Expertise development in the professions; Implications for teaching and assessment

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Investigating expertise and expertise development from the perspective of the professions implies a specific goal, i.e. that the student develops into the direction of the standards set by the specific professional community this person is training for.

Professions set standards for the kind and level of competencies that are expected of a practitioner in that field, the body of knowledge shared by its members, or the practices performed. From that perspective, *expertise* is relative to the standards set for the quality of the services provided both to the clients of the profession and to the profession itself. Services to clients are medical can be care, contract writing, or teaching lessons; similarly, services to the profession can be improvements of care practices, guidelines for certain contracts, or evidence-based improvement of a teaching method. This means that *expertise level* can be defined according to set standards, but also to performance of peers. *The* expert in a certain field is characterised by better performance on critical tasks than his or her peers, while experts in general are better than intermediates.

From the perspective of formal education, standards set for expert levels of performance are not very informative. More interesting and informative is the answer to the question how experts came to that level. How was the trajectory that brought them so far? Which educational and instructional measures and formats can help novices and intermediates take the next step in their development toward expertise? These measures depend on the level of expertise.

In our research efforts we have taken the latter perspective using a cognitive view on knowledge and skill development; it has lead to a theory of expertise development including two major processes: knowledge extension and validation and problem-oriented knowledge restructuring – consisting of knowledge encapsulation, and illness script formation and enrichment (see Boshuizen & Schmidt, 2009; Boshuizen, Van de Wiel & Schmidt, submitted). It was also found that skilful use of knowledge in practical settings requires that knowledge can be used dynamically and is automatically and readily available (Wagenaar, 2008). The role of biomedical and clinical knowledge (in the medical professions, which is comparable to the fundamental and applied sciences is other fields) turned out to have two dimensions: 1) it lays and structures the scientific grounds for development of the whole domain, and 2) through the same structure it helps students to learn and remember the less principled and less coherent knowledge of the applied sciences (Woods, et al., 2007). Intermediates and experts use this basic science knowledge in different ways: Intermediates use it to solve cases, unless they are very easy; experts hardly use biomedical knowledge, unless they deal with very complex cases.

Such findings have several implications for teaching both at the novice and the intermediate levels of expertise.

1) Selection of topics and subject matter to be included in a curriculum must depend on the body of knowledge shared by professionals;
2) Selection of the basic science knowledge should also serve the goal to improve understanding of clinical knowledge;
3) Tasks set for students should help them to evaluate and validate their knowledge;
4) Solution of misconceptions should be supported;
5) Students should be trained in all competences required of a beginning professional;
6) As the role of well-structured knowledge permeates all competences, knowledge development should come first but not in isolation from the competences;
7) Authentic problems should be used to guide problem-oriented knowledge reconstruction;
8) These problems should be chosen such that they best serve integration and validation of knowledge, support knowledge restructuring in the 'right direction', demonstrate the variations within problem themes prevalent in the field, and cover the kind and complexity of tasks of beginning professionals.

Assessment formats should match the levels of expertise reached and be in accordance with the aim of a specific curriculum part. That might mean the following:

1) Whole-task assessment should be the norm in an assessment programme though part-task assessment may play a role; a backwashing effect of the latter might have detrimental effects of the intended learning outcome
2) At the lower levels students should demonstrate the validity and extent of their knowledge in the context of authentic cases.
3) At higher levels students should show their competences in the context of cases that gradually become more complex both in the sense that the cases themselves become more complex and that the circumstances in which action is required become more demanding.
4) Task complexity can involve co-ordination, speed, timing and time-management. .

All this is relatively 'easily' done when the relation between education and expertise domain is clear, which is the case in medicine, but less in law or language or mathematics.

An extra complication results from differences in the structure of labour markets in different countries and continents. Some countries and labour market expect more generic skills in graduates while other countries expect that graduates have a mix of generic and domain specific skills.

So far no good models of generic skills exist. In much literature, problem solving, social and communication and lifelong learning have been identified as important skills. However, there is no common understanding of what lifelong learning skills are. Especially in domains where no set practices and no common body of knowledge exist –the 'new' professions– lifelong learning skills should entail generating and setting standards for practice and finding sources for feedback on performance to be compared with these standards.

References

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