Research paper

Creativity in Medical Learning: A direction-finding study of junior hospital doctors

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Contextualisation

The training of medical doctors is currently undergoing a period of development partly reflecting changing pressures within the medical world and partly changes in practice here and in Europe. Older patterns of training 'at the bedside' are giving way to more formal and skills orientated approaches. This paper raises the issue of where creativity and a questioning attitude sit in this training process and focuses on the extent to which medical trainers embody these characteristics.

Abstract*: In a questionnaire study of creativity, the author has assessed the teaching and clinical practice of medical teachers, as observed by their students. The study has taken some preliminary steps to assess the place of creativity in postgraduate medical learning in the United Kingdom. Junior doctors were asked to compare their 'best' teacher with their 'worst' utilising a semantic differential scale and questions derived from Torrance's definitions of creativity. The response rate was 81 (56.25%) of 144 junior hospital doctors, in whose view, 'best' teachers showed greater creative behaviour as evidenced by significantly higher creativity scores on the majority of parameters (p<0.0001).*

Introduction

In the UK, there have been recent, radical changes in the way in which postgraduate medical education (PGME) is undertaken. For example, and for the first time in many hundreds of years, the academic bodies responsible for the overseeing of such education, the Medical Royal Colleges, have produced curricula (Federation of Royal Colleges of Physicians, 2001). This development, together with the currently shortened period of registrar training and emphasis on skills acquisition, may run the risk of developing specialist training along the lines of a pure competency model, as criticised by Barnett (Barnett, 1994). This is not to say that competence is undesirable, but, in its pure form, such a model may entertain its own dangers, and care must always be taken to avoid a minimalist definition of training and to allow a more generous conception of curriculum.

Under pressure from the Department of Health, PGME has developed into a model more structured than heretofore (Calman, 1988; COPMeD, 2000). These developments, known sometimes as the 'Calman Changes', replace the former, long period of experiential learning 'by the bedside' with a shorter (4 years), more formalised, more didactic training, the completion of which enables the trainee to acquire a Certificate of Completion of Specialist Training. This pattern is very similar to the specialist training seen in Continental Europe which unison was one of the driving forces behind the change (Shrank, 2001). The rationale for this, in such an gifted and academically able group of learners is not entirely clear and the author notes that the recent changes have not commanded the unqualified support of all (Barber, 1997; Biggs, 2001; Dudley, 1999).

In over 20 years as a trainer of junior doctors, the author has been witness to these changes and noticed that this group of learners appreciates teachers who not only teach by example, but also (either by design, training, or intuition) demonstrate a questioning style that brings out

the best in their learners. This questioning style goes beyond a simple Socratic method, and utilises a paradigm that gradually trains the fledgling specialist constantly to question and be critical not only of the *practicum* but of their own application of it. In its fully-developed form, this expert *practicum* shows many features explicated by some medical authors (Dowie and Elstein, 1988) having many features of creativity.

Although it is feasible that, eventually, the 'new' type of specialist would develop this creativity, it may be taking a risk to assume that the new, formalised training will necessarily entrain all of the skills seen at the end of the 'old model' training. This paper outlines work undertaken as a preliminary exploration of the continuing need for creativity in good PGME. In short, it is a direction-finding study of how junior hospital doctors in one large English teaching hospital are able to equate creativity, both in their teachers' clinical and teaching practice, with 'good' teaching. In a way, it is predicated upon the artistry in practice much espoused by authors such as Schn who celebrate creativity in professional problem-solving, and Dowie and Elstein, as mentioned above. This is not to say that Schn's thesis is without its critics, particularly Eraut, who finds Schn lacking in sustained argument and that he is possibly searching not for examples of everyday practice but for 'an epistemology of creative practice.' (Eraut, 1994, p 143). However, this author feels that there must be a middle way between the free reign of creative practice and training and the pure competency model that is in danger of widespread adoption by the new Medical Standards Board.

Creativity

Creativity is sometimes known as lateral thinking, although, in fact, creativity may be a wider term, embracing more issues than in simple problem-solving (see below). Lateral thinking involves ways of structuring problem-solving and thinking that cut across boundaries, provoke movement, generate alternatives, challenge assumptions and suspend judgment (de Bono, 1977; 1992). Sequential and linear modes of thought are rejected (Brookfield, 1987) and there is a capacity for 'cognitive restructuring', for working on several ideas at once and testing multiple 'predicate hypotheses' (Henderson, 1984; Tennant, 1988). In a Gestalt fashion, flashes of insight are acquired after a number of trials (Eysenk and Keane, 1995). Schn has shown, many professionals consciously or unconsciously utilise similar creative cognitive ploys (Schn, 1991 **.(**Maslow and Claxton believe that creative, 'slow' modes of thinking are essential for learning in any sphere (Claxton, 1997; Maslow, 1971). Maudsley and Scrivens have gone further and recently suggested that the kind of thinking which this paper explores is necessary for professional problem-solving (Maudsley and Scrivens, 2000). Unfortunately they refer to creative thinking as 'critical thinking'; a term de Bono uses differently and rejects in his criticism of logical, sequential analysis. Maudsley and Scrivens believe that creativity is an important (although not necessarily self-sufficient) strategy in effective problem-solving, and therefore finds a place in medical education.

