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Intuition as a function of the expert nurse: a critique of Benner's novice to expert model

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Intuition as a function of the expert nurse: a critique of Benner's novice to expert model
Benner's model of skill acquisition is currently receiving considerable interest from nurse educationalists, and promises to form the basis for some curricula offered by colleagues of nurse education This paper debates the 'novice to expert' model and seeks to explain exactly what an 'expert' is The Benner model proposes that one component of expertise is working from an intuitive base This claim is disputed and the definition of intuition is contested Alternative explanations to account for the intuitive responses of Benner's subjects are suggested

INTRODUCTION

Benner's (1984) model of skill acquisition has recently been presented as a framework for Project 2000 courses in education and, despite the absence of objective validation of the model, it has generally been accepted uncritically by nurse educationalists in Britain and abroad (Carlson *et al* 1989, Gately 1992a) However, the extent of its use will only be apparent when colleges of nursing publicize their Project 2000 programmes (UKCC 1986)

The novice to expert model invites further interest as Gately (1992b) identifies similarities between Benner's model and the recommended structure of the Post-Registration Education and Practice Project (PREPP) (UKCC 1990) and suggests that the model provided by Benner and Dreyfus presents a coherent framework to support the lifelong learning of nurses promulgated by the UKCC

Although this model is attracting attention, there are some aspects of it that require further investigation and explanation The expert nurse is proposed as demonstrating excellence in nursing care, but while the stages to become an expert are clearly presented these stages are merging points on a continuum which impede measurement Aspects of expertise are described, but expertise is not clearly defined One feature of the expert is her recourse to intuition, but intuition as a concept is somewhat ambiguous This paper seeks to pursue the issues of expertise and intuition as described by Benner, to investigate if these concepts have anything to offer nursing

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MODEL OF SKILL ACQUISITION

Benner's (1982, 1984) model of skill acquisition, based on ascending levels of proficiency, was originally developed by Dreyfus & Dreyfus (1980), and Benner (1982) and Dreyfus (1987) claim that this model can be generalized to nursing According to the model, the nurse passes through five stages of career development, novice, advanced beginner, competent, proficient and expert Skill attainment requires an ordinal progression through these stages, and discrete capabilities reflect the stage of development reached This incremental development is dependent on a combination of depth and range of clinical experience, which is positively correlated with the length of time spent nursing

Students of the Project 2000 course enter as 'novices' and reach the stage of 'advanced beginners' by the end of the common foundation programme On completion of the branch programme, i e at the end of training, they should have reached the stage of 'competent' 'Proficient nurses will emerge only once they have practised for between 3 and 5 years in one clinical area, and before the nurse can claim 'expert' status she is expected to have had experience in one clinical area for more than 5 years

The logical structure of the model is appealing It implies progress in theory and practice according to the nurse's experience, and therefore overcomes the limitation inherent in the modular system which demands a student nurse to develop according to a college timetable The present system assumes that, on reaching certain junctures in training, the student nurse will have gained requisite experiences On the basis of this assumption, student nurses are expected to be able to perform nursing tasks at a predetermined level This does not allow for variance in students' abilities or pre-nursing experience, nor for variance in the range of clinical experience available on different wards

The theoretical model that Benner (1982) suggests is more student-orientated, the student moves from one stage to the next depending on competence, not according to the collegial teaching programme However, in practice, Project 2000 nurses are still expected to attain pre-determined stages of development by set times This presumes that the target clinical experience and theoretical understanding described by Benner, which is essential before moving on to the following stage, can be achieved within the training period designated by the college programme

TUITION

Benner (1982, 1984) also identifies different methods of tuition for nurses at different stages of career development According to their expertise (which is dependent on their level of skill acquisition), they are more receptive to different specified models of teaching Hence the model of teaching employed is that which is best suited to the needs of the learner

The strength of Benner's model is that the emphasis is placed on clinical nursing care, which only assumes meaning in the context of the ward environment Isolated theoretical instruction is of limited value and only becomes meaningful to the nurse when applied in a clinical setting Benner thus promotes the concept of holistic nursing as being more pertinent and more meaningful than task allocation The adoption of this framework then deflects some of the early criticism of the Project 2000 programme, when concerns were expressed that the course content was too theoretical and insufficient attention was being paid to the development of clinical skills

