Trainee anaesthetists understand their work in different ways: implications for specialist education

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Background. Traditionally, programmes for specialist education in anaesthesia and intensive care have been based on lists of attributes such as skills and knowledge. However, modern research in the science of teaching has shown that competence development is linked to changes in the way professionals understand their work. The aim of this study was to define the different ways in which trainee anaesthetists understand their work.

Methods. Nineteen Swedish trainee anaesthetists were interviewed. The interviews sought the answers to three open-ended questions. (i) When do you feel you have been successful in your work? (ii) What is difficult or what hinders you in your work? (iii) What is the core of your anaesthesia work? Transcripts of the interviews were analysed by a phenomenographic approach, a research method aiming to determine the various ways a group of people understand a phenomenon.

Results. Six ways of understanding their work were defined: giving anaesthesia according to a standard plan; taking responsibility for the patient’s vital functions; minimizing the patient’s suffering and making them feel safe; giving service to specialist doctors to facilitate their care of patients; organizing and leading the operating theatre and team; and developing one’s own competence, using the experience gained from every new patient for learning.

Conclusions. Trainee anaesthetists understand their work in different ways. The trainee’s understanding affects both his/her way of performing work tasks and how he/she develops new competences. A major task for teachers of anaesthesia is to create learning situations whereby trainees can focus on new aspects of their professional work and thus develop new ways of understanding it.

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in a study on interactions between anaesthetists and patients found two distinct types of practice: interpretative habit of action and reactive habit of action. Interpretative habit of action was characterized by recognition of the uniqueness of each patient, and reactive habit of action was based on a deterministic implementation of a preoperative plan. Anaesthetists from the latter group had difficulties in learning from practical situations.

To teach anaesthesia is demanding. To create a good learning environment the teacher must know what the learner understands about the professional role into which he/she is to grow. In a previous study we have shown that specialist anaesthetists understand their work in qualitatively different ways, made up of four different professional roles. Moreover, it can be assumed that trainees’ ways of understanding their work differ from those of experienced anaesthetists. The aim of this study was to identify the different ways trainee anaesthetists understand their work.

### Methods

The study was approved by the Ethics Committee at the Faculty of Medicine, Uppsala University, Dnr 01-226.

### Theoretical framework

Our interest concerns the ways a group of people conceive of a phenomenon. This type of study is best carried out using a qualitative research method, which we considered would give us the best possibility to gain new knowledge. If we were to use a quantitative research method, so dominant in anaesthesia, we would be restricted by our own understanding.

The research approach of this study is phenomenography, a pedagogic research method developed in the late 1970s. The phenomenographic approach has been increasingly used in health care research. The research object of phenomenography is to determine the different ‘ways of understanding’, that is the ways a group of people understand or experience a phenomenon. Several studies have shown that learners understand a phenomenon in qualitatively different ways; different aspects are brought into the focus of awareness and different meanings are created, affecting the outcome of the learning process.

### Setting and participants

The departments of anaesthesia in four university hospitals and two middle-sized county hospitals were chosen for the study. Trainees with up to 2 yr of experience of anaesthesia were asked to participate. All those working at the hospitals during the weeks of interview, 10 women and nine men, accepted. The interviewees were between 27 and 39 (median 31) yr old and had from 2 to 24 (median 10) months of experience as trainee anaesthetists. The sample size of 19 informants was considered adequate because many phenomenographic studies have shown that every way of understanding a phenomenon can be determined when 20 informants have been interviewed.

### Data collection

The interviews took place at the trainee anaesthetists’ workplace from February 2001 to January 2002. They were done by the first author (J.L.), a consultant anaesthetist with training in qualitative research. The answers to three open-ended questions were sought. (i) When do you feel you have been successful in your work? (ii) What is difficult or what hinders you in your work? (iii) What is the core of your anaesthesia work? The same or similar questions have been used in studies of specialist anaesthetists’ understanding of their work, on diabetes care, and of medical students.

