', 'Sleep'.	Positive	self/progression

In Table 1, No 529 is relying on a mixed metaphor. The diagram of the maze is set within the axes of a graph which does not make immediate sense. But the message appears to be that in order to comprehend the material there is also a requirement of time. Time and comprehension will enable the maze to be solved. So it is a maze which in other circumstances might require a trial and error approach, but for this student time goes with developing understanding in class rather than an inscrutable puzzle which needs to be solved. No 547 appears as a maze but is not an accurately drafted usable maze. All that the student wanted to convey was while there was one way in, getting out could lead to the degree or beers or sleep. This did not illustrate a single outcome. The maze appears to be an illustration of the daily or weekly experience. Time is spent in the maze and the student occasionally emerges to sleep or party and ultimately will end up with a degree. The student's overall view was positive and here the focus is the personal experience and the characteristics of their progress.

Both these mazes, while the dominant image in the drawings, are conveying different things. In the first the maze represents the puzzle which will be solved through time and understanding. So the student is not lost in a maze. The solution is already clear. In the second the maze is also a puzzle, but which can be entered and exited at will, so again absent the traditional characteristic of a maze which is a puzzle in which someone will get lost. It is clear why we would group these two drawings together, because of the maze reference. However, it could be argued we are not dealing with a university course as a maze directly in either of them.

6.2 Desk

Desks can be seen as symbols of the student experience. They connote study or work. It is the context of the desk which distinguishes these images.

Table 2: Desk annotations

Desk	#678	Student asleep at desk. Always sleepy during classes.	Neutral	self/course.
Desk	#681	Three students sleeping at a desk. The bleary-eyed student is in the centre of the drawing. The label is 'sleepy'.	Positive	self/course
Desk	#683	Images of student sitting at desk with computer. One caption is 11 AM next caption is 4 AM. Text complains about insufficient training on software. Note images include laptop and clock and times. Student has ideas but no time to realise them.	Neutral	self/course
Desk	#691	Three desk scenarios. Before: gaming 16hrs per day. After: Rhino (design software) 26 hrs per day. 3 rd image student concentrating at desk with no screen. The additional text comment is group work is a 'nightmare'.	Neutral	course/progression

In Table 2, No 678 conveys sleep deprivation. This could be argued to be non-figurative. Whether in class or studying at home the student is literally sleepy. No 681 is also an illustration of sleep deprivation except with three sleepy students. No 683 expands on the sleepiness theme by creating a type of narrative to explain why. The working until the early hours of the morning or doing an all-nighter is a common theme in the drawings. It suggests that even though a desk appears as a motif there should at least be a cross reference to images which illustrate working through the night.

No 691 is a variation of the desk symbol in the way it illustrates aspects of the student's experiences as a progression from school with three distinct images. Gaming 16 hours per day at a computer is contrasted with using design software for '26 hours per day' and then a screenless desk. It is not clear if this represents that screens are a burden which students need to be liberated from in order to genuinely learn.

Students did the drawings in class. There is the risk of cross-contamination or group contagion in this exercise. The common desk motif with lack of sleep in close to consecutively numbered drawings (ie the same cohort) may represent a peer group response to the overall data gathering exercise rather than a sincere expression of an individual's first year experience. This is something which needs to be taken into account in the analysis. But it does not necessarily mean the data is unreliable. The size of the overall sample should mean noise is diminished.

Overall, the desk image ties these illustrations together. It tends to be a non-figurative device to illustrate a common experience of time poor students. In this example the desk is the least elusive of symbols to interpret but also does not necessarily help in the analysis of the drawings. In these cases all the desk does is confirm the subjects of the research are students. It may not communicate any more than that. A desk is a less helpful symbol than the maze. However, the lack of sleep in the context of the desk establishes thematic connections. Maybe the choice of desk as an image category is missing the point.

6.3 Violence

And then there are strikingly negative illustrations, which are, it should be noted, rare in the overall data.

Table 3: Violence annotations

Vio- lence	#540	Student hanged. Dollars going down the drain. Surrounded by fails.	Negative	self/course/progression.
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In Table 3 No 540 illustrates despair and suicidal ideation. Anyone teaching knows that if a student expresses these sorts of sentiments university counselling needs to be contacted. Unfortunately as this exercise is anonymous we had no way of identifying the student other than they were a design student. For the purpose of this exercise the illustration is useful because the extrapolation is that there are students who have been defeated by their studies and the financial investment into them. The reason we are singling out this particular slide is because in the absence of classification or taxonomy this single drawing has revealed the value of the exercise. If other students facing these circumstance can be assisted in our teaching or in university support services generally, then the exercise has been worthwhile. It tends to obviate a need for an overall classification system. It speaks for itself.

7 Conclusions

What we need to accept is that what we are doing is a type of ethnography. At the start we are prompting and observing. The students have an opportunity to guide meaning by a simple Likert ranking scale but can also expand on meaning by adding their own annotations. However, once the research exercise is complete and what we are left with is the pictures, since we are no longer in contact with the subjects, then the question needs to be asked: can we with confidence attribute a meaning? Perhaps the best we can do is look for patterns and similarities. We can apply a classification system but we are unlikely to be able to say each category represents a particular state of mind. This may be a paradox of classification. We can organise and label the images and there may even be an ability to identify a shared meaning in relation to what an image represents, but classification can paradoxically move us away from the original intended meaning. And while we can construct categories what might be elusive is the truth of an individual subject's state of mind. The outcome is we have a rich dataset but we cannot ascribe objective meanings to it. In an image one student may be expressing stress and despair while another student, using a similar image, is expressing a resilient acceptance of challenges that need to be overcome. A recommendation may be to use the existing data to create prompts or stimuli for students to respond to with drawings. The starting point is there is a given series of images which we attribute a meaning to before the task and ask students to further expand on an image they choose to more accurately convey their mood or state of mind. This could be a follow up project.

8 Declarations

8.1 Acknowledgements

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8.2 Ethical Approval

This study has been approved by the University of Technology Sydney Human Research Ethics Committee (UTS HREC). Ethics Approval Number: ETH18-2929.

8.3 Informed Consent

The ethics approval process included a Participant Information form which described the research, identified any risk to the subjects, made it clear the participation was voluntary and assured subjects that contributions were anonymous. However, because the contributions were anonymous participants were warned if they changed their minds regarding participating after the research was completed then it would be difficult to withdraw their contributions as they would be difficult to find. Contact numbers of the authors were provided to the subjects as well as contact details for the UTS Human Research Ethics Committee.

8.4 Competing Interests

The authors have no financial interests in entities which would have had an influence on the topics discussed in this manuscript.

8.5 Publisher's Note

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