Benner (1984) also advocates that the preferred method of learning is by observing and emulating the role model These role models are the experienced nurses who act as mentors or instructors to the inexperienced learner As experienced nurses function at a higher level than novices, they demonstrate greater competence in practice and hence the beginners can learn by observation

> By studying proficient and expert performance, it is possible to obtain a rich description of the kinds of goals and patient outcomes that are possible in excellent nursing practice This knowledge of goals and possible outcomes can be useful in expanding the scope of practice of nurses who are less proficient In fact, a vision of what is possible is one of the characteristics that separates competent performance from proficient and expert performance
>
> (Benner 1982)

Social learning theory

Social learning theory is well documented in psychology literature, e g Bandura (1965) Gately (1992a) comments that skills which can only be communicated by example are seen as being exceptionally relevant to nursing

The novice to expert prototype is therefore promoted as a complete model for charting the development of the clinical nurse career this paradigm is relevant, for it emphasizes holistic clinical nursing as an educational aim It demonstrates the need for continuing post-registration education as a means of achieving excellence in practice, uses clearly described stages of development and does not lose sight of the value of caring for patients Benner (1984) offers several examples of the effects of nursing expertise on patient outcomes Benner also advocates career specialization, rather than generic development, as expertise can only arise from extensive experience in the same clinical area Attention is paid to describing skills, understanding and behaviour which contribute to expertise, which in turn is contrasted with that of the non-experts

> Descriptions of excellence from expert nurse clinicians, however, offer new clinical possibilities for competent nurses and may facilitate their movement to the proficient stage When experts can describe clinical situations where their interventions made a difference, some of the knowledge embedded in their practice becomes visible And with visibility, enhancement and recognition of expertise become possible
>
> (Benner 1984)

THE EXPERT

Benner (1982, 1984) provides examples of expert nursing, but does not define the 'expert nurse' Her 'expert' subjects are identified by peer assessment, which presents methodological shortcomings Having placed such importance on the role of the expert nurse, it would be worthwhile to seek further clarification of exactly what is entailed in gaining expertise, in addition to Larkin *et al*'s (1980) proposal that considerable knowledge is an essential pre-requisite to expert skill

According to this model it is unclear at what stage one becomes an expert, and if there are better experts than others, i e are there stages of expertise or is 'expert' a unique and final state? This is not merely a pedantic dispute over semantics As nursing practice is now expected to meet specific criteria that quality assurance demands, precise definitions and descriptions of patient care are required An educational programme that focused on expertise would have to identify the criteria by which nurse experts were measured

Kolodner (1984) presents expertise as being an end product of an incremental experiential development and consolidation of data in long-term memory New experiences are interpreted in relation to previous ones, and expert interpretation in terms of semantic (memory for theoretical information) and episodic (memory of life events) memories Therefore the expert has greater semantic store (theory) and greater episodic store (experience) Kolodner (1984) proposes that even if an expert and a non-expert had equal semantic knowledge (knew the same facts), the expert's experience allows her to build up better episodic definitions of how to use it

Addressing the issue in terms of artificial intelligence systems, Kolodner (1984) reinforces Dreyfus's (1987) initial hypothesis, that in supplying an expert system with information, as the data base increases, it would be expected that the system would take longer to produce the relevant answer The human expert, in fact, is able to produce the appropriate answer more quickly than the non-expert and this is attributed to the integration and reorganization of the information over time 'The difficulty in extracting rules from experts supports the contention that experts don't use rules for reasoning, but rather they reason in some other way' (Kolodner 1984)

The argument that is emerging is that the expert functions in a different manner from the non-expert Where the non-expert is guided by explicit rules, codes and formal procedures, the expert in practice operates above this level, views situations holistically and much of her knowledge is embedded in practice (Meerabeau 1992) But at what stage enlightenment (and cognitive reorganization) suddenly befalls the 'proficient' nurse and she is transformed into an 'expert' is still not clear, nor what catalyst brings about the conversion Moreover, experts can only be understood by other experts and so are unable to communicate the secrets of their understanding to non-experts Dreyfus (cited in Benner 1984) describes the expert performer,

> The performer is no longer aware of features and rules, and his/her performance becomes fluid and flexible, and highly proficient The chess player develops a feel for the game, the language learner becomes fluent, the pilot stops feeling that he/she is flying the plane and simply feels that he/she is flying