The interviewees were encouraged to speak about experiences from their own clinical work. By using probing questions (Table 1) and reflective comments such as ‘What do you mean by that?’ or ‘Can you tell me more about that’, the interviewer encouraged the interviewees to give a genuine and detailed description of how they viewed their work.

The interviews lasted for 1–1.5 h and were tape recorded and transcribed word-for-word.

### Method of interview analysis

1. First, each interview was read to get acquainted with the text. As is usual in such open interviews, much of the talk was about things other than the research questions. The text was therefore read again, and the parts where the interviewee’s conversation was about the three main questions were marked. These parts were considered to be the essential content of the interview.
2. The essential parts of the text were characterized as to what the trainee’s attention was focused on and how he/she described their way of doing the work. In all interviews, two or more focal points were identified. For each interview, a preliminary description was given of the anaesthetist’s predominant method of understanding their work.

3. The 19 descriptions were grouped into categories, based on similarities and differences. No predetermined categories were used. Descriptions expressing the same or similar areas of what the trainee’s attention is focused on and how he/she is doing his/her work were placed in the same category. For each category, a common description was formulated.

4. Finally, each interview was read once more to identify passages where the interviewee expressed other ways of understanding in addition to the predominant one, in particular ways of understanding which had the same focus as any of the other categories already defined.

This four-step analysis was done by J.L.

Rigour in qualitative research

The question of rigour in qualitative research must be addressed differently from that in quantitative research. Validity and reliability have different meanings in these two research approaches. Whereas quantitative research aims at refutation or confirmation of a hypothesis, qualitative research aims at deeper understanding of a phenomenon. To increase the validity of the interview data in this study, the interviewer repeated the same questions several times to give the interviewees the best possible chance of expressing genuine thoughts; by use of probing questions and encouraging comments the interviewees were stimulated to expand and deepen their descriptions of experiences in their work.

Analysing qualitative interviews requires working with large texts. The researcher should strive to lessen the influence of his own pre-understanding by holding back his own interpretations in the first stages of the analysis. The issue of reliability in this study was dealt with by two qualitative researchers (I.H. and E.L.) reading the interviews after the categories had been defined by J.L., placing each interview into one category. In five interviews, the categorization differed. Each of these interviews was discussed again until there was agreement on the appropriate category (negotiated consensus).

The software QRS NUD*IST\(^1\) was used to handle and analyse the data material.

Results

In this group of 19 trainee anaesthetists, six ways of understanding their work were found: (i) giving anaesthesia according to a standard plan; (ii) taking responsibility for the patient’s vital functions; (iii) minimizing the patient’s suffering and making the patient feel safe even in unpleasant situations; (iv) making it possible for the specialists, surgeons, and other doctors to take care of the patient in an optimal way; (v) taking care of the planning of operations, co-operating and communicating with the team; and (vi) using the experience from every new patient to learn something new.

These six descriptive categories are illustrated below by excerpts from the interviews.

Giving anaesthesia according to a standard plan

Keep to the routines that the anaesthetist has been trained to follow. Correct deviations from the plan by taking prescribed measures, getting the expected results.

‘Usually it is some little thing that I want to correct and things go as I have planned. The patient’s response is as I had thought it would be. When things go as planned, I feel content. There can be some trouble, I take some measure and things go well. Arterial pressure goes down and it works out when I give fluid or ephedrine.... Last week: saturation was not so good; it looked a little strange when the nurse... not that it was abnormal when she intubated, but they had to put so much air into the cuff and then I thought that the return volumes were not OK. Then I looked down and saw that the whole cuff was outside, she hadn’t got it completely down. Then you can feel good that you have been thinking a little. When things go as you have planned.’

The two trainees with this sort of understanding are focusing on anaesthesia as a set of procedures to follow. The anaesthetist’s task is to learn the procedures and perform the necessary tasks. If any deviation from the protocol occurs, a predefined correcting measure is taken. Satisfaction comes from seeing the expected results from the measures taken.

