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A professional development framework for teaching in higher education

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This paper outlines a professional development framework for teachers in higher education, based on the United Kingdom Professional Standards Framework. The framework outlined in this paper has been designed to align with a range of other evolving models of tertiary teaching standards, extending these to identify performance indicators at three different levels of operation: teaching classes, coordinating units and, leading programs. The model is generic in terms of its overall design, but explicitly incorporates disciplinary within the levels of operation to enable application to a variety of fields. The way in which this framework will be tailored for teaching mathematical sciences, as part of an Australian Learning and Teaching Council Project, is also discussed.

Keywords: higher education, professional standards, professional development

Introduction

In 2009, an international study of quality teaching was undertaken of 29 higher education (HE) institutions across twenty Organisation for Economic Co-operation and Development (OECD) countries. Published by the OECD Institutional Management in Higher Education, a forum focussed on challenges in HE in OECD countries, the study aimed to “highlight effective quality initiatives and mechanisms and to push forward reflection or practices that may in turn help other institutions to improve the quality of their teaching, and thereby, the quality of their graduates” (2009, p. 4). One of the main findings was that teaching *matters* in HE institutions, and “initiatives (actions, strategies, policies) aimed at improving the quality of teaching are spreading” (2009, p. 4). Adopting professional standards for HE teachers is one approach that is increasingly being advocated by educators and government bodies (Department for Education and Skills, 2003; Higher Education Academy [HEA], 2005). Indeed, professional standards, linked to accreditation, and as a guide to professional learning, have already been widely adopted in the school sector (Ministerial Council for Education, Early Childhood Development and Youth Affairs [MCEECDYA], 2010; National Board for Professional Teaching Standards, 2010; Training and Development Agency for Schools, 2009).

Standards in teaching may serve a number of important purposes. These include providing leadership from the profession in terms of quality and consistency, a shared language around teaching and learning that can inform institutional policies and planning, a basis for accreditation, recognition or reward and, a guide for professional learning (Australian Science Teachers Association, 2002; HEA, 2006; MCEECDYA, 2010; Queensland University of Technology, 2004). Taking the lead in development of HE standards, the Higher Education Academy in the United Kingdom (UK) released a Professional Standards Framework for teaching and supporting learning in higher education (UK PSF) in 2006. The UK PSF uses three standard descriptors to reflect different roles and career stages of those working in teaching and supporting learning in the HE sector. The first is aimed at early career, teaching academics (including postgraduate teaching assistants), the second at those with substantial teaching roles, and the third for those experienced teaching academics who have moved into mentoring and leadership. Underpinning each of these standards are three domains: *professional activity*, *core knowledge* and *professional values*, each comprising individual elements. The UK PSF aims to be:

- an enabling mechanism to support the professional development of staff engaged in supporting learning;
- a means by which professional approaches to supporting student learning can be fostered through creativity, innovation and continuous development;
- a means of demonstrating to students and other stakeholders the professionalism that staff bring to the support of the student learning experience; and
- a means to support consistency and quality of the student learning experience (HEA, 2006, p. 3).

Being a generic framework, any reference to specific disciplines is absent, being reflected only in descriptors referring to “the subject” (HEA, 2006, p. 4). Similarly, the framework does not include any specific indicators for the elements allowing institutions to “determine their own criteria in the application of the standards framework” (HEA, 2006, p. 2).

Since its release, the UK PSF has been adopted by several institutions to guide teaching practice, facilitate annual reviews, and inform professional development (e.g. Durham University, 2009; University of East London, 2008; University of Western Australia, 2009).

In the Western Australian adaptation, *core knowledge* and *professional values* are embedded in each *area of activity*. This framework document also outlines suggested forms of evidence that could be used to demonstrate achievement of the appropriate standard, of which there are five, corresponding to academic levels. Being closely linked with promotion, the framework document includes elaboration on evidence that would be required to demonstrate higher levels of performance. However, as with the UK framework, there is no consideration of specific disciplines.