Experience

It is reasonable to infer that theoretically, over time and with the necessary experience, all practitioners could eventually become experts and perform at the levels described here, but Benner (1982) clouds the issue by claiming that

> experience is not the mere passage of time or longevity, it is the refinement of preconceived notions and theory by encountering many actual practical situations that add nuances or shades of difference to theory

She also remarks that not all nurses will be able to become experts (Benner 1984), but no explanation is offered as to why all nurses who have worked for more than 5 years in one clinical area cannot become experts There is also no guidance to assist nurses to become experts, other than working through the stages of skill acquisition, but even this does not guarantee expert status The expert nurse is then presented as a blessed practitioner, initiated into the protected knowledge of some secret society, and forbidden or unable to divulge the rites of passage to the acolytes Non-expert nurses might be excused their exasperation in asking just what they have to do to be admitted into the inner sanctum

INTUITION

The expert nurse apparently interprets clinical situations using a different set of constructs from the inexperienced nurse This perceptual awareness is portrayed as intuitive, and is strengthened by familiarity with the patient and the ward characteristics This intuition is the exclusive province of the expert but there are communication difficulties which limit the transference of information concerning crises anticipation between the expert and the non-expert, which means that the expert cannot explain how she makes her deductions Even if the expert could

recognize exactly what inner analytical process alerted her to the immediate need for intervention, the explanation would be so alien to the undeveloped mental constructs of the non-expert, that it would be unintelligible to anyone except another expert

Benner (1982) describes the expert nurse as having 'an intuitive grasp of the situation' and Benner & Tanner (1987) enigmatically claim that 'The seasoned nurse's well-honed sixth sense enables her to make lifesaving decisions' Such rhetoric might capture the imagination, but the claims are fanciful as the concept of intuition in this context merely provokes further investigation What exactly is intuition, and how does one become intuitive? The title of the paper by Benner & Tanner (1987) 'How expert nurses use intuition' begs two questions, that expert nurses *do* use intuition, and that such a mental process as intuition exists in this context

The role of intuition as a function of the expert nurse, as implied by Benner (1982, 1984) does not assume the same significance as it does in the later paper by Benner & Tanner (1987) Presumably this is due to the wish to incorporate Dreyfus & Dreyfus' (1985) 'six key aspects of intuitive judgement' (pattern recognition, similarity recognition, commonsense understanding, skilled know-how, sense of salience, and deliberative rationality) into the existing Dreyfus/Benner model

Identifying potential crises

Intuition does appear in the literature to be concerned with such concepts as solving physics problems (Larkin *et al* 1980), decision making (Cosier & Aplin 1982), intuitive knowing (Agan 1987) and group intuition (Rew 1986), but in the present context it is more related to identifying potential crises in patients before significant clinical changes are evident Benner (1984) asserts that perceptual awareness is central to good nursing judgement, and this begins with vague hunches and global assessments that initially bypass critical analysis It is claimed that expert nurses often describe their perceptual abilities using such phrases as 'gut feelings', a 'sense of uneasiness' or a 'feeling that things are not quite right', although Benner (1984) cautions,

> Expert nurses know that in all cases definitive evaluation of a patient's condition requires more than vague hunches, but through experience they have learned to allow their perceptions to lead to confirming evidence
>
> If nurses were disembodied computers or mechanical monitoring devices, they would have to wait for clear, explicit signals before identifying one singular feature of a problem Fortunately, however, expert human decision makers can get a gestalt of the situation and proceed to follow up on vague, subtle changes in the patient's condition with a confirmatory search aided by the whole health care team Experts dare not stop with vague hunches, but neither do they dare ignore those hunches that could lead to early identification of problems and the search for confirming evidence

Benner's (1982, 1984) examples of expert intuition therefore demonstrate acute awareness, that precedes clear evidence of clinical changes in the patient Benner & Tanner (1987) avoid any challenge for objective verification to support their hypothesis by claiming that intuition would be categorized as an art rather than a science and, as such, is unique, creative and cannot be taught (or measured) It is defined as 'Understanding without a rationale', and predicting the backlash from sceptical empiricists, Benner & Tanner (1987) readily admit that there is a reluctance to grant legitimacy to this approach in making clinical judgement, suggesting that parochial bigotry underpins a Western culture which demands a rational explanation of the world