Taking responsibility for the patient’s vital functions

Monitor and balance the patient’s physiological variables, using knowledge of physiology and pharmacology. Beware of pitfalls. Have strategic plans for different possible scenarios. Perform difficult technical procedures.

‘... you check the physiological parameters, how they are. If you have been too restrictive with fluids or may be too generous or things like that... evaluate the patient’s condition and try to optimize, so that she can stand the anaesthesia... for the anaesthesia means that you so to speak take over the vital regulating mechanisms, wipe them out and then you have to replace them with other drugs, so to speak take over the responsibility for the patient’s organs and health from the moment the patient is put to sleep until she is sent back to the ward and can manage respiration, blood pressure and can produce urine.’
Anaesthetists with understanding of this category focus on vital functions in an anaesthesitized or seriously ill patient. The anaesthetist’s task is to monitor physiological variables and to control, stabilize, optimize, and sometimes take over the patient’s vital functions. The anaesthetist should tailor anaesthesia to the individual patient, considering both the patient’s disease and the operation to be done.

Minimizing the patient’s suffering and making the patient feel safe even in unpleasant situations

See to it that operations can be done with no risks to the patient and in a way that gives a good end result for the patient. The patient should be treated with respect; he/she should trust you.

‘I also feel good if I notice that, in the first place, the patient feels safe with me. And secondly that he wakes up and he is content, you notice that he has no pain when you hand over, maybe that is a really positive experience.... The core? To give the patient a feeling of safety in unpleasant situations... verbal contact before and afterwards and give this feeling of being safe "we will take care of you, you can feel safe". You notice that you manage to get them a little calmer just by being calm yourself, giving them a feeling of being in a safe and secure environment. Even if the situation is very unpleasant....’

The trainees with understanding of this category focus on the patient as a person who has to go through an operation, sometimes in pain or with nausea, and often nervous. The task is to take the patient through the operation with minimal risks and with as little suffering as possible. The anaesthetist should make the patient feel safe and secure.

Making it possible for the specialists, surgeons, and other doctors to take care of the patient in an optimal way

Adapt anaesthesia to the needs of the surgeons and to the well being of the patient. The anaesthetic should be as simple and straightforward as possible for all those involved.

‘The essence is to see to it that the surgical clinics can take care of their patients and do what they want in an optimal way and that the patient’s condition is as good as possible after the operation... it should be as easy as possible for everybody involved to do this, that is—the surgeons should be able to do this in a flexible way. And I see to it that the patient is well meanwhile... all the time adapt our ways of giving anaesthesia according to the surgeons’ wishes. And then of course they have to adapt themselves to us a little.’

Only one trainee has this as her main understanding. Her focus is the patient, being cared for by surgeons and other specialist doctors. The anaesthetist should help other doctors to take care of patients in an optimal way. The aim is that the patient feels as well as possible after the operation. The anaesthetist can often be a link between the different hospital specialists, ‘the hospital’s GP’.

Taking care of the planning of operations, cooperating, and communicating with the team

Keep the focus on production, getting a fast patient turnover. Survey the team around the patient, co-operate and communicate.

‘I try to be very much present in the operations rooms, helping in the turnover of patients, trying to... just by you being present things go faster... you want the patient turnover to be quicker... then you have to look at the operating list, where the next patient is, so that you are one step ahead and take care of the time planning. That is also part of the job. You must be involved in that too, so that you know where you are in the time schedule and what there is still to do....’

In this category, in contrast to the first three, the patient is not the main focus. It is the workload that has the anaesthetist’s attention. The anaesthetist should organize and lead the work, co-operate with all the team members and survey everything that happens in the operating rooms.

Using the experience from every new patient to learn something new

Learning is a matter of training and challenges. You feel well when you have succeeded. Form a picture of the case, discuss it with an experienced colleague and get feedback. Do difficult things, at the upper limit of your competence, with support from a consultant.

