

## Competence in scientific agriculture

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It does not happen often that one finds a source that is thrilling by its very nature. When I opened the file '*Agricultural education. Report of a Deputation appointed by the Council of University College, Reading, to visit selected centres of agricultural education and research in Canada and in the United States*', a document from the library of the University of California at Los Angeles, and digitized in 2007, I thought it would be a recent document. I quickly went through the table of content, also triggered by the fact that the Deputation was from the University of Reading, which colleagues in the field know as a university with a strong Department of Agriculture. Given the nature of my chair at Wageningen University, I could not resist to directly search what the document stated regarding the notion of competence. This must be a matter of professional deformation. My research group has written a lot about competence management and development; in fact we see capacity building as a special case of competence development within the framework of human resource development. We know that the competence-based education movement in the United States has a very controversial history, and that colleagues in the field who have 'enjoyed' competence-based education in the seventies and eighties are certainly not very positive about it. A colleague from a Scientific Advisory Board some weeks ago told me he agrees with the critiques on competence-based education in the US. When he was at College, competence-based education for example meant whether a student had accomplished competency 13.4.34 from an obviously very long list of detailed competency-statements. No wonder that the competence-movement, also present at that time in teacher education, known as CBTE, basically went broke, although there has always been a stream of advocates who maintained that this educational approach was good for many things, not in the last place for the alignment of labour market and skills needs and curriculum planning. I was very curious to know whether the report mentioned above, which was written by W.M. Childs, chairman of the Deputation, would confirm the developments of competence theory we have by now synthesized in three large phases of professional use of this concept. We defined these phases as many colleagues get confused when the definitions of competence, competency and competencies are concerned. It is also a difficult issue. One of the difficulties is that there are many dimensions by which the meaning of the concept varies, many contexts in which it is conceptualized, and many different functions it fulfils. The phases we distinguished are:

Phase 1. Competences as behaviouristic functionalism; this meaning entails the detailed breakdown of competencies in lists of trainable behaviours, was for instance used in the 70s and 80s of the last century. As stated, experience showed this approach was difficult to maintain in education as it was too fragmented, and actual behaviour of professionals like teachers did not really change when they were trained in very many isolated skills.

Phase 2. Competence as integrated occupationalism; this means that competence is seen as the integrated capability of persons to achieve results. This approach is very popular amongst educational policy experts who want to warrant that the outcomes of education are up to the current standards as defined in national competency-based qualification frameworks. The approach is called integrated because there is combined attention for the development of knowledge, skills and attitudes, often based on occupational profiles.

Phase 3. Competence as situated professionalism; this means that competence only gets meaning in a specific context, in which professionals interact with each other. It is closely related to the theories and practices of professional development which show that personal epistemologies have a stronger influence on professional behaviour than isolated skills training. It also touches upon the notion that competence is heavily influenced by what important stakeholders expect of the professional in terms of wishful professional action. Professional associations (such as associations of medical specialists or pilots), but also local players (such as hospital directors, chefs de clinique, and airline executives) have a strong influence on the desired competence fields and the extent to which the professionals need to be proficient in these fields.

Applied to the development of farmers, who are engaging in multifunctional agriculture (such as in fields like care farming, regional produce, rural tourism, environmental education), competence development means that they can follow specific practical training sessions, enrol in certain educational programs to receive a license for their new or additional activity, and develop their own knowledge, skills and attitudes by getting experience in their new fields of economic activity.

Would the report of the committee-Childs confirm these developments, and would the report indicate a renaissance of competence-based agricultural education in the USA?

As said, I searched the report for references regarding competence, and I found a series of them. For instance, on page 67, '... the progress of agricultural education in England has been delayed ..., and especially by the fact that English farmers are not exempt from the prejudices which in part at least are the outcome of their competence.' I would not want to debate the assessment of farmer's competence in the United Kingdom, but the committee clearly stated that although farmers in the UK are not very keen on agricultural education and extension, much of the progress in agriculture throughout the centuries is the results of agricultural research and education. The report goes on to define what is needed in terms of practical competence: 'Practical work in the British Dairy Institute is included, and competence in prescribed manual farm operations is required (p.67).' Depending on the nature of the description of the nature of the farm operations this can be perceived as being an example of integrated occupationalism, although farm operations can also be listed as a long series of detailed activities which need to be mastered one by one.