Discipline-based frameworks

Although there is growing interest in discipline-specific teaching practice in HE (see Healey, 2009; Webster, Mertova & Becker, 2005), this is not yet being translated into discipline-based teaching standards for the sector. However, the works of McDougall and Squires (1997) in Information Technology and Cox (2004) in Mathematics provide two examples of frameworks for discipline-specific professional development. In his framework, Cox proposes four areas that mathematics teachers in higher education should develop:

1. basic knowledge and skills of curriculum design, delivery methods, and assessment;
2. practical skills in managing the teaching process, supporting students' learning and conducting assessment ;
3. deeper understanding of the underlying principles and theories of teaching and learning; and
4. attitudes, self-awareness and self-development in relation to the teaching and learning process and interaction with students (Cox, 2004, p. 3).

What is noteworthy from this work is that the areas themselves are generic, with the uniqueness of the discipline therefore needs to be implied in the interpretation. Indeed, these areas are consistent with the other generic frameworks previously discussed. The challenge, as we see it, becomes one of contextualising generic teaching and learning frameworks into discipline based frameworks that are relevant and meaningful for tertiary teachers in their own discipline. In addressing this, we have considered how this problem has been approached in the school sector where there has been significant work towards producing standards for highly accomplished teachers within disciplines. These standards reflect the specificity of teachers' knowledge and expertise according to the subject domains and levels in which they teach:

What accomplished teachers of science know and do is different from what accomplished teachers in other fields know and do. If standards are valid – if they capture what good teachers know and can do – they must reflect these differences (ASTA, 2002, p. 7).

In 1999, a series of Australian Research Council Linkage grants focussed on the development of standards for teachers working in specific discipline areas (Science, Mathematics, English and Literacy). The resulting frameworks strongly embed the specific disciplines, yet they are underpinned by generic domains that described accomplished teaching. Indeed, the frameworks have significant areas of synergy around three domains: *professional knowledge*, *professional attributes* and *professional practice*. Perhaps unsurprisingly, these directly correlate to the domains used in the UK PSF. How the domains are fleshed out to incorporate discipline perspectives is illustrated in the Australian Association of Mathematics Teachers (AAMT) Standards for Excellence in Teaching Mathematics in Australian Schools (2006):

- Domain 1: *Professional Knowledge*
 - 1.1 Knowledge of students
 - 1.2 Knowledge of mathematics
 - 1.3 Knowledge of students' knowledge of mathematics
- Domain 2: *Professional Attributes*
 - 2.1 Personal attributes
 - 2.2 Personal professional development
 - 2.3 Community responsibilities
- Domain 3: *Professional Practice*
 - 3.1 The learning environment
 - 3.2 Planning for learning
 - 3.3 Teaching in action
 - 3.4 Assessment

In explicating the elements of each domain, the essence of mathematics comes through even more strongly. For example in 3.3 (Teaching in action):

Excellent teachers of mathematics ... initiate purposeful mathematical dialogue with and among students. As facilitators of learning, excellent teachers negotiate mathematical meaning and model mathematical thinking and reasoning (AAMT, 2006, p. 4).

The AAMT acknowledges the interrelationships between the domains, with *professional knowledge* and *professional attributes* underpinning *professional practice*. They also note that the framework does not seek to advocate a particular style or approach to teaching, rather diversity is encouraged through the flexibility of the standards.

Use of professional standards framework for professional development

The use of professional standards frameworks to guide professional development is the specific interest of the authors of this paper. Quality professional development has been identified as being highly successful in improving effectiveness of teaching and learning (Elmore 2002; Elmore & Burney 1997; Guskey & Huberman 1995; Hawley & Valli 1999). Hence, with the increasing emphasis on teaching quality in HE, improving teacher effectiveness through professional development is rightly becoming embedded in institutions through formal and informal programs, and encouraged through recognition and reward (Ling, 2009). Furthermore, the importance of early career teacher preparation has resulted in increasing formalisation of foundations programs. A 2008 survey of 31 Australian universities indicated that over 70% of institutions require staff to engage in such a program (Goody, 2008). These programs are predominantly delivered centrally through an academic development unit (Goody, 2007), but there is a growing trend of both formal and informal involvement of subject departments (Brown, Donnan & Maddox, 2009).