This observation is supported by Cosier & Aplin (1982) who attribute scepticism of scientists to the belief that nature should be explicable in rational scientific terms However, Benner & Tanner (1987) dogmatically assert that intuition is a legitimate and essential aspect of clinical judgement Benner (1984) equates this perception with formulating an early hypothesis, and claims that Dreyfus & Dreyfus (1980) term this as a rapid grasp of the correct region of the problem If intuition is present, as is argued, the advantage of it is that it would 'buy time' for the nurse to act and, as Benner (1984) documents extensively, intervene on the behalf of the patient at a critical time

Benner & Tanner's (1987) anticipated fear of the collective nursing recoil from their introduction of intuition as a legitimate and essential aspect of clinical judgement is understandable Perhaps there is an unfortunate connotation with the concept of intuition, relating it to familial telepathy or mysticism, or an exclusively feminine trait Whatever feelings it evokes, it is a subjective and questionable entity and hence, until empirically and unequivocally validated, has limited applicability in a nursing profession which is attempting to develop a research base to support its actions

Role model

As part of the role of the expert is to act as a role model to student nurses and demonstrate excellence in clinical practice, it would be beneficial to others if the experts could explain their acute perceptiveness in critical situations Documented accounts of clinical excellence should be

available for emulation, but there may be some problem explaining clinical judgement that is attributed solely to intuition As Larkin *et al* (1980) suggest, admitting the reality of intuition is simply a prelude to demanding an explanation for it The examples of potential crises being identified by 'gut reaction' imply an emotive response to a recognized situation, but this does not explain how the potential crisis situation was identified initially

The anecdotes offered by Benner (1984) typically entail some assessment of a patient situation by the expert nurse The nature of the assessment is said to be intuitive as the nurse invariably explains her evaluation as based on something other than explicit overt evidence This aspect of intuition implies a perceptual involvement with a situation at this stage, no action is involved, the nurse perceives some cue (visual or auditory) that attracts her attention

Benner (1984) obliquely corroborates this inability of the expert to explain their inferences by referring to Dreyfus's chess player who made a move because it 'felt right' But what is described as 'intuition' in a chess player entails an evaluation of a situation in which the player opts to choose one move in preference to alternatives The analysis of the position of the chess pieces is involved and considered The player is not responding to a perceived anomaly, he is weighing up alternative moves The problem solving (intuition) involved with the chess player would be radically different from the perception (intuition) of the expert nurse

Westcott (1968) explains that 'intuition' has several meanings depending on the use of the term and the context used These definitions ranged from a philosophical interpretation of the experience of ultimate truth, to the psychological definition of intuition as inference Westcott (1968) offers a working definition of intuition

> intuition can be said to occur when an individual reaches a conclusion on the basis of less explicit information than is ordinarily required to reach that conclusion

Westcott (1968) points out that this definition is at a purely behavioural level and represents elements that are potentially measurable (Benner, favouring gestalt interpretations, may reject behavioural scenarios as being too simplistic) The concept of intuition as some psychic phenomenon as proposed by Agan (1987) is not considered There may be such an innate extra-sensory perceptive element that is possessed by some people, including nurses, but intuition as a paranormal faculty is not debated here Accordingly, 'intuition' can refer to either unexplained knowledge or an unexplained perceptual process 'Understanding without rationale' is more attributable to a cognitive process than a perception, and Dreyfus's chess player who made a move 'because it felt right' may be merely making a post-cognitive evaluation

INTUITION REDEFINED

One alternative explanation for 'crisis anticipation' worth considering is the feature-detection model of cognitive psychology As identified above, the proficient nurse, through experience, builds up a picture of expectations of events These expectations can be represented cognitively as scripts (Schank & Ableson 1977), causal scenarios (Tversky & Kahneman 1973) or schemata (Goodman 1980, de Jong & Fergusson-Hessler 1986) The central tenets underpinning the theories are that external events are related internally in some form There is, therefore, a generated set of interrelated expectations involved with the event With experience, the internal representation can be altered or modified but a core shall remain that can allow generalization of the event without specific elements being present

Aspects surrounding any event would therefore assume high or low relevance, and the presence or absence of these aspects would be noticed Goodman (1980) proposes that atypical and unexpected events which do not conform with schema expectations would receive increased attention Once noticed, these atypical features would also be retained longer with discriminative accuracy than typical or expected aspects