On page 75 of the report a different notion of competence is used where the Deputation writes: 'As soon as a College has attained a sufficient measure of competence and strength as a University institution, it should itself determine and control its principal courses of study,

and the examinations in connexion with them'. Here we see competence in the meaning of what Hamel & Heene (1994) and Hamel & Prahalad (1994) called the core competence of the organisation. It refers to the strength of an organisation to produce certain goods or to deliver certain services. In the case of college education it means that the college has the expertise, staff and management which enables itself to offer a quality educational program. In this case in agriculture.

A next example of what the report says about competence is encapsulated in the following citation: 'Thus the essence of our observations upon curriculum is that the first part of the route to competence in scientific agriculture lies through technical and practical study (p. 83).' This idea of competence development which leads to scientific agricultural competence is quite in accordance with the general philosophy of competence-based education, which states that competence is the integrated set of knowledge, skills and attitudes which enables persons to perform (cf. Mulder, 2001). An important part of this thought is that students need to learn to apply scientific knowledge in practice (which is also the definition of competence given by Cedefop, the European Agency for the Development of Vocational Training), although activity theorists argue that cognitive development is based on practical experience, so in fact it is the other way around. I think that the truth regarding this matter is somewhere in the middle. When I am learning new things, such as editing digital video, I want, or rather need, to apply the explanations I get, or else I will forget instructions immediately. But also, when I am applying my knowledge about this domain while editing, I discover new possibilities and analogies with other programs, and by practicing and experimenting, I learn to create an interesting product.

On page 124 the report goes in to the competence of teachers. 'It is obvious that no course ... could be given with success unless the teaching staff commanded, in a measure at present not usual, technical competence and cultivation of mind. The qualifications wanted in the teacher who directs ... a course are not so much manual dexterity or a narrow expertness, as a strong and cultivated intelligence, a grasp of the best methods, and a wide social experience (p. 124).' This is of course obvious, although there are concerns about teacher quality and professionalism, at least as far as the Netherlands is concerned, not only in agricultural education, but in the whole educational system, ranging from primary, via secondary to tertiary education. It is interesting to see that the report calls for generic competence instead of narrow expertise, which concurs with the current ideas of holism in competence-based professional education. The report reiterates this by stating: 'It is that no scheme of the kind indicated can be usefully attempted unless the teaching resources are adequate. As stated above, these resources must include both technical competence, social experience, and cultivation of mind (p. 125).'

A different example of the way in which the Deputation sees competence is represented by this quote: 'One circumstance in particular will be held, in the opinion of competent judges, to differentiate more markedly than anything yet mentioned the problems of agricultural instruction in America from those which confront us here (p. 59).' At first sight I was thinking that this refers to the judicial use of competence, which is known the literature, as in the competence of a court of law, or more recently, as in the competence of institutions, like

the institutions of the European Union. The European Committee even speaks about the Union competences, meaning the public rights the member states have conferred to the European Union, which are exerted by the many institutions like the European Council, the European Parliament, the Committee of the Regions and the European Court of Justice. But none of this is the case. The Deputation speaks about experts who as ‘connoisseurs’ (Eisner, 1976) or assessors can make meaningful assessments of certain practices which they have observed and interpreted.

The next quote on page 73 I extracted from the report touches some recent thoughts we developed. ‘Directive and organising faculty does not always accompany learning; brilliance in research sometimes goes with poor teaching; many competent teachers lack imaginative and creative powers essential for the performance of research of the highest order; and experience shows that unless students are handled one by one as well as collectively, many of them will fail to profit as they ought by the instruction they receive, however excellent it may be (p. 73)’. This quote refers to the debate that the best researchers are not always the best teachers, although in recent years we see much improvement in this respect, mainly because competence-profiles and standards for teachers have been developed, not only for teaching staff in elementary education, but also for staff in secondary and even higher education. It is probably correct to state that without further teacher training researchers can very rarely be effective teachers. That is a pity, because many researchers have interesting findings to share with students in agricultural education. There are experiments going on to support researchers to develop their competence in teaching. This holds for fulltime researchers who do not have a teaching position at the university, college or school. Regular teaching staff at the university is of course in most cases expected to do research so that they can integrate their research findings in their teaching.

