

Cowan, J. (2004). Beyond reflection: where next for curricula which concentrate on abilities. In C. Baillie and I. Moore (Eds.) Effective Learning and Teaching in Engineering. London and New York: RoutledgeFalmer. Pp 203 – 219.

Pages 205 -207

In process analysis, we ask ourselves ‘How do I...?’ or the more general question ‘What is happening when I...?’ (Taras, 2002). Typically we can do this to advantage when we work out how we do tasks which bear a family resemblance to each other, and then try to generalise from that, in a way which can enhance our practice when we are next called upon to tackle another task of that type. A student would be engaging in process analysis if he identified the key features of his method of searching for information on the Web, and then tried to pinpoint aspects of that process which might be leading to inefficiencies in his searching process. [...]

Example

Some tasks in engineering education can be complex, and extend over a long periods as, for example, in group projects. In these circumstances, I have facilitated activities in which students are regularly required to take a short ‘time out’. During this period, I push them to identify, in general terms, ‘How do I... tackle the complex task we are encountering?’ (Cowan, 1998). Usually they are at first unable even to identify and describe in general terms the elements in their approach. It takes some effort and time before they can cope with the demand to describe in detail what these component activities have entailed, and how they have been making the decisions within them. When they eventually arrive at *generalisable* summaries, their *particular* performances tend to improve markedly. For they have seen scope for enhancement more clearly in their generalised algorithm than amid the details of a particular (and past) solution. Consequently, next time round, they usually don’t need to be persuaded to take time out to think about what they are doing and how they are doing it. They will have discovered the usefulness of doing that.

I have found that this type of engagement in analysing can have even more impact on students’ development if they are told that I will expect them to keep notes of how well they followed their own advice; when they deviated from it, and why; and with what effect. I warn them that they will be expected to compile revised advice, after the next problem tasks, based upon the success of otherwise of this current advice. This is iterative process analysis, focused on key activities, and incorporating what Kolb (1984) called ‘Active Experimentation’, of which more later in this chapter.

I hope it goes almost without saying that these two teaching examples illustrate the use of an ability (that of process analysis) which I value. Consequently, in accordance with the principle which Biggs (1999) has called alignment, I recognise and attempt to discharge the obligation to teach for the development of that ability, and to assess (and reward) its achievement. How that is done, is perhaps, another story.

Rationale

My justification for embodying process analysis in engineering curricula is that I have found (Cowan, 1987; Boyd and Cowan, 1986) that those who are encouraged to think about how they do ‘it’, whatever ‘it’ is, will on the whole become more effective and efficient thereafter (Kolmos and Kofoed, 2002). This seems to be so, because – having derived a refined generalisation in their own words – they apply their generalisation methodically to future examples within the same category, without ‘going back to the beginning again’. Process analysis thus leads through specification to development of generic abilities.