‘If things have gone well I feel good and try to remember what I did and how I acted, what I gave and which dosage. I feel that every patient gives me a piece of experience and I try to memorize it.... I try to remember that for the next similar patient.... It can be a challenge to do a good epidural or get in a central venous catheter or similar things, in the beginning. And I can still find there is training, and challenges, and you feel content when you have succeeded.’

The anaesthetists with this understanding concentrate on their own competence development. For them the aim is to get experience of difficult cases and technical procedures, and reflect on these experiences together with consultant anaesthetists.
Table 2 Distribution among 19 trainee anaesthetists of the six ways of understanding their work. Nineteen trainee anaesthetists’ predominant (++) and less-dominating (+) ways of understanding their work. Numbers in brackets: months of practice in anaesthesia

<table>
<thead>
<tr>
<th>Interviewees</th>
<th>(A) Giving anaesthesia according to standard plans</th>
<th>(B) Being responsible for patient’s vital functions</th>
<th>(C) Caring for the patient, minimizing suffering</th>
<th>(D) Serving surgeons and other specialists</th>
<th>(E) Organizing and surveying operating theatre</th>
<th>(F) Using experience from patients to learn new things</th>
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<td>Male (16)</td>
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The distribution of the ways of understanding their work among the 19 interviewees is shown in Table 2.

Discussion

In this study of 19 trainee anaesthetists we found that there were six methods they used to understand their work: (A) the procedure of giving an anaesthetic; (B) the medical process of anaesthesia; (C) the patient as a person undergoing surgery and anaesthesia; (D) surgeons and other specialist doctors, caring for patients; (E) the operating theatre and its team; and (F) the trainee’s own competence and skill.

Understanding (A) and (B) is about managing the anaesthetized patient in the operating theatre. Trainees with understanding of (A) describe managing anaesthesia as a procedure with a protocol to follow. This is the first stage in the development of professional competence for the novice, which probably most anaesthetists go through at the beginning of their training. The teacher of anaesthesia should be concerned if this understanding still dominates learning in trainees who are not at the very beginning of their career. Most trainees focus on the patient’s physiology, as in category (B), when managing the anaesthetized patient.

The four trainees with understanding of category (C) have the individual patients in focus and feel responsible for providing safety for them. This also includes managing anaesthesia in a safe way. All the four trainees who gave priority to category (C) also express understanding of categories (A) or (B). Understanding category (C) can be considered as a higher stage of development than categories (A) or (B). With understanding of (C) a trainee will also have understanding of (A) or (B), whereas the reverse is not true. This is supported by the fact that seven of the 10 trainees with understanding of categories (A) or (B) did not have understanding of (C); it is possible to focus on the medical process of anaesthesia without taking into account the patient as an individual.

In understanding category (F), learning is the central focus. Three trainees had this as their main understanding, and seven as a less important understanding. In fact one would expect all trainees to focus on learning. That this is not the case is an important finding. One possible explanation might be that some trainees consider professional competence as something that comes to you automatically just by doing anaesthesia. However, a prerequisite for reflective learning is that the learner is aware of and takes control of his/her learning.

Young trainees in anaesthesia thus show great variation in the way they understand their work. This variation is important because the way a phenomenon is understood governs where the learner directs his/her attention and what type of competence is acquired.

