

Providing the Meta- Model of Development of Competency Using the Meta-Ethnography Approach: Part 1: Reviewing the Available Models of Competency Development

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Abstract

Background and Purpose: The literature review over the past few decades is a reflection of a global specific move towards the competency and evaluation of outcomes based education and the importance of this type of education is to the extent that Harden introduced "competency-based education" through a focus on outcomes and competencies as the most important trend in the medical education in the past decade. Due to the particular importance of competency-based education and the need to review the competency -based curriculum to be based on the competencies, the need to review the design of the curriculum is completely evident. But a question arises here that "Is there a comprehensive model that can be drawn for the development of competency in order to design new curriculum based on it?" In this study, we have tried to develop models to assess and synthesize existing development models, achieve to design a comprehensive meta-model for competency development.

Methods: Meta-ethnography is a useful method for the synthesis of qualitative researches which is used in order to develop models that interpret findings in several studies. Considering that the aim of this study was finally to provide a meta-model of competency development, in the first step of meta-ethnography, first three steps and also a criticism was conducted on the available competency development models, for this purpose, literature review was also done to achieve competency development models. The models obtained by search were studied precisely and the models were presented based on first hand description of the by the developer(s), then offering critiques were extracted from the literature and the critical of researcher was finally provided.

Results: After determination of the research question and characterization of synthesis focus, inclusion criteria and quality assessment of search were conducted and eight competency development models were selected and a precise investigation has been done on each.

Conclusions: Considering the importance of competency-based training at the global level and the urgent need to review the existing curriculum and competency-based curriculum design, the analyzed models can provide the basis for synthesis of a meta-model for competency development and curriculum.

Keywords: META-ETHNOGRAPHY, COMPETENCY DEVELOPMENT, META-MODEL, QUALITATIVE SYNTHESIS

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Introduction

The literature review over the past few decades, reflects a global movement towards the competency-based training and evaluation of outcomes and the importance of this type of education to the extent that Harden introduced "competency-based education"

through the focus on outcomes and competency as the most important trend in medical education in the past decade (1).

According to the observed expression which competency-based education and the need to review the curriculum in a way that is competency -based is highly important and the need to review the design of the curriculum is completely felt. But here is the question "Is there a comprehensive model that could be used to draw up a new curriculum design?"

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Nowadays, access to a comprehensive model as considered as a necessity as far as the issue has become a challenge for Can MEDS and other competency based medical education programs to create a framework that is a common term between all models (2), because with a little precision in the literature, it will be seen that we will be faced with numerous competency development models with similar topics using different terminologies. It seems that through reviewing and synthesis of all these models, finally, a design for a comprehensive meta-model for the development of competency can be achieved.

Methods

A meta-ethnography is a useful method for the synthesis of qualitative researches which is used to develop models that can interpret the findings in several studies. Considering that the aim of this study was to develop a meta-model of competency, the first three steps of meta-ethnography in this study has been done so that at first the competency development models should be criticized. For this purpose, literature review was conducted to achieve competency development models. The models obtained by search were precisely studied, at the beginning the description of model was studied from provider (s) of model. After examination of the models individually, research was conducted for access to available critical texts about the all the models. At this point also detailed studies have been conducted and reviews as well as criticism of others were included in the study. In the next step, the researchers presented their critique the model.

Seven steps of Meta-Ethnography (Noblit and Hare ,1988) (3)

1. Getting started
2. Deciding what is relevant to the initial interest
3. Reading the studies
4. Determining how the studies are related
5. Translating studies into one another
6. Synthesizing translations

7. Expressing the synthesis

Literature search strategy

Since the entire study was a qualitative study, questions are open until the end of the project. Due to the reciprocating process of qualitative studies, the questions can be amended and also be changed. In fact, the ultimate form of questions is determined at the end of the project. However, in the beginning, to search the texts we focused on the following questions: What components are involved in the available competency development models? Is it possible to design a comprehensive meta-model of competency development?

The systematic, comprehensive literature search was conducted in databases and websites. Keywords focused on competency, "development model of competency", "competency model formation", "competence development model", "model of skill acquisition", as well as related keywords such as "expertise model", "model of professional expertise", "capability model", "model of meta-competency", "model of professional competence", "professional functioning model" and "professional development model", respectively. In searches the combinations of search terms were also used. Of course in different databases, specific points were observed about search. In the initial search, numerous models were found, in order to remove non- relevant models (like content models of competency in which the ingredients nor the competency development process were noted), the first screening was done on the titles of obtained articles and abstracts were studied. After that the articles that focused on competency development models or provided evidences in connection with the development of their educational qualifications in full text were selected. In this study, we continued to search the literature until saturation. So that the new model was not found in the literature for competency development and ultimately 8 base models were studied. Among the limitations of the search was the use of English.

