Towards a skills development framework

Shawcross, J K and Ridgman, T W

University of Cambridge

Abstract

In the UK, business, government and now students, have called for greater development of work-related skills during Higher Education. This longitudinal action research study aims to produce a skill development framework especially for more complex skills such as problem solving.

In the initial project phase, a skill development framework (SDF) was drawn from employability, higher education and professional development literature and then tested in a Masters programme designed to prepare students for careers in manufacturing industry.

The SDF comprises fifteen elements related to skill description, exercises, feedback, reflection and student motivation. Results confirmed the presence of all SDF elements but at different levels of adequacy with reflection aspects considered the weakest.

Proposed SDF refinements include increasing the number of feedback and reflection elements. Further work in defining and assessing skills is required to enable more rigorous testing in subsequent project phases.

Introduction

The purpose of this study is to produce a skill development framework (SDF) for use in Higher Education for work related skills. This initial work involves construction of a framework from literature and then testing it on problem solving skill development in an MPhil programme.

Problem solving skills are crucial to the students in this MPhil programme as it contains four industrial projects that count for 50% of the assessment. Each industrial project involves two students, tackling a real issue, for two weeks. Students present their problem definition, analysis and proposed solutions on their last day and submit a report the following week.

During the first module, problem solving skill development (PSSD) is essential. This involves a lecture followed by a series of exercises, with group membership and type of task being varied. Tutors have found this preparation enables students to successfully complete their first industrial assignment.

Literature

To derive the SDF, literature in the fields of employability, higher education and professional development were reviewed to draw out aspects that related to skill development. No one field covered the full range of elements identified for the SDF and the more significant contributions are summarised below.

At a high level there is broad consensus that "skill...is the ability to do something that has been learnt" (Moon 2004) and that a skill requires "knowledge that" and "knowledge how" (Eraut 1994; Moon 2004). For professional skills Eraut adds "judgement". As judgements are situation dependent, skill development should occur during context specific activities, a view shared by Knight and Yorke represented as "Skilled Practice" in their USEM Model of Employability (Knight and Yorke 2002).

The use of multiple experiences to develop higher levels of context knowledge and judgement skills is supported by a number of models including Drefus Model (Dreyfus and Dreyfus 1986). In terms of HE, experiences to support skill development can be delivered by exercises (Jennings 2002; Goodhew 2010) and Goodhew notes that they are particularly effective for learning related to complex situations. Student self efficacy - a component of the USEM Model - can also be developed by experience, by providing the level of challenge so that some achieve mastery experiences and facilitated such that remainder have vicarious experiences (Bandura 1995).

Race (Race 2010) returns to the concerns of Kolb (Kolb 1984) - to identify factors that underpin successful learning - adding the wanting or needing of a student to learn to experience, feedback and reflection aspects. Becoming a reflective practitioner (Schon 1987) is fundamental for professional development as it develops the ability to handle complex problems with confidence, skill and care.

Fifteen elements of skill development were grouped into four areas (columns) of skill description, experience, teaching process and student motivation. A preliminary representation of the SDF for use as an evaluation tool is presented in Table 1 overleaf with each of elements described in terms of a measurable aspect.

Table 1: SDF

Skill Description	Experiences	Teaching Process	Motivation
Teaching time for delivery	Number of exercises	Time for feedback	Linked assessment
Content - knowledge 'that'	Range of different exercises	Feedback relevant to all	Explanation of importance
Content - knowledge 'how'	Mastery level challenge	Reflection time after each exercise	Student engagement Level
Content - 'common judgements'	Facilitated to provide all with vicarious experience	Reflection outputs enable learning	

Methodology and Results

As part of a longitudinal action research project, this initial test was to compare how the MPhil PSSD compared to the SDF. Multiple sources of evidence were collected through observational methods during four exercises.

Evidence informed judgements were made on the adequacy of each element – the darker the shading the weaker the element. The results are presented in Table 2 below.

Table 2: Skill Development Framework – Results

Skill Description	Experiences	Teaching Process	Motivation
Adequate teaching time	Number of	Adequate time for feedback	Linked Assessment
Knowledge 'that'	Range of different experiences	Feedback relevant to all	Explanation of importance
Knowledge 'how'	Mastery level of challenge	Time for student reflection after each exercise	Level of student engagement
Common judgements	Facilitated to provide all with vicarious experience	Reflection outputs enable learning	

Eight elements were judged highly adequate, five elements adequate and two elements less than adequate.

Discussion and Conclusions

Reflection aspects were considered weak. The method used did not encourage individual, focussed or in depth reflection and students were required to reflect quickly, immediately following an exercise. However it did provide a way to identify issues and prompt discussion on aspects of skill development.

Student levels of engagement fell during feedback and reflection activities which could be due to tiredness due to their timing.

Two components of skill description judged adequate were the descriptions of knowledge 'how' and 'judgement'. These aspects lend themselves to further explanation following an exercise as they are often context specific.

The SDF describes skill development as a multi-dimensional construct in which all components should be present and ideally at an adequate or highly adequate level. As with any framework trying to capture complex constructs there is a danger of oversimplification. It is argued that this may apply to the 'Teaching Process' column which should be split into separate feedback and reflection columns. There would then be five key aspects, mapping closely with the core components of Races' learning model (Race 2010).

Many SDF elements are interrelated, a feature not represented in the current presentation. This is recognised as a key area of further work as constructive alignment (Biggs 2003) should further support learning.

This framework is at the initial stage of development, having been used as an evaluative tool in one context. Since PSSD was previously considered to be well

developed this suggests that the SDF, even in its current early stage of development proved a useful evaluation tool. Ultimately it is aimed to extend its functionality to become a design tool.

Whilst the SDF appears reasonable further work is planned to enable future testing and refinement. This involves a better definition of problem solving, developing effective assessment methods and expanding the feedback and reflection elements.

References

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. Self-Efficacy in Changing Societies. A. Bandura, Cambridge University Press.

Biggs, J. (2003). Teaching for Quality Learning at University, Open University Press.

Dreyfus, H. L. and S. E. Dreyfus (1986). Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer. Oxford, Blackwell.

Eraut, M. (1994). Developing Professional Knowledge and Competence. London, The Falmer Press.

Goodhew, P. (2010). Teaching Engineering, UKCME.

Jennings, D. (2002). "Strategic Management: an evaluation of the use of three learning methods." Journal of Management Development 21(9): 655-665.

Knight, P. T. and M. Yorke (2002). "Employability through the Curriculum." Tertiary Education and Management 8(4): 261-276.

Kolb, D. A. (1984). Experiential Learning, Prentice Hall, Englewood Cliffs, New Jersey.

Moon, J. A. (2004). A Handbook of Reflective and Experiential Learning. London and New York, RoutledgeFalmer.

Race, P. (2010). Making Learning Happen, A guide for Post-Compulsory Education. London, Sage.

Schon, D. A. (1987). Educating the Reflective Practitioner. San Francisco, Jossey-Bass.