So, when a common scene is viewed, the appropriate action schema is activated and an episodic representation is formed Greater attention is paid to unexpected information In patient scenarios, the expert nurse, having extensive experience of a certain type of patient, has an internal representation of what to expect when viewing a patient scenario On noticing some incompatibility between the expected and the actual scene, she responds Such perceptual acuity would only develop following extensive experience in similar situations

Haber & Hershenson (1980) illustrate this concept

> When chess players were given a brief look at a chess game in progress, chess masters could easily remember the location of the 20 to 25 pieces on the board However, novices could place only 6 to 8 pieces correctly When pieces were placed on the board at random, neither master nor novice could remember more than 6 to 8 positions Chase and Simon (1973) investigated these differences and concluded that the immediate perceptual processes are more important to the chess master than logical deductive thought processes They suggest that the master was responding to learned patterns of perceptual

structure, such as pawn chains or particular types of clusters Visual properties like colour and spatial proximity may be important elements in these structures, but the overall configuration based upon the identity of particular pieces was most important The years of practice that are required to become a master involved the creation of these structures of expectancies so that the master no longer has to remember and keep track of each piece as if it were a separate and unrelated feature

A challenge

This cognitive approach is not presented as advocating the 'checklist', but to challenge the concept of an intuitive interpretation, or to redefine intuition in terms of cognitive models Benner & Tanner (1987) reject cognitive models of human judgement as being 'too narrowly prescriptive to cope with the ambiguity and fuzziness of real life situations' They dismiss the cognitive models only to replace them with Dreyfus's 'aspects of intuitive judgement' (pattern recognition, similarity recognition, commonsense understanding, skilled know-how, sense of salience, and deliberative rationality), yet it is questionable to what extent the Dreyfus model explicates perceptual acuity Of these aspects, as described by Benner & Tanner (1987), pattern recognition and similarity recognition refer to matching external events with internal representations Sense of saliance refers to organization of priorities Commonsense understanding and deliberative rationality are equated with interrelated expectations Skilled know-how refers to task performance It is dubious if Dreyfus's model offers any novel or superior interpretation of cognitive processing

In describing 'the perception of form', Haber & Hershenson (1980) indicate the difference between recognition, which describes a sense of familiarity, and identification which requires the production of a specific category name or label The examples of nurses' intuitions given by Benner (1984) tend to be ones of recognition (that there was something wrong) rather than identification (which would allow them to say what it was that was wrong), although the initial perception is inevitably followed up to diagnose the problem This leads to the basic theory of attention which focuses on the orienting reflex of the individual, when the internal model (expectation) is mismatched with the external event, the organism is orientated towards the scene Because this could mean either novelty or danger, then this is always accompanied by increased arousal ('gut feeling' could be a consequence of sympathetic stimulation of the autonomic nervous system)

This response precedes cognitive evaluation Attending to the perceived area of interest, the expert nurse investigates further for explanations to account for her concerns Anticipating crises and acting appropriately is within the capability of any experienced nurse who diligently attends to her patients Accurate diagnosis comes from repeated exposure to similar incidents which were successfully resolved, and sound clinical knowledge

CONCLUSION

As the expert nurse is held in the Benner model to be a paragon of excellence, and someone to be emulated, then an accurate description of expertise is required Moreover, for nurses who strive to achieve excellence, it is essential that the criteria defining excellence in practice are made explicit In the absence of such criteria, any model which attempts to describe selective aspects of practice, but neglects to identify the qualifications necessary for classification as an expert, fails to contribute positively to clinical development of career nurses

If the expert is to demonstrate standards of excellence, how should experts be identified? In order to utilize effectively the experts as preceptors, it is essential to provide some objective measurement of what constitutes expertise to satisfy the college of nursing Such a definition would extend far beyond the opinions of peers

Perceptual acuity

Descriptions of perceptual acuity in experienced nurses which lead to clinical intervention and effective patient care are attractive and desirable qualities that other nurses shall covet, but to present this ability as some esoteric talent available only to a few initiates is misleading and inaccurate After all, fellow patients are often capable of pointing out that there is 'something wrong' with some patient — are they experts? Benner's (1982, 1984) methodological approach attempted to demonstrate excellence in nursing, and negative incidents were not recorded The researchers did not attempt to falsify the hypothesis, and non-experts were not asked if they made 'intuitive' inferences that were later verified

To imply that insightful and attentive recognition of patients' needs derives from anything other than diligent observation, sound clinical knowledge and experience is denigrating to the majority of nurses In a climate of accountability, such explanations of the expert's perception, as being based on intuition, are unacceptable

Scientific knowledge

Why present the concept of 'intuition' at all? Is the term used solely to satisfy the adaptation of the Dreyfus model, or does it really feature as a valid method of situation analysis?