Results

Step 1) determination of the research question: At this point, the aim was determination of a question that can be reached to its answer with meta- autography qualitative research, our research question was: "The available competency development models are formed of what elements, Is it possible eventually to design a comprehensive meta-model by analyzing them?"

Step 2) determination of the synthesis focus, inclusion criteria and quality evaluation: In this step, our focus was on the models referred to the competency development. Purposeful sampling was done to achieve competency development models, all models were searched without time limit that somehow refer to competency development and expertise, and were entered in our study.

Step 3) study and analysis of models: In this step, the search models obtained in the previous step were studied; we kept research question in mind continuously and got the paper and tried to extract the basic concepts of our model. In this step, according to the view of Shutz, we tried to provide first, second, and third order constructs (4), the first order constructs, in fact are expression and provision of model by provider (s), the second order constructs are the criticisms that in other researches had been referred and are attainable in the text while third order constructs were the researcher criticism that each of these steps had been done on 8 models selected in this step.

1. The five-stage model of mental activity involved in the acquisition of skills Dreyfus Brothers (1980)(5)

Defining the model based on first hand description by the developer(s)

According to this model, the acquisition of skills through training and experience, learner passes usually five stages of development that have been identified in the model. As the learner become more skilled, the attachment to the abstraction principles decrease less and

get more dependent on concrete experience (5).

If we want to express key characteristics of each step, the individual characteristics of each phase are: Novice: Rigid adherence to taught rules; little situational perception; no discretionary Judgment. Advance beginner: guidance-based action according to the characteristics or aspects, situational perception is still limited; describe all the attributes and aspects separately and with equal importance. Competent: conscious design based on long-term goals, the ability to perform routine tasks and standards. Proficient: sees situations holistically, considering the most important aspects of any situation, perceives deviations from normal patterns, decision-making with less effort, using the rules for guidance. Expert: Lack of relying on rules or guidelines, intuitive grasp of situations based on a deep tacit understanding; and analytical approaches only to novel situations (6).

Criticisms by other critics: the model is most situational, rather than a model of trait or talent, because its focus is on the performance and real outcome in the certain situations (7), the key of successful development is review and critical reflection which Dreyfus brothers did not mention that in their model (8). Model really did not explain how learning occurs through experiences and although in their model skills acquisition has been described, however more emphasis has been on the receiving and making decisions rather than routine activities, a fundamental aspect of the development of professional skills that means the understanding is missed in the model (9). The model does not pay attention to the impact of social and cultural contexts, while another limitation of this model is that the novice person starts as a blank slate and has no experience, no professional skills based on the performance from the past to monopolize their performance in terms of education. This is while learning does not only include adding new knowledge or compatible to a pre-existing base, but includes the meaningful

relationship and active interaction with previous knowledge (10).

Researchers' criticism of the Dreyfus brothers' model: This is a graded development model of professional performance, and isn't an analytical model -it has also no claim in this regard. Since the developmental model hasn't addressed the content, the boundaries between the stages of development are a bit vague and not transparent. Probably we will have to make the boundaries transparent by adding the following lines to explain the model and the model of development. Moreover, criticism also noted that the novice students had no idea and no thoughts, while this is not correct and it is necessary to consider the Novice through an additional step and finally, the expert is not the end of the path, but also the path continues and it is needed to be added at the end of a stage.

2. Cheetham and Chivers comprehensive model of professional competence (1996) (11)

Defining the model based on first hand description by the developer(s)

The model tries to combined ethic, meta-competency, behavioral competence and functional competence. In the center of model, 4 key components of professional competence including: functional competence, behavioral or personal competence, knowledge /cognitive competence, value/ethical competence that these are referred as core competence, and each of them consisted of a series of sub-components.

The four core components - a number of meta-competencies- include communication skills, problem solving, creativity, analysis, and self-development. Meta-competencies contribute to the development of other competencies (e.g. self- development) or are able to increase competence through one or all classes of capabilities (e.g., creativity).

Meta- competencies, and four basic competence, and their various components all interact with each other to gain access to the specified outcomes.

Personal understanding of competence is likely to be supported by feedback from the others and in the model, understanding leads reflection.