Looking further afield, formal examples of discipline specific professional development can be found. The Mathematics, Statistics and Operations Research (MSOR) Subject Centre based in the UK offers induction courses and support for lecturers and coordinators of mathematics departments (Cox & Mond, 2008). Although a fundamental belief of the MSOR network is that "the principal locus of training should be in academic departments" (p. 34), they advocate collaboration between departments, academic development units and the broader discipline network through professional bodies (Cox & Mond, 2008). A different

model is seen at the University of Auckland. A second year unit, Tutoring in Mathematics, is offered for students who are engaged in the university's peer-group tutoring program, many of whom continue to tutor at higher levels (Oates, Patterson, Reilly & Statham, 2005).

Notwithstanding attention to individual disciplines, there has been some critique of the present standards frameworks in terms of providing guidance for professional development. The UK PSF has been criticised by some as being unable to 'provide guidance for institutions wishing to train their staff' (Cox & Mond, 2008). Whilst we may question the use of the word 'train', the concern has some validity. The UK PSF and its derivatives do not provide specific criteria to provide educators with an explicit vision of the sorts of performances required, nor do they deconstruct the knowledge, practice or values that apply at different levels of operation (such as teaching classes, coordinating units or leading programs).

The professional development framework

The development of the current framework represents the first step in articulating good practice indicators for teaching and learning in HE mathematical sciences through the establishment of underpinning generic indicators which can then be contextualised to the discipline.

Our framework (Tables 1–3) is based upon the UK PSF as a contemporary and internationally recognised framework. Criteria for tertiary teaching are based on three domains of pedagogy (*core knowledge* [Table 1], *areas of activity* [Table 2] and *core values* [Table 3]), reflecting those adopted by the HEA (2006). These are also consistent with other professional teaching standards frameworks such as those of AAMT and ASTA (*professional knowledge*, *professional practice* and *professional attributes*), the UK teaching standards (*professional attributes*, *professional knowledge and understanding* and *professional skills*) and the new National Professional Teaching Standards in Australia (*professional knowledge*, *professional practice* and *professional engagement*) (AAMT, 2006; ASTA, 2002; MCCEECDYA, 2010; Training and Development Agency for Schools, 2009).

Each of the three domains specified in the framework are broken into criteria drawn from the work of the HEA. This is in recognition of the extensive consultation process undertaken in the development of their framework (HEA 2005; 2006). Our framework differs in that it attempts to articulate indicators of good practice for each of the criteria at each of three levels of operation: teaching classes, coordinating units and, leading programs. These indicators were drawn from the collective experiences of the authors, and cross-correlated with the work of Lee (n.d.) on teaching for student learning. The framework aims to provide clearer guidance surrounding the different responsibilities of tertiary educators. In this way, teachers of classes, coordinators of units and leaders of programs may more accurately interpret and apply the general domains and criteria of the professional standards framework. In doing so, it is recognised that roles in HE teaching and learning are not always commensurate with experience or academic level.

In adopting a generic approach, we were mindful of the need for our work to be underpinned not only by best practice, but also by a shared purpose (Elmore, 2002) relevant to the discipline to which it will be applied. In the mathematical sciences promoting the field can strengthen its reputation and potentially its utility, and as such the UK framework has been augmented to include a sixth core value, "advancement of the discipline". Although arising from the perspective of the mathematical sciences, we believe that this would be broadly

adopted by other disciplines, as a core responsibility of all tertiary educators is to promote a genuine passion for their field of study. Certainly in mathematics, it has been recognised that a way to achieve advancement of the discipline is through ‘better and more inspirational teaching’ (Cox & Mond, 2008, p. 7).