Experienced anaesthetists’ understanding of work

In a previous study on experienced anaesthetists, four ways of understanding work were found: (1) giving anaesthesia and controlling the patient’s vital functions—‘the Professional Artist’; (2) helping the patients by alleviating their pain and anxiety—‘the Good Samaritan’; (3) giving service to the whole hospital to facilitate the work of other doctors and nurses, caring for severely ill patients—‘The
Thus, of all the ways a situation can be highlighted; other aspects must recede into the background be put into some order. One aspect of the situation must be experienced of chaotic situations understandable they must be understood, if he/she like many specialist anaesthetists, consciously aware of the ways the anaesthesia workload can be understood in a limited number of ways, only a limited number of areas can be focused on. If one aspect of the work that the teacher or learner is consciously aware of is put into focus, that is make it perceptible, is variation. Thus, of all the ways a situation can be understood, one must be chosen for the trainee to concentrate on; other possible ways of understanding still exist but should be left aside. As the anaesthetic workload can only be understood in a limited number of ways, only a limited number of areas can be focused on. If one aspect of the work that the teacher or learner is consciously aware of is put into focus, both of them will concentrate on it, which is the prerequisite for learning from such experience. Therefore, making the different aspects of work explicit will create a better foundation for learning. However, if the teacher is not consciously aware of the ways the anaesthesia workload can be understood, if he/she like many specialist anaesthetists, has narrowed their field of vision to one or two of the four fields on the anaesthetists’ work map, then they may not help the trainees reflect on their clinical experience appropriately.

Learning as a change of understanding

In the development of competence at work, there are two qualitatively different ways of learning. On the one hand, there is ‘learning within an understanding’ which is the most common, everyday way of learning. On the other hand, there is ‘learning change understanding’, which constitutes a much greater challenge in competence development. Such changes are often necessary if the trainee is to develop his/her competence to master all aspects of their work. But there is nothing in the present study or in the previous study on experienced anaesthetists, to indicate that changes to more comprehensive ways of understanding work normally take place over time, except for the fact that the trainees’ understanding of category (A) in the novice group, was not found among experienced anaesthetists.

Learning styles

The trainee anaesthetist’s working environment is often chaotic, highly stressful, and uncontrollable. But it is when young anaesthetists have to handle difficult situations in spite of their limited experience that they can determine the best starting point to reflect on their action. It is this reflection that makes possible the transformation of tough experiences into mental patterns that can be stored and recalled in future similar situations. However, to make the experience of chaotic situations understandable they must be put into some order. One aspect of the situation must be highlighted; other aspects must recede into the background and remain there. Thus, of all the ways a situation can be understood, one must be chosen for the trainee to concentrate on; other possible ways of understanding still exist but should be left aside. As the anaesthetic workload can only be understood in a limited number of ways, only a limited number of areas can be focused on. If one aspect of the work that the teacher or learner is consciously aware of is put into focus, both of them will concentrate on it, which is the prerequisite for learning from such experience. Therefore, making the different aspects of work explicit will create a better foundation for learning. However, if the teacher is not consciously aware of the ways the anaesthesia workload can be understood, if he/she like many specialist anaesthetists, has narrowed their field of vision to one or two of the four fields on the anaesthetists’ work map, then they may not help the trainees reflect on their clinical experience appropriately.

### Table 3 Trainees’ understanding of anaesthesia work, categories of description

<table>
<thead>
<tr>
<th>Category</th>
<th>What? Aspect in focus</th>
<th>How? The meaning of work</th>
<th>Variation that brings the aspect into focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>The procedure of giving anaesthesia</td>
<td>Follow the protocol</td>
<td>Methods of giving anaesthesia and ways of monitoring patient physiological parameters</td>
</tr>
<tr>
<td>(B)</td>
<td>The medical process of anaesthesia</td>
<td>Monitor and balance physiological parameters</td>
<td>Physiological parameters</td>
</tr>
<tr>
<td>(C)</td>
<td>The patient undergoing anaesthesia and surgery</td>
<td>Minimize risk and suffering, calm and comfort patient</td>
<td>Patients’ apprehension before operation, pain and suffering after operation</td>
</tr>
<tr>
<td>(D)</td>
<td>Surgeons and other specialist doctors caring for patients</td>
<td>Give service, adapt anaesthesia to surgeons’ needs</td>
<td>Other doctors’ need of service and assistance</td>
</tr>
<tr>
<td>(E)</td>
<td>Operating theatre and team</td>
<td>Organize, survey, and communicate</td>
<td>Workload, need of immediate action</td>
</tr>
<tr>
<td>(F)</td>
<td>Trainee’s own competence and skill</td>
<td>Get exposed to challenges, reflect, get feedback from experienced colleagues</td>
<td>Difficulties in performing procedures, experienced anaesthetists’ ways of managing anaesthesia</td>
</tr>
</tbody>
</table>