This model allows different professions require different combinations of essential components. These potential differences, between and within the professions, result in the development of occupational competence mix model (11, 12).

Criticisms by other critics:

A number of criticisms by readers of European Industrial Training, representatives in conferences and experts were selected and has been received in the field of competence, human resource development, and professional development. This means that the strengths of the model were as follows: Comprehensiveness of the model and providing a good foundation for experimental works as well as putting the concepts that have been seen separately, creates a better depth of competence, overcome the limitations of performance analysis, comparisons. For the weaknesses of the model the main criticism is related to the complexity of the model, because capability is a complex concept and the model did not consider the role of context and work environment (12).

In this model, meta-competency are drawn as a detail beyond the competences which is as one of the strengths of this model, while in the Delmar model meta-competency has been provided alongside three other competence on a par with them, although some criticisms on the components in the model can be expressed (whether all of them are really meta-competencies?).

If we want to define all competencies (for task specific and enabling) and meta-competencies it can be stated that the capabilities that are not specialized for tasks are two types: one of those capabilities that are common to all tasks and as a prerequisite for a variety of tasks and we call them enabling competencies that is an essential component for having technical competencies while these technical competencies are

divided to task specific competencies. The second category includes those that aren't a precondition of the task but are needed over time for performing the task under different conditions and high qualification and we call them meta-competency which is achieved from the development of enabling and technical competencies. Non-core and evolving competencies are also the results of development of task specific competencies.

3. Integration model of professional expertise, Jill Yelder (2004) (13)

Defining the model based on first hand description by the developer(s)

This model is an outline of the basic model of expertise includes many integrated aspects that have been grouped into five themes including knowledge base, cognitive processes, professional practice, internal integrative processes, and interpersonal relationships. Although the five components are shown separately, it is important that we look at them as integrated, as seen in the complexity of specialists function (13).

Criticism by other critics: this model refers to the dimensions that make up the expertise, not expertise developmental stages. Yelder's moving away from focusing on intuition that previously had been noted by the Benner and Dreyfus is admirable. It seems that there is a form of uncertainty about the relationship between the components of the model (6). Yelder found that the basic fundamental knowledge that is linked to interpersonal skills causes a change in performance (14).

The researchers' criticism: Yelder discussed the professional functioning that is composed of two components, including professional technical performance and professional social behavior. The discussion is around the competency and meta-competency which is a subset of professional technical performance and only these elements will be used in our model. Since Yelder wanted to provide a model of professional expertise and professional performance no objection was expressed on this model in these areas, but it might have been better that Yelder also should separate two areas in his model.

In this model instead of providing a specification schematically, in conjunction with expertise, a list of features is presented in table format in 5 dimensions that these features at first reflect nothing about the characteristics of integrity, wholeness and integration claims. The notion of internal integration processes is a little ambiguous, with a little subset of the components; it seems that here the aim of Yelder was to refer to the identity but he didn't express it directly. The concept of expertise in this model is a static state (refer to something that eventually we will reach it), while in our definition of expertise, we want to introduce it as a dynamic issue (in fact, the path to the ultimate performance of the expertise and mastery) and at this stage we should bear in mind at this stage of the issue.

4. The model of professional development (MPD) by Dal Alba and Sandberge (2006)(9)

Defining the model based on first hand description by the developer(s)

Dal Alba and Sandberge in the model without any prior assumptions about the compliance of a fixed sequence of steps have noted to develop skills by enhancing the experience as the horizontal dimension of skills development and in the vertical dimension the differences in the understanding and practice have shown in the development of professional skills. This dimension requires the attention to the diversity in the imagined perception of the performance. The combination of horizontal and vertical dimensions provides the development of professional skills in the model of a range of developmental routes (9).

Reviewing the models in the literature by other researchers: Horizontal and vertical dimensions are only artificial results and don't describe the basic characteristics of these dimensions. Features of 5 steps of professional skills development have been well recognized but these steps are not definitive and a person, especially in a volatile environment may be in more than one step. Hence, considering a simple linear

progression through the stages of professional development is a misconception. Markers are described on the vertical axis below (6) this model describes the importance of experience and performer understanding in the field. Additionally the progress from novice to expert performer is not necessarily linear and the development of understanding and skills associated with the pattern is done less. The model also lies on the fact that expertise is hidden in performer and by their understanding of the performance of the activities (15).

