How residents learn: qualitative evidence for the pivotal role of clinical activities

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OBJECTIVES Medical councils worldwide have outlined new standards for postgraduate medical education. This means that residency programmes will have to integrate modern educational views into the clinical workplace. Postgraduate medical education is often characterised as a process of learning from experience. However, empirical evidence regarding the learning processes of residents in the clinical workplace is lacking. This qualitative study sought insight into the intricate process of how residents learn in the clinical workplace.

METHODS We carried out a qualitative study using focus groups. A grounded theory approach was used to analyse the transcribed tape recordings. A total of 51 obstetrics and gynaecology residents from teaching hospitals and affiliated general hospitals participated in 7 focus group discussions. Participants discussed how they learn and what factors influence their learning.

RESULTS An underlying theoretical framework emerged from the data, which clarified what happens when residents learn by doing in the clinical workplace. This framework shows that work-related activities are the starting point for learning. The subsequent processes of ‘interpretation’ and ‘construction of meaning’ lead to refinement and expansion of residents’ knowledge and skills. Interaction plays an important role in the learning process. This is in line with both cognitivist and sociocultural views on learning.

CONCLUSIONS The presented theoretical framework of residents’ learning provides much needed empirical evidence for the actual learning processes of residents in the clinical workplace. The insights it offers can be used to exploit the full educational potential of the clinical workplace.

KEYWORDS *internship and residency; *learning; Netherlands; obstetrics/*education; gynaecology/*education; clinical competence/*standards.

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INTRODUCTION

In many countries, residency programmes are in the process of being reformed.1–4 One essential aspect of the training of future specialists will stay largely intact, however: residency has been and will remain situated at the workplace.5 This means that the educational perspectives underlying the modernisation of graduate medical education will have to be translated into everyday clinical practice. However, current changes in residents’ working hours constrain the presence of residents on the clinical work floor.6,7 In order to benefit from new educational views and create more effective graduate medical education, a basic understanding of residents’ learning processes is indispensable.

There is no single theory explaining the processes at work as a resident gradually develops into a proficient medical specialist.8 Rather, a range of educational

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theories and principles can be applied to this transition. Medical education is dominated by cognitivist views on learning, leading to a pedagogy couched in terms of how faculty staff influence residents’ acquisition of knowledge and skills.6,9 Cognition and understanding are seen as individual attainments. This is reflected in Kolb’s influential experiential learning theory and in research into the stages doctors pass through when learning from experience.10–12 Schön’s ideas about the importance of reflection are well attuned to this line of discourse.13,14 Although there is some empirical research into the learning processes of specialists in continuing professional development (CPD) and within other professions, the relevance to residency training of any of the theories mentioned above has not been subjected to empirical research.5,8,15–18 As Eraut put it, learning from experience is ‘a catch-all phrase which has dominated both adult education and learning in the workplace without much critical attention’.18 We performed a qualitative study to try and unravel the intricate processes of how residents learn in the clinical workplace.

METHODS

The methodological approach we utilised in our research is ‘grounded theory’. Grounded theory was originally developed by Glaser and Strauss to provide a systematic approach for conducting and analysing qualitative research.19,20 It was particularly suited to our research question, as our aim was not to test or verify an existing theory, but to explain the processes of residents’ learning during residency.21 Grounded theory provides a method for inductively generating a theory that emerges from, or is grounded in, the data.22

Study context

The study was conducted in the Netherlands, where residency training immediately follows undergraduate medical education. The 6 years of undergraduate training lead to the MD degree and a basic qualification to practise medicine. Residency programmes are run by university medical centres in close collaboration with affiliated general hospitals and vary in length from 3 to 6 years depending on specialty. Before residency, most doctors work for several years as residents-not-in-training to increase their likelihood of gaining a post in the residency programme of their preference.

Focus groups

Focus group discussions represent a qualitative research method that is increasingly used in medicine and medical education.23–25 Focus groups are particularly appropriate for research in poorly understood or ill-defined topics.26–28 A moderator facilitates the focus group in which typically 6–9 participants explore the topic under discussion.29

Participants and procedure

We conducted focus group discussions among residents in training and residents-not-in-training working in obstetrics and gynaecology. This specialty incorporates aspects of both surgery and medicine and thus offers residents a wide variety of learning environments. A total of 7 focus group discussions were held with group sizes ranging from 5 to 10 participants. Table 1 shows the arrangement of the focus groups and descriptive characteristics of the residents.
In the summer of 2005 the focus groups met for approximately 90 minutes per session. An experienced moderator (AJJAS, SJvL or KB) guided the discussion, while the main researcher (PWT) took notes and asked questions to clarify points where necessary. To start the discussion, the moderator asked the participants to write down some examples of things they had learned during the previous year. Next, participants were asked to explore the following key questions:

1. How did you learn the items you just described?
2. What factors influenced your learning process?

At the start of the session the moderator explained the procedure and guaranteed full confidentiality. All participants gave informed consent to the tape-recording of the discussions. Within a week, all participants received a summary reflecting the content of the discussion. Of the 7 discussants who sent comments in response, 3 suggested minor changes.