Reflection on action

The trainee anaesthetist’s working environment is often chaotic, highly stressful, and uncontrollable. But it is when young anaesthetists have to handle difficult situations in spite of their limited experience that they can determine the best starting point to reflect on their action. It is this reflection that makes possible the transformation of tough experiences into mental patterns that can be stored and recalled in future similar situations. However, to make the experience of chaotic situations understandable they must be put into some order. One aspect of the situation must be highlighted; other aspects must recede into the background and remain there. Thus, of all the ways a situation can be understood, one must be chosen for the trainee to concentrate on; other possible ways of understanding still exist but should be left aside. As the anaesthetic workload can only be understood in a limited number of ways, only a limited number of areas can be focused on. If one aspect of the work that the teacher or learner is consciously aware of is put into focus, both of them will concentrate on it, which is the prerequisite for learning from such experience. Therefore, making the different aspects of work explicit will create a better foundation for learning. However, if the teacher is not consciously aware of the ways the anaesthesia workload can be understood, if he/she like many specialist anaesthetists, has narrowed their field of vision to one or two of the four fields on the anaesthetists’ work map, then they may not help the trainees reflect on their clinical experience appropriately.

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To achieve a change of understanding, a new, hitherto unperceived aspect of the phenomenon must be brought into the learner’s conscious awareness. What may bring the new aspect into focus, that is make it perceptible, is variation. In a learning situation where only one aspect of the work varies while other aspects are kept stable and recede into the background, the learner will have the best opportunity to focus on this aspect. It is therefore important that a teacher is consciously aware of the different aspects of the trainee’s work and of the variations that can help to bring each of these aspects into focus (Table 3).

Learning styles

The trainee’s learning style might influence how their understanding of work is developed. In education literature, two main learning styles have been described: (i) surface learning, directed at memorizing factual knowledge and extrinsically driven (e.g. by the wish to get a job) and (ii) deep learning, aiming at understanding meaning and intrinsically driven by internal goals. The type of practice described by trainees with understanding of (A) could be the
result of a surface learning style, whereas a trainee with a deep learning style could be expected to move to understanding (B), driven by the desire to understand the patient’s physiology. Alternatively, a trainee might move to understanding (C) if driven by the desire to do good for patients. This is highly speculative and needs to be studied further. For this reason, a forthcoming study will focus on the different ways trainee anaesthetists understand the learning process.

In conclusion, we investigated how 19 young trainee anaesthetists understand their work. We found a great variation in the ways they understand their work; consequently the trainees’ ways of directing their attention, and the knowledge and competence they develop also vary. Learning a profession means that the learner must be able to reflect on situations experienced in work; this is an important part of the learning process. The way a situation is perceived will determine the content of the reflective process.

In a previous study, we described the work map of anaesthesia from the perspective of experienced anaesthetists. To develop professional excellence the anaesthetist must be aware of the different ways work can be understood and the different aspects of work that must be considered. Only in this way can the everyday experience of work, often complicated and unstructured, be moulded into structured mental patterns. This is the basis of superior professional behaviour, the way experienced clinicians, often with uncanny speed, find the best way to act in complicated situations.

Teachers of anaesthesia can turn unstructured work into learning experiences by stimulating young trainees to define the different aspects of a situation to focus on, when reflecting on their experiences. This will help young doctors to develop into proficient anaesthetists; however, it presumes understanding of the central role of reflection in professional learning.

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