Table 1: Indicators for each level of operation for the *core knowledge* domain of the professional development framework

CORE KNOWLEDGE	Teaching classes	Coordinating units	Leading programs
1. The subject material	<ul style="list-style-type: none"> • Unit content • Prerequisite knowledge • Applications of unit content 	<ul style="list-style-type: none"> • The purpose of the unit • How concepts in the unit relate to other units across and within year levels • History of concepts in the unit • Applications of the concepts in the unit 	<ul style="list-style-type: none"> • External content requirements for professional bodies, accreditation • Connections between discipline and other areas in the university • Currency with trends in discipline area
2. Appropriate methods for teaching and learning in the subject area and at the level of the academic program	<ul style="list-style-type: none"> • Ways of communicating in the discipline • Different approaches to explaining concepts • Different approaches and techniques for solving problems 	<ul style="list-style-type: none"> • Structuring the unit • Designing and developing teaching activities and resources to align with learning outcomes • Adapting materials for different learners • Strategies for teaching large and small classes 	<ul style="list-style-type: none"> • Current teaching practices in the field • Teaching approaches being used across the program to support course level outcomes
3. How students learn, both generally and in the subject	<ul style="list-style-type: none"> • Contemporary learning theory: <ul style="list-style-type: none"> ○ How to differentiate teaching depending on student background and context ○ How to cater to different learning styles ○ Engagement and scaffolding 	<ul style="list-style-type: none"> • Providing opportunities for students to engage with the unit content in different ways • Sequencing the curriculum content to support development of learning outcomes • Implications of students’ discipline backgrounds 	<ul style="list-style-type: none"> • Contemporary learning theory in the discipline area • Methods of structuring and sequencing of content across a program to enable appropriate development of concepts over a degree program • Cognitive maturity of students
4. The use of appropriate learning technologies	<ul style="list-style-type: none"> • Available teaching technologies and how to use them 	<ul style="list-style-type: none"> • LMS unit development and design skills • How technologies can be used to represent concepts and facilitate collaboration to effectively achieve learning outcomes • Electronic assignment submission and marking approaches • Supporting technology use by teaching staff 	<ul style="list-style-type: none"> • Available technologies for application in the discipline • Emerging technologies for learning and teaching • Trends in technology usage in discipline-specific research
5. Methods for evaluating the effectiveness of teaching	<ul style="list-style-type: none"> • Different approaches to collecting and analysing evidence about teaching and student learning 	<ul style="list-style-type: none"> • Different approaches to collecting evidence about unit level student outcomes • Approaches to analysing effectiveness of the unit 	<ul style="list-style-type: none"> • Approaches to program evaluation at institutional and national levels
6. The implications of quality assurance and enhancement for professional practice	<ul style="list-style-type: none"> • University policies relating to teaching • Professional development to improve classroom practice 	<ul style="list-style-type: none"> • Institutional requirements • Professional development to improve unit development and implementation 	<ul style="list-style-type: none"> • National trends and policies • Communities of practice for benchmarking

Table 2: Indicators for each level of operation for the *areas of activity* domain of the professional development framework