**Analysis**

All focus group recordings were transcribed verbatim and entered into qualitative data analysis software (Kwalitan). The analytical process commenced while data collection was in progress in order to allow us to explore interesting side roads and look for deviant cases in later discussions.

First, PWT analysed the transcriptions of 2 focus groups, assigning distinct codes to each remark made in the light of the research questions. As the number of codes grew, the ongoing process of renaming and reorganising codes resulted in a grouping of codes by themes. A second researcher (FS) repeated this process to cross-check the coding system. The coding system was compared and discussed by the 2 researchers until full agreement was reached. The second level of the analysis comprised the exploration and definition of connections between the themes and their reorganisation into more abstract categories. Through the constant comparison of remarks, codes and themes, categories were developed that fitted within the emerging theory. At this stage we accessed literature that was relevant to the emerging theory. The 2 researchers (PWT and FS), the moderators (AJJAS, SvL, KB), and an independent medical education expert (CPMvdV) discussed the results until consensus was reached. PWT refined the theoretical construct by analysing the remaining transcripts using the categorisation agreed on.

**RESULTS**

The structure of the Results section follows the analytic process described in Methods. After describing the results of the first analysis, we will explain the framework of learning in the clinical workplace that emerged from the analysis.

During the process of theory formation, we decided to use Eraut’s typology of knowledge because this best matched our findings. Eraut defines several kinds of knowledge. **Codified knowledge** is found in books, journals, records, manuals, protocols, etc. **Personal knowledge** denotes ‘what individual persons bring to situations that enables them to think, interact and perform.’ This includes personalised versions of codified knowledge, but also knowledge of self, people, situations, attitudes and emotions.

**Initial themes**

The first analysis of the data generated 8 themes (Table 2) with related codes. Examples of codes grouped under the ‘how’ theme are: ‘acting; observing and copying; making mistakes; receiving feedback; reactions from patients; and studying textbooks’. ‘Lack of direct observation by faculty’ and ‘acting without critical self-reflection’ are examples of codes under the ‘negative factors’ and ‘implicitness’. "Table 2 Arrangement of focus groups and descriptive characteristics of participants"
themes, respectively. While looking for relationships between the themes, we noticed diversity in the level of abstraction and aggregation of codes within themes. At the same time, we identified an underlying construct that allowed us to connect codes from different themes. This ‘emerging theory’ encompassed the diversities and gave meaning to the different aspects of learning mentioned by the participants. Our theoretical framework of residents’ learning processes is visualised in Fig. 1. We will now discuss the processes we discerned. To illustrate how our concept of learning in the clinical workplace is grounded in the data, extracts of transcripts are presented. Each remark is uniquely identified by 2 letters indicating the focus group, followed by ‘P’ for participant or ‘M’ for moderator.

**Participating in activities**

For residents, nearly all learning starts with participating in the work-related tasks of their day-to-day job. A working day can be seen as a succession of work-related activities, such as doing rounds, seeing patients in the outpatient clinic, or attending meetings:

‘But in fact everything is first “acting” and then comes everything else.’ (FS-P2)

‘Feedback, yes...’ (FS-P3)

‘Yes. Look, experiencing, feeling, those are things you have to do. Observing a colleague, that’s also doing, attending meetings, practical skills, that’s all first acting. Yeah, so it’s all acting. You learn by doing things and then upon your action follows a reaction from somebody else, a faculty member, or a patient.’ (FS-P2)

Residents participate in these activities with varying degrees of responsibility and autonomy. All sorts of information is embedded in work-related activities:

![Figure 1](image-url) A framework of learning in the clinical workplace. Plain lines refer to the route to personal knowledge/learning process; dotted lines to the internal part of the learning process, and double lines to external influences on the learning process and personal knowledge. X_# refers to the corresponding explanation in the text.