The criticism of researchers: they have attempted to show dimension in 2 axes, but they did not specify what were their scales and also their classifications; it seems that on the horizontal developmental stages of Dreyfus has been in focus, but in the vertical axis it was not specified. The dimensions included in the model are two distinct dimensions that people with similar skills can be at different level of understanding and no direct or indirect relationship was observed between these two dimensions (understanding is obtaining the basic mechanism knowledge and organization of this knowledge is elaborated as causal mechanisms). In the model, the concept of the skill development was certainly not the same as developing psychomotor skills, here the aim was the competency that we also observed this correction in the development of model developed by Kinchin and colleagues (from incorrect word empowerment), although competence is a step of competency development and should be replaced at competency levels. In a model that is provided by Kinchin in the development of Alba model, once the novice to expert range were drawn in the horizontal dimension and once on the arrow of the graph and the arrow points that the development of novice to expert should both increase while this is in contradiction with the horizontal axis labels that alone can bring us to the expertise.

5. Periodic Table of expertise by Collins and Evans (2007) (16)

Defining the model based on first hand description by the developer(s)

This model is presented in a table that is comprised of 4 rows; our primary focus was on the second row which means that specialist expertise or domain specific is specified which probably will be useful in the final meta-model synthesis, in the following the summary of this row is presented: specialist expertise or domain specific includes expertise with relatively unobservable components that the ubiquitous tacit knowledge includes beer mat knowledge, popular understanding, and primary source knowledge. Contributory expertise is related to the tacit knowledge that enables individuals to become experts in the field who are involved in it.

The connection bridge between the experts with contributory expertise and ubiquitous expertise is interactional expertise. Interactional expertise is related to the implicit knowledge in the language areas and is also acquired language areas through socialization. Interactional expertise is the tools in place that technical judgment is done and there is also a transition relationship between 5 types of specialist expertise (16). Criticizing the model by others: The model is not specific in a particular area; however it can be useful to help understanding the types of expertise beyond the level (15). While Dreyfus model is focused on one individual, this model is more focused on expertise position as a social group".

Researchers' criticism in this model: a minimum perception of expertise has been provided and only the acquisition of tacit knowledge is implicit, while the competency development process and expertise is much wider than the development of knowledge structure and in this way we in addition to re-organization of codified knowledge, the development of perceptual ability, acquiring tacit knowledge, and development of reasoning skill (a reasoning with less energy and efforts).

The strength of the model is that interactional expertise has been accessed with contributory expertise, but in addition to these strengths, the problem is that it is true that these two interact with each other, but it should not be forgotten that we should not consider the two consecutive, but also these two are simultaneous and parallel with each other. Another criticism of the model is that, the first three columns of this row were as the students' knowledge (beer mat knowledge, popular understanding, primary source knowledge) but suddenly in the last two columns of this row the word expertise appear (interactional and contributory expertise) that it is better to use all of them as our tacit knowledge rather than interactional and contributory expertise, social tacit knowledge and technical tacit knowledge.

6. Kinchin model, Cabot and D.B.Hay (2009)(17)

Defining the model based on first hand description by the developer(s)

The vertical dimension of model explains the characteristics and the roles of each knowledge structure. The chain of appropriate understanding is indicative of strategically successful learners. The demonstration of highly developed and integrated nets of understanding may be seen as the hallmark of the expert, for whom the demonstration of expertise is achieved by the accommodation of competing chains of understanding and the selection of appropriate chains to suit particular contexts. A horizontal reading across the model suggests a progression in the development of knowledge structures from chains to nets. The implication that the development of net structures among students may be the goal of higher education is one that may be contested, particularly where chains of practice seemingly have more immediate practical application than networks of understanding.

As an individual develops expertise, the networks of understanding will develop sophistication whilst the choice of embedded chains of practice will also grow. The

smoothness of transition between the two will increase with increasing expertise (17) (6).

Criticisms of the models by other critics:

A key chain is concerned as proper understanding of learning. Viewing the integrated and highly developed networks may be perceived as the hallmark of experts, the experts is intended through compliance the competitive chains, and the chains appropriate adaptation to suit the particular circumstances (6).

The model helps to show how the link between theory and practice, the model also emphasizes the importance of understanding the context-dependent, except that there was a kind of feedback loop that is displayed in the model, many aspects of expertise such as behavioral profile overall, there is a hierarchy of decision making and integrative factors that have not been considered in the model (15). Kinchin in his model referred to knowledge organization as the only chain and network, while the development of the knowledge structure is much more complex and diverse than it includes more structures and chains and networks.