AREAS OF ACTIVITY	Teaching classes	Coordinating units	Leading programs
1. Design and planning of learning activities and/or programmes of study	<ul style="list-style-type: none"> • Designing and planning classes • Structuring the class and the teaching activities 	<ul style="list-style-type: none"> • Constructive alignment of unit • Liaising with relevant stakeholders • Writing unit outlines • Selecting texts and resources • Including a range of learning activities and resources 	<ul style="list-style-type: none"> • Determining course level learning outcomes • Mapping program curricula • Mapping graduate attributes • Differentiating curriculum depending on stage in program • Determining appropriate division of content and student workload between units
2. Teaching and/or supporting student learning	<ul style="list-style-type: none"> • Effective communication • Encouraging participation and interaction • Considering student diversity • Creating a culture of inquiry • Incorporating a range of strategies for teaching in small groups • Giving students opportunities to engage with feedback and reflect on their work 	<ul style="list-style-type: none"> • Leading and managing small teaching teams • Ensuring there are appropriate channels of feedback and support for students • Incorporating a range of strategies for teaching large groups 	<ul style="list-style-type: none"> • Providing support and guidance for teaching teams to support effective practice • Providing appropriate structures to support students • Encouraging and providing for professional development of staff to improve teaching and learning • Encouraging and modelling appropriate use of learning technologies
3. Assessment and giving feedback to learners	<ul style="list-style-type: none"> • Using different types of assessment • Providing effective and timely feedback to individuals 	<ul style="list-style-type: none"> • Designing effective and aligned assessment tasks • Employing a range of assessment tasks • Providing clear instructions and marking criteria • Moderating between markers 	<ul style="list-style-type: none"> • Ensuring appropriate variety and balance of assessment tasks across the program • Calibrating levels of difficulty between units • Leading the implementation of current assessment practices
4. Developing effective environments and student support and guidance	<ul style="list-style-type: none"> • Creating a positive culture in the classroom • Engaging students • Encouraging student interaction 	<ul style="list-style-type: none"> • Providing support and guidance to tutors • Facilitating student interaction in the unit • Implementing avenues of unit-wide student support 	<ul style="list-style-type: none"> • Providing program level support for students • Employing, training and supporting teaching staff (including sessionals)
5. Integration of scholarship, research and professional activities with teaching and supporting learning	<ul style="list-style-type: none"> • Using tertiary teaching literature to inform classroom practice • Integrating own and others research into teaching 	<ul style="list-style-type: none"> • Using current learning and teaching research to inform curriculum design 	<ul style="list-style-type: none"> • Conducting and encouraging research-based approaches to learning and teaching
6. Evaluation of practice and continuing professional development	<ul style="list-style-type: none"> • Collecting evidence to evaluate teaching • Analysing and reflecting on collected data • Undertaking relevant professional development 	<ul style="list-style-type: none"> • Collecting data from a variety of sources to enable critical reflection upon unit • Reflecting upon performance based upon analysis of unit data • Engaging relevant professional development to improve unit 	<ul style="list-style-type: none"> • Managing and monitoring programs based on feedback • Supporting professional development of departmental staff • Contributing to professional bodies and communities of practice

Table 3: Indicators for each level of operation for the *core values* domain of the professional development framework

CORE VALUES	Teaching classes	Coordinating units	Leading programs
1. Respect for individual learners	<ul style="list-style-type: none"> • Developing a supportive and inclusive learning environment • Demonstrating inter-cultural competence 	<ul style="list-style-type: none"> • Planning for students with differing backgrounds and future pathways • Providing accessible resources • Choosing inclusive texts and learning examples • Identifying and nurturing high achieving students 	<ul style="list-style-type: none"> • Leading by example - demonstrating inclusive practice with students and staff • Providing opportunities and pathways for high achieving students
2. Advancement of the discipline	<ul style="list-style-type: none"> • Instilling enthusiasm for the discipline amongst students 	<ul style="list-style-type: none"> • Raising awareness of opportunities for students to participate in discipline activities 	<ul style="list-style-type: none"> • Providing opportunities for students to participate in discipline activities such as seminars and summer programs
3. Commitment to incorporating the process and outcomes of relevant research, scholarship and/or professional practice	<ul style="list-style-type: none"> • Valuing the use of discipline-specific education theory in teaching practices 	<ul style="list-style-type: none"> • Sourcing and sharing relevant discipline-specific knowledge and, teaching and learning research with members of the teaching team 	<ul style="list-style-type: none"> • Leading the integration of educational research into learning and teaching across the department • Setting up conditions for learning and teaching research that could contribute to the literature
4. Commitment to development of learning communities	<ul style="list-style-type: none"> • Collaborating with unit coordinator and colleagues • Seeking out and participating in learning and teaching communities 	<ul style="list-style-type: none"> • Facilitating collaboration between teaching staff • Facilitating and participating in peer observation and review 	<ul style="list-style-type: none"> • Leading the implementation of policies that support learning and teaching collaborations • Leading and encouraging participation in learning and teaching communities
5. Commitment to encouraging participation in higher education, acknowledging diversity and promoting equality of opportunity	<ul style="list-style-type: none"> • Directing students to support and resources 	<ul style="list-style-type: none"> • Monitoring student progress • Negotiating support or alternative pathways for students at risk 	<ul style="list-style-type: none"> • Planning, implementing and raising awareness of study pathways and resources for students from a diversity of backgrounds
6. Commitment to continuing professional development and evaluation of practice	<ul style="list-style-type: none"> • Engaging in reflective practice • Seeking opportunities for professional development 	<ul style="list-style-type: none"> • Seeking opportunities for professional development for self and members of team 	<ul style="list-style-type: none"> • Creating opportunities for professional development across the department • Promoting a scholarly approach to learning and teaching