Table 2 Themes within the coding system

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
<th>No. of codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  How</td>
<td>Codes on how residents learn</td>
<td>43</td>
</tr>
<tr>
<td>2  Relevance</td>
<td>Codes specifying aspects of how residents learn</td>
<td>15</td>
</tr>
<tr>
<td>3  Positive factors</td>
<td>Codes on contextual factors with a positive impact on learning</td>
<td>15</td>
</tr>
<tr>
<td>4  Negative factors</td>
<td>Codes on contextual factors with a negative impact on learning</td>
<td>14</td>
</tr>
<tr>
<td>5  Level of experience</td>
<td>Codes on the influence of the level of experience on learning</td>
<td>10</td>
</tr>
<tr>
<td>6  Explicitness</td>
<td>Codes on explicit knowledge or learning</td>
<td>5</td>
</tr>
<tr>
<td>7  Implicitness</td>
<td>Codes on implicit knowledge or learning</td>
<td>7</td>
</tr>
<tr>
<td>8  Formal teaching sessions</td>
<td>Codes on the influence of formal teaching sessions on learning</td>
<td>6</td>
</tr>
</tbody>
</table>

for example, the information may be medical and relate to diseases or treatments, or it may be cultural and relate to how one is supposed to (inter)act and participate in a given context. Cultural information is often taken so much for granted that people are not aware of it. All this information is not simply adopted by residents as knowledge: they go through processes of ‘interpretation’ and ‘construction of meaning’.
Interpretation

Interpretation is the process of reading a situation, of noticing specific aspects while (subconsciously) overlooking others. Interpretation of activities gives rise to ‘personal experiences’. One activity can generate multiple experiences in the same way that many kinds of information can be embedded in a single activity. Obviously, it is the resident who, consciously or subconsciously, interprets (aspects of) activities based upon his or her own frames of reference or personal knowledge (Fig. 1, arrow A1):

‘Well, I play my hunch. If I think, “Well, this can’t be right,” or if I do not trust it, or if I do not see it, if I can’t make a diagnosis, then I’ll ring a faculty member. And if I think, “I’ve actually got a complete picture here, yeah this must be about right” … then I trust my own judgement and then it’s okay.’ (FR-P1)

Other people’s views, for instance, those of consultants, and contextual influences can affect the interpretation process (Fig. 1, arrow A2) and, in certain cases, so can readily available codified knowledge (Fig. 1, arrow A3):

‘But also when you’re in doubt, like … is it possible or not. For instance, when you don’t know a baby’s exact presentation at birth, but you do know enough to safely do a vacuum extraction to get the baby out in time. In a situation like that it can be very valuable to ask an interested faculty member for a second opinion to learn if you were right or wrong.’ (FZ-P1)

‘I get to learn most through doing things and when I come across something I don’t know, I look it up. At least that’s how it usually goes.’ (FP-P1)

‘Or you look it up in the guidelines of the obs/gyn association, or eh ... well in our hospital we have small pocket books with our local guidelines which I use as a reference. And you can always ask another more experienced resident or faculty member.’ (FP-P2)

Construction of meaning

“What do I learn from this?” is the next question to be answered. Residents construct an understanding of their ‘personal experiences’, relevant to them (Fig. 1, arrow B1). As with interpretation, external views or contextual factors can influence this (Fig. 1, arrow B2). These are, however, not necessarily consistent with the resident’s construction of meaning:

‘There are also faculty members who try to teach me things of which I think: “I’d better quickly forget this.”’ (FZ-P2)

‘Yes, that’s what I meant when I mentioned observing faculty, that can also be a way of realising how you do not want to do things.’ (FZ-P3)

In sum, ‘interpretation’ and ‘construction of meaning’ are the cognitive and social processes that selectively transform information embedded within activities into a resident’s personal knowledge, thereby continuously modifying or consolidating it:

‘You pick things up as you go along. I don’t set out to discuss with patients how they think I am doing or how they perceive me.’ (FR-P2)

‘But it is like you said about the reaction of patients. If you notice that when you bring the message across in a certain way and patients seem to like that, then you think, well this is obviously a good method.’ (FR-P3)

Reflection

Residents point out that reflecting on personal knowledge is another vital part of their learning process (Fig. 1, arrow C1). It can have different focuses. For example, residents may reflect on activities and the subsequent learning processes; they may reflect on how their current personal knowledge relates to that of others, and they may think about how their personal knowledge will enable them to perform in future activities. External input from sources ranging from formal evaluations to informal gatherings can trigger and fuel this reflective process (Fig. 1, arrow C2):

‘…for example when your time management is not optimal and your outpatient clinic is always running late, then you start thinking to yourself, “Hmm, I have to try and do this more rapidly.”’ Then I overheard someone saying that she asked questions while doing an ultrasound, in fact she took the history with the echo-head in her hand. Yeah, well as a perfectionist I did everything by the book, sit down first, take a history, and then the physical examination and of course I would end up in a jam. So now when the need arises I too adjust my routine.’ (FY-P1)
Codified knowledge

In addition to using codified knowledge in interpreting activities (Fig. 1, arrow A3), residents (are encouraged to) study codified knowledge in the form of textbooks, journals, etc. to expand their personal knowledge in preparation for future activities. Analogous to interpreting work-related activities, residents process this new information using their own frames of reference (i.e. their existing personal knowledge) (Fig. 1, arrow E1). They report that codified knowledge that can be linked to specific activities or is utilised within a certain timeframe enhances their understanding of that particular knowledge subset.