There is another reason why this quote, which is related to brilliance, triggers me. which is related to brilliance. Inspired by Dreyfus & Dreyfus (1982) who have differentiated five levels of professional development (novice, advanced beginner, competence, proficient, expertise), I have started to use also five levels, but with partly different labels, one of which is identical to the quote above. The five levels are: ignorance, nascence, competence, excellence and brilliance. An ignorant person can work by instructions at the level of beginning performance, which is far from professional. A nascent person can work under guidance, as an apprentice, and his or her performance is partly professional. A competent person has the capacity of working independently and can be seen as a true professional in his or her field. The person can work while complying with directives, legal agreements, regulations and expectations of professional associations, management, clients and colleagues regarding performance. An excellent person is delivering outstanding performance which goes beyond what is expected or can be required by educational institutions or employers. An excellent person outperforms many colleagues who are in the same job and have the same working conditions. This outstanding performance can be in a broad field, but can also be limited to a very specific technique, like robot-supported minimal invasive surgery. Brilliance finally is a matter of great talent for superb performance. This is applicable to stars, and to an

awesome and unique level of performance, for instance in sports, music, dance and painting, but also in field like science, technology and business.

A cynical quote from the report is the following: ‘Experience shows everywhere that the agricultural college is too often regarded as the last refuge of the incompetent (p. 84)’. Apart from the fact that the term ‘incompetence’ delivers 10.5 million hits on Google (the total number of Google hits for the concept ‘competence’ is 41.4 million), and thus signifies a lot of dissatisfaction with certain (un)professional practices (such as teachers who were declared incompetent but who bought their way back in a job in other school districts in the USA), I do not support the general nature of the quote. Although I have stated that professional development in agricultural education needs attention, I also mentioned that this is the case in all education. And I have also seen many high quality agricultural educational institutions , but some I have seen indeed lack sufficient competence to run programs that meet the international standards of agricultural education.

**Comment [PA1]:** (here a practice lacks competence? It is not so clear what you mean)

Finally, the Deputation contends: ‘The lecturers and others employed must not only be competent for their work, but they must be able to give to it the time it demands without detriment to the internal efficiency of the Department. It is folly to distract a lecturer with outside duties if he is already fully burdened with internal teaching duties; and it is also folly to send out men to address farmers who are not able, owing to other claims or to insufficient special training, to give them the best information (p. 101).’ As will be clear this quote partly goes back to the competence of teachers, but it also refers to competence of management regarding the fulfilment of basic conditions for teaching.

Looking back to the quotes, we can discern the following categories: competence of professionals (farmers), competence in professional tasks and responsibilities (manual farm operations), competence in professional practice (scientific agriculture), competence of teachers (and competence of researchers as teachers), competence of assessors, competence management (enabling and securing good working conditions), and last but not least: incompetence of all mentioned above.

What is so special about this? Much of these notions are already known and described in the literature at length. Is it more than just a case? Well, the Deputation as mentioned went to the Macdonald College, St. Anne de Bellevue, the Central Experimental Farm in Ottawa, The Ontario Agricultural College in Guelph, the Government of Ontario, Cornell University (including the New York State College of Agriculture) and Wisconsin University (including the College of Agriculture) in ... 1910. It is nice to read that ‘The Deputation landed at Quebec on May 13, 1910, and sailed from New York on June 11. The duration of the stay in America being thus limited, it would clearly have been unwise to attempt many visits of inspection (p.8).’ Having a short month for visiting these institutions would now mean a completely different thing than in those days. We can only try to imagine the effort it has taken to go to all these sites with the transportation means and infrastructure of those times.

So, what can we conclude from this? Is there indeed nothing new when it comes to competence development? We already dated the history of the concept of competence back to

the time of the ancient Persian culture, to the laws of King Hammurabi, in the 17<sup>th</sup> century BC. So we could indeed say the whole competence movement is old wine in new bottles. But hold on. We speak about professional use of the concept of competence nowadays, from the perspective of integrated occupationalism or situated professionalism. Currently the concept of competence is institutionalized, for instance in the European Qualification Structure, in National Qualification Structures, in standards for professional practice, or in laws. We have dated the professional use of the concept of competence back to fifties of the last century (White, 1959). So there is a difference between the older use of the term competence in daily practice and in professional literature. And although the concept of competence in the report of the Deputation does not structurally use the competence development philosophy, it displays that the notion of competence in its various forms was already popular in professional thinking about agricultural education when it was written. In this way we dated the professional use of the competence concept nearly 50 years back.

Apart from this, the Childs-report teaches us one more lesson: history is always more complex than one can describe, since regardless of the historical phases we described in this contribution, various elements of the different meanings of competence have been used in the past, are currently being used, and probably will be used in the future next to one another.

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