An “instrumental approach” for teaching 3D multimedia

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Background

There are a number of branches of technology education which are concerned with transformation of the environment. For instance, in materials technology (that is, working with wood, metal and plastics with tools such as lathes and chisels) one might be concerned with using a chisel to effect a transformation on a piece of wood in order to fashion a candlestick. Similarly, the 3D multimedia author works towards transformation of his or her environment, for instance, through adding characters and props, establishing a setting and animating the characters. Materials technology educator Vérillon (2000) has argued that

in order to do their jobs, technology educators need epistemological and psychological frameworks to derive coherent representations encompassing their field of knowledge and their students’ cognitive functioning … [what is needed is] … a psychological model of instrumentation, that is, a model of the cognitive process in which artifacts progressively acquire instrumental value and are integrated into one’s mental and physical interaction with the world (Vérillon, 2000, p. 6).

Rabardel’s “instrumental approach” provides such a model. It is an approach implemented in a number of (diverse) fields, such as: teaching/learning of CAS calculators and materials technology. The starting point for understanding it is the definition of an instrument:

any object which the subject associates with his action in order to perform a task. It prolongs and/or modifies this action and present characteristics which simultaneously associated with the operations of the subject and with the objects (and the context of the task) to which it is applied. As such, the instrument constitutes a sort of intermediate universe between subject and object: it is both content in regard to the subject’s actions and a form in regard to the objects to which it is applied (Vérillon & Rabardel, 1995, p. 84).

Vérillon and Rabardel go on to stress the difference between the concepts of an artifact and the instrument. Using the context of materials technology as an example, a chisel would be an artifact, but the instrument is the psychological construct - how one goes about using a chisel, or how it might find application in various situations. As Trouche (2004, p. 285) notes, “the instrument does not exist in itself, it becomes an instrument when the subject has been able to appropriate it for himself and has integrated it with his activity”.

In addition to the instrument, the “instrumental approach” describe a subject and an object and how they are related to it (Vérillon & Rabardel, 1995, p. 85). The subject is the user, and the object is that towards which the action of the instrument is directed. The interaction between these three is presented in Figure 1, and described in the paragraphs which follow.

![Figure 1: The instrumented activity system (Vérillon & Rabardel, 1995, p. 85)](image)
The example of a baby learning to use a spoon can be used to explain the “instrumental approach” by considering the interactions between the three elements: a baby (subject), the spoon (instrument) and the substance being manipulated by the spoon (object).

Not only does he have to elaborate efficient schemes in order to grasp and manipulate the spoon (subject-instrument interaction), but he has to learn to keep some of the milk in the spoon on its way to this mouth (subject-object interaction). In the process of this, he acquires some knowledge about the behaviour of liquids as opposed, say, to mashed potatoes (subject-object interaction mediated by the instrument). Eventually this knowledge may lead him to use his spoon differently for milk and mashed potatoes (modifying previous forms on subject-instrument interaction).

Vérillon and Rabardel (1995, p. 85)

This process for the construction of the instrument (eg the spoon as a melding of a psychological construct and actual artifact of ‘spoon’) is called instrumental.

A classroom example

The class commenced with the teacher using a data projector to show the class a range of sample worlds, and observing that, taken on face value, worlds provided (even though there is a wide variety) can be uninspiring. Sample worlds were shown by the teacher. Firstly, the sample world ‘as provided’ and then the teacher modified them to be more appealing. For instance, a desert scene could be changed to an island (by swatching the sand to resemble water), or a room could be changed to a gaol, abandoned warehouse or wizard’s laboratory (by changing the colour or texture of the bricks). Students also made suggestions as to how worlds could be modified. For instance, a large boulder in the desert could be made to seem like a close-up of a pimple on someone’s skin, by swatching the sand to skin colour. Students agreed that these ideas were more engaging and were more suggestive of interesting narratives than the originating world.

At the conclusion of this plenary discussion, students were asked to practice choosing worlds and swatching to create interesting settings for potential narratives. As they were working, the teacher moved among the students, admiring some work and remarking to others that their work “still looks the same, just a different colour”. After a period of working, students were invited to share their ideas and show their work to the rest of the class. This stimulated some discussion which could lead to improvements or better ideas. The students were then asked to return to the computers and to continue working to continue develop creative and interesting settings. The class concluded with a further showcase and discussion. In all, students had spent about an hour thinking about setting, background and narrative, alongside practising relevant skills to make meaning.

There are several things to be observed about how this class proceeded, which exemplify the “instrumental approach”:

- Focus on developing how ‘swatching’ and ‘choice of worlds’ could “work” to make meaning in different situations. (Not on amassing a large technical repertoire).
- Students being given time to explore and practice, develop, share, discuss and respond to new ideas.
- As a result of these, giving students the opportunity to form a ‘psychological idea’ of how certain technical capacities are “linked” to making meaning, and giving the opportunity to “bed these down”; finding ways to help students form an ‘instrument’ rather than acquiring the skills associated with an ‘artefact’
- As a result, the ‘how’ and the ‘what’ are linked in a simultaneous learning act
A learning framework

Our exploration with Kahootz, which has involved experimenting with it ourselves, watching its use in classes and thinking about the issues which then emerge with the teachers involved has led us (researchers and teachers) to suggest that the following process, informed by the “instrumental approach”, would be a valuable way of introducing students to Kahootz.

Introducing Kahootz and multimodal literacy

| View | A very short film clip, chosen deliberately to exemplify certain codes/conventions (eg use of camera, framing, colour, sound effects) |
| Deconstruct | Review and understand how meanings have been made using certain codes/conventions |
| Demonstrate | The teacher to model construction of an element of a Kahootz xpression\(^2\) which uses those codes/conventions to create meaning. Joint construction with the class |
| Do | Work on a Kahootz xpression to use exactly these codes/conventions to create meaning |
| Reflect | Consider how effective each effort has been at creating meaning using these codes/conventions |

Repeat this process for several pieces of work (possibly up to a dozen), each taking no more than a lesson to complete, which are cumulative in their complexity and deliberately scaffolding the learning in meaning-making and technical skills.

It has been this approach to teaching the “what” of multimodal literacy and the “how” through Kahootz which we have sought to demonstrate in the session today.

References


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1 This process is deliberately shown in the diagrammatic form of a Nassi-Schneiderman Diagram, familiar to computer programmers. It shows a sequential set of four steps and the conditions under which they are repeated.

2 A *Kahootz* file is called an ‘xpression’