Core knowledge and *core values* underpin *areas of activity*, aligning with other professional development models that base practice upon understanding and belief systems. The framework provides an often direct correspondence between *core knowledge* and *areas of activity* to highlight the links between knowledge and practice. For instance, *core knowledge* area 1 ‘The subject material’ directly informs *areas of activity* 1 ‘Design and planning of learning activities and/programs of study’. Some *core values* are directly related to *areas of activity*, for example *core value* 3 ‘Commitment to incorporating the process and outcomes of relevant research, scholarship and/or professional practice’ directly underpins *area of activity* 5 ‘Integration of scholarship, research and professional activities with teaching and supporting learning’. However there are also *core values* that relate to more than one *area of activity*, an

example being *core value 5* 'Respect for individual learners' that directly informs *area of activity 1, 2, 3, and 4*. This highlights the more pervasive influence of belief systems upon teaching practice. The values have tentatively been phrased as action statements, so that accomplishment of the criteria at each level of operation can be observed and determined. However, the project team is considering whether or not these should be phrased as beliefs, which would be more difficult to directly observe but more clearly relate to the value areas being assessed. The team invites feedback about the relative merits of each approach.

The framework has been designed to be generally applicable to teaching in a range of fields. However, the model still attends to discipline-specific learning constructs and teaching processes by identifying these for each of the different levels of operation. For instance, *core knowledge area 2 for teaching classes* explicitly acknowledges that there will be different approaches to communicating, depending on the discipline in question. In this way the framework can be adapted for use in a range of learning domains.

By incorporating areas of scholarship and reflective practice in all three dimensions, the model emphasises a research-based approach to teaching. For instance Trigwell's (n.d.) knowledge of teaching and learning, reflection on teaching and learning, communication of ideas and activities, and conception of teaching and learning are all integrated in the model to promote a research driven approach to teacher development. With the inclusion of design, practice, theory, and attitude elements the model also attends to all four areas of professional development that Cox (2004) proposed HE teachers of mathematics require.

Future directions

The primary purpose of the developed framework is to design a professional development program for HE teachers in the mathematical sciences, as part of an Australian Learning Teaching Council project. As such, it aims to give some structure for the development of curriculum, reflecting the contention of ASTA (2002) that 'an effective professional development system needs clarity about the areas in which teachers should improve' (p. 6). Our approach, to build from a generic model and adapt to a specific discipline, has been a deliberate one to acknowledge the considerable body of evidence already in existence about quality teaching in HE. Hence, peer review is invited to provide feedback about the draft, with a view to improving its quality and applicability.

The particular focus of the project team is now the adaptation of this framework to the discipline of mathematics. In explicating the indicators to encompass the distinctive characteristics of mathematics, the team intends to draw on the work of Cox (2004), Cox and Mond (2008), the AAMT (2006) standards document and, our own survey of those teaching in the mathematical sciences in Australia. However, the applicability of the generic framework for application in other discipline areas is also of interest, and the project team would welcome collaborations to test and develop the framework so that it may be of broader utility.

Professional development plays a central role in enhancing quality teaching and learning, yet in order to design evidence-based curricula for professional development, there needs to be a clear articulation of good practice:

... teaching must be framed and informed by professional standards of practice that define what good teachers should know and be able to do and what qualities

and dispositions they should possess for care for and connect with their students (Hargreaves & Fullan, 2000, p. 3).

From school-based research, professional development of teachers has been found to be essential element in improving student achievement in mathematics (American Federation of Teachers 2002; Hawley & Valli, 1999; Sowder, 2007). It is not unreasonable to contend that this would also be the case in the HE setting. The need for clear standards of practice that guide this professional learning therefore appears to be of significant importance.

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