Researchers criticism: the concept of expertise in Kinchin model is virtually limited to the structure of knowledge, while the competency development process and expertise (in the development process) is much wider than the development of the knowledge structure (Collins and Evans referred to this issue in the review model), Kinchin also had a minimalist look on the expertise the restructuring of knowledge. Kinchin in his model, had no reference to the relationship between the levels of development of the Dreyfus model, while we know that the way of (individual) expertise is a path from novice to expert, and will experience changes. Another objection is that the model suggests that after the Alba model there is the understanding, in this model, perception is defined as a network of knowledge and it is such a conception is a minimum level of understanding, it should be borne in mind that reorganization codified

knowledge and the discussion and development of understanding and knowledge mechanism in two ways are entirely separated, which must be both defined and delineated.

7. Model of expertise redevelopment (MER) Grenier and Kehrhahn (2008) (18)

Defining the model based on first hand description by the developer(s)

Socio-cultural concerns of the expertise focuses on the relationship between individual and social processes in knowledge construction. Expertise has not been considered sufficiently in the literature. This model seeks to explain the expertise redevelopment in three states- dependence, independence and Transcendence - in connection with the ongoing development situation through three territories: content, environment, and constituency. Although the model can explain the basic development of the expertise, provision of the impact of changes in the experts makes it a unique model (18).

Reviewing the model by other critics: the model explains the expertise by individual and social characteristics and by dependence and independence states. The model also through the transcendence state emphasized a strong tacit knowledge. As with the Garrett's six dimensions framework, in this model practice has been emphasized the role of expertise context and environment (15). Experts find themselves in different situations and contexts that they must cope with new conditions. More advanced models of expertise needed to replace the complexity of organizing expert performance includes motivational factors and socioeconomic effects and how the complexity influences experts (19). Teachers are not only looking for people to make them competent but they are also looking for capability. Teachers must prepare environments and processes to enable people to earn their continuing ability (20).

Researchers' Review: In this model, focusing on the fact that the experts find themselves in different situations and contexts that they should cope with these parameters, scenarios,

and new challenges. In fact, it makes sense in two parts: 1. The definition of an expert (accordingly, an expert is a person who has high contextual awareness and can adapt to the issue), and (2) the development of expertise (If an expert is an individual who makes the decisions and judgments, then the way which leads to expertise should certainly be varied and individual should face with different conditions to learn how to manage conditions), the issue is consistent with what are known as capability based on Fraser's definition.

8. A framework for the Six dimensions of expertise, Garrett et al (2009) (21)

Defining the model based on first hand description by the developer(s)

This model has a socio-technical perspective and takes into consideration variables such as the background and the subject teams, context and subject matter. The main focus is on the subject that describes how integration of the concept of multidimensional expertise can help to integrate the concept of expert's behavior in the context of cognitive group processes and task performance. The six dimensions of expertise include: subject matter, situational context, interface tools, expert identification, communication skills, and information flow path (21).

Criticizing the models in the literature by others: This model is highly valuable for many researches in which individual expertise is mainly focused on many social and interpersonal aspects of expertise. Model also separates the content, context, and expertise process that is important to distinguish the role of each dimension. This model has a strong emphasis on the role of context and expertise context (15).

Most researchers pointed capability, but in the concept of competency, organization of the knowledge and tacit knowledge has not been mentioned and is incomplete. The situational context is better to be replaced with situational judgment because the term is as part of expertise, the tools to manipulate interface technological systems are basically the same concept that is close to the

capability, the situational context and the interface tools and also expert identification is a part of the concept of interactional expertise expressed by Collins that we've called it as social tacit knowledge, and is the information flow path and expertise issue in the information and evidence based practice and also meta-competency. The model also points a number of subset concepts such as contextual wisdom, improvement of performance, and communication skills (enabling competency, this model is true for individuals who work in the dynamic, ever-changing, and complex system, that the main concept of this case is the formation of the capability of individual empowerment and the ability to update their own information. In fact, the combination of competency and meta-competency caused formation of capability.

Conclusion

Since today we are faced with a variety of models of competency development that all of them try to make a point with different terminologies and sometimes we see that each of these models refers only some (but not all) aspects of competency development, so that by synthesizing them a comprehensive model for competency-based training can be achieved, a model that is essential for current age. Therefore, in this study, we have tried to due to the importance of competency-based education on a global level and the urgent need to review the existing curriculum and competency-based curriculum design, the analyzed models in this study could be the basis for competency development in the second part of this study for a meta-model synthesis and then competency-based curriculum development can be provided.

Conflict of Interest

The author declares no conflict of interest.

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