This paper suggest that intuition as described by Dreyfus & Dreyfus (1980) refers principally to decision making, but the main use of intuition as described by Benner's (1984) subjects refers to a perceptual process, and reference to cognitive psychology models of memory offer clear explanations more capable of accounting for 'intuitive' responses

If nursing is to become a research-based profession, nursing practice should be founded on scientific knowledge The procedures that nurses carry out shall require a foundation in empirical research Clinical assessment must be equally based on explicit criteria, and such criteria are not provided in the 'hunches' of Benner's experts

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References

Agan R D (1987) Intuitive knowing as a dimension of nursing *Advances in Nursing Science* **10**(1), 63–70

Bandura A (1965) Influence of models' reinforcement contingencies on the acquisition of imitative responses *Journal of Personality and Social Psychology* **1**, 589–595

Benner P (1982) From novice to expert *American Journal of Nursing*, March, 402–407

Benner P (1985) *From Novice to Expert, Excellence and Power in Clinical Nursing Practice* Addison-Wesley, Menlo Park, California

Benner P & Tanner C (1987) How expert nurses use intuition *American Journal of Nursing*, January, 23–31

Carlson L , Crawford N & Contrades S (1989) Nursing student novice to expert Benner's research applied to education *Journal of Nursing Education* **28**(4), 188–190

Cosier R A & Aplin J C (1982) Intuition and decision making some empirical evidence *Psychological Reports* **51**, 275–281

de Jong T & Fergusson-Hessler M G M (1986) Cognitive structures of good and poor novice problem solvers in physics *Journal of Educational Psychology* **78**(4), 279–288

Dreyfus H L (1987) Misrepresenting human intelligence In *Artifical Intelligence* (Born R ed), Croom Helm, Beckenham, Kent, pp 41–54

Dreyfus H L & Dreyfus S (1980) A five-stage model of the mental activities involved in directed skill acquisition Unpublished study, University of California, Berkeley

Gately E P (1992a) From novice to expert the use of intuitive knowledge as a basis for district nurse education *Nurse Education Today* **12**, 81–87

Gately E P (1992b) PREPP from novice to expert *British Journal of Nursing* **1**(2), 88–91

Goodman G S (1980) Picture memory how the action schema affects retention *Cognitive Psychology* **12**, 473–495

Haber R N & Hershenson M (1980) *The Psychology of Visual Perception* Holt Rhinehart and Winston, New York.

Kolodner J L (1984) Towards an understanding of the role of experience in the evolution from novice to expert In *Developments in Expert Systems* (Coombs M J ed), Academic Press, London, pp 95–116

Larkin J , McDermott J , Simon D P & Simon H A (1980) Expert and novice performance in solving physics problems *Science* **208**, 1335–1342

Meerabeau E (1992) Tacit nursing knowlege an untapped resource or a methodological headache? *Journal of Advanced Nursing* **17**, 108–112

Rew L (1986) Intuition concept analysis of a group phenomenon *Advances in Nursing Science* **8**(2), 21–28

Schank R & Ableson R (1977) *Scripts, Plans, Goals and Understanding* Erlbaum, Hillsdale, New Jersey

Tversky A & Kahnemann D (1973) Availability a heuristic for judging frequency and probabilty *Cognitive Psychology* **5**, 207–232

United Kingdom Central Council for Nursing, Midwifery and Health Visiting (1986) *Project 2000 A New Preparation for Practice* UKCC, London

United Kingdom Central Council for Nursing, Midwifery and Health Visiting (1990) *The Report of the Post-Registration Education and Practice Project* UKCC, London

Westcott M R (1968) *Toward a Contemporary Psychology of Intuition* Holt, Rhinehart and Winston, New York