Some activities within residency programmes, such as journal clubs or book reviews, are specifically aimed at enhancing critical appraisal of codified knowledge (Fig. 1, arrow E2):

‘You can read in a book how a delivery normally goes. That is your basics; that is what you know from the books. and that might help you decide when to sound the alarm during a pregnancy... But still I find that I learn most by doing it and actually seeing what slow progress of labour means. Or a “turtle sign” for instance. It’s great reading about a “turtle sign”, but the first time I saw it, at first I thought, “Well, the birth of the head sure takes a while, wait a minute, oohhh, THIS is a turtle sign.’’ (FS-P2)

DISCUSSION

Principal findings

In view of the current modernisation of residency programmes, we qualitatively investigated how residents learn in the clinical workplace. The outcome of the study is a framework of learning in the clinical workplace based on a grounded theory approach. It stresses that work-related activities are the foundation of resident learning. The subsequent processes of interpretation and construction of meaning lead to the expansion and refinement of residents’ personal knowledge.

Relationship to other studies

Our framework of learning in the clinical workplace is tied in with other research findings as well as with theoretical discourse. It is comparable with experiential learning theory in that it highlights the importance of ‘experiences’ for learning. However, the starting point of learning has shifted to the central notion of ‘activity’ in our framework. This is concordant with situated learning theories and sociocultural views of learning, where activity or practice is the pivotal factor.31-33 Our model of learning in the clinical workplace recognises the significance of learning from and with other people. Because the scope of social interaction is not restricted to the formal training programme, it will be clear that our theoretical model also supports ideas about informal learning.16,34,35

Strengths and weaknesses of the study

In this study we exploited the full potential of the grounded theory approach to develop a theoretical model. There are parallels between our theoretical insights and related literature. In addition, our results have sufficient generality to claim ‘theoretical generalisability’.36 However, because this study was restricted to a single specialty, no conclusions can be drawn about possible distinctions between specialties, although we are inclined to expect similarities. Another limitation of our framework concerns its focus on knowledge acquisition. It does not allow for conclusions about how personal knowledge informs action or behaviours.

Significance of the study

To conclude that the learning of residents starts from work-related activities may seem to be stating the obvious. However, so far no studies have provided empirical evidence of what actually happens when residents learn by participating in practice. Our study has provided such evidence. To sum up, we will outline 3 of its implications for those working in medical educational practice and will end with questions for future research.

Currently, new educational principles are being introduced into graduate medical education. Although we do not dispute the potential of structured competency-based curricula, simulations or other educational tools, we conclude from this study that those principles should be complementary to learning from work-based activities and not substitutes for them. Learning to become a medical specialist means working and acting as specialists do. Our construct of learning in the clinical workplace can be a valuable aid in attuning modern ideas about graduate medical education to current practice. We consider this to be a more feasible approach to graduate training than creating an educational structure that thwarts the organisation of health care.
Those who are attempting to integrate a competency-based curriculum into clinical practice should realise that residents can learn several competencies from a single activity. Which competency gets the most attention in the learning process is a matter of steering the interpretation and construction of meaning in the desired direction. This is only possible with well informed residents who know what they can and should learn from a certain activity. Moreover, the role of faculty members, nurses and other health care personnel in identifying specific aspects of a resident’s performance becomes eminently clear. Whereas faculty tend to focus on the medical aspects of a resident’s performance, nurses, for instance, can provide feedback on the social skills of residents and how these are perceived by patients.

As apprentice-type arrangements are likely to remain the prevailing educational format in residency, faculty members should understand the impact of their actions and behaviour on the learning of residents. Faculty largely determine residents’ tasks and responsibilities. They put their stamp on the interpretation and construction of meaning processes and are usually the ones to evaluate residents’ levels of personal knowledge. Faculty should be aware of when and why they influence a specific phase of a resident’s learning process.

Unanswered questions and future research

Our framework of learning in the clinical workplace gives rise to many new research questions. Further investigations into different elements of the framework are needed for more extensive validation of our theoretical construct. A more detailed understanding of how people interpret and construct meaning and how external input influences this process would also be valuable. Differences between specialties and levels of expertise should be addressed. Fundamental questions, such as the role of the unconscious and how it relates to the development of skills and knowledge are also relevant subjects for further study.

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