Torrance (1995) believes that in creative problem-solving, alternative hypotheses are generated, assumptions are challenged, there is innovation, analogy, a 'teasing-out' of the 'dominant idea', and brainstorming. He explains that in teaching, the creative confront ambiguities and uncertainties, use questioning to heighten anticipation and expectation, create awareness of a problem to be solved, make the strange familiar or the familiar strange and free learners from inhibiting mental sets, an idea also agreed by Bohm (1998) and Egan (1986).

Several junior doctors have suggested to me that their 'best' teacher showed creative thought in both problem-solving and in teaching. As a side effect of this (as it were) 'creative learning climates' seem to have been entrained. One told me:

> He never criticised… you would just fire off ideas at him and he, sort of, used these as a jumping board towards more… exchanges, yes. No matter how dim and slow

> you thought you were being, he never said you were wrong, he just encouraged you in all sorts of different ways to look at the problem.
>
> (Junior doctor, personal communication)

This creative activity has little to do with the major kinds of artistic creativity but more to do with the everyday existence of the teacher/practitioner. Maslow, in particular, is very keen to equate such creativity with the fully-developed, actualised person familiar to proponents of a learner-centred teaching approach (Maslow, 1970).

Unfortunately the large skills- and knowledge-base of medical practice often means that an assumption is made that the *teaching* of this *practicum* perforce must be predicated upon a similar 'techno-rationalist' approach that will be familiar to readers of Schn. There has been little if any work on alternative approaches in the medical educational literature and the recent *milieu*, post-Calman, would sit uneasily with any suggestion that creativity has any place. To this author, a vital question is, 'How far may the two approaches be utilised in tandem?', particularly since opinion and research in clinical problem-solving has elegantly championed the continued existence in medical practice of Schn's 'swampy lowlands' (Bendelow, 2001; Boreham, 1994; Dowie and Elstein, 1988). The issue may yet be wider. Barnett, for one, argues that professional practice is a wider concept than just problem-solving (Barnett, 1994) and this begs the question, 'How much is the whole issue of creativity an issue which concerns clinical, as well as teaching, practice?'.

Methods

I approached 144 house officers (HOs) in my own hospital trust who will have all graduated between one and four years previously. Utilising a postal questionnaire to study various aspects of creative practice and creative teaching using parameters derived from Torrance (1995), I studied both the teachers' creativity in clinical practice as well as their creativity as teachers since I have previously shown that the professional modelling inherent in practice observation is an important teaching modality in this setting (Talbot, 2000a, 2000b). House officers were chosen to represent a broad sweep of teaching experience yet be close enough to their undergraduate learning experience adequately to remember it.

The questions were derived from check lists utilised by Torrance to evaluate how examples of teaching conform to his 'Incubation Model', particularly within the broad categories or staged of, 1) heightening anticipation, 2) deepening expectation, and, 3) keeping it going (Torrance, *op cit*). Thus there are certain requirements of a teaching model to be satisfied before creativity may be said to have been engaged. These are:

1. States of consciousness other than the logical, wakeful state of consciousness must be activated at least for, brief, intermittent periods. [There are clear similarities here with Claxton's intuitive model (Claxton, 1997)].

2. Intellectual, volitional, and emotional functions must all be brought into play together.

3. There must be realistic encounters with a problem, intense absorption, commitment and heightened consciousness and awareness.

4. Opposite, contradictory or antithetical concepts, images or ideas must be confronted simultaneously.

5. Visual, kinetic, auditory and other sensory modes of thought must be brought into play.

(Torrance, 1995, p 222)

The questions chosen for the questionnaire reflected, therefore, these criteria, further elaborated upon by Torrance (*op cit*, p 217 *et seq*)

The subjects were asked to score various indices of creative thinking in their 'best' and their 'worst' teacher, either at the undergraduate or the postgraduate stage on a seven-point semantic differential scale (Appendix 2). They were assured of anonymity. They were asked their age, experience, sex and career aspiration. The latter was simplified into medical specialties, surgical specialties, general practice and 'Don't know' (Talbot, 1998). A pilot study suggested that the questions were all understandable. The subjects were not told specifically that this was a study concerning creativity, which at the least raised an ethical question. However, in an accompanying letter it was explained that the study was to discover more about good medical teaching and that the findings could potentially be used to better postgraduate medical education; both essentially true. In order, therefore, not to alert the subjects to the creativity 'angle' and thus bias the responses, there seems to be a utilitarian justification in this non-disclosure.

The parameters of creativity in collected responses were compared for the best and worst teacher by the X^2 test at 4-6 degrees of freedom. A comparison was made of the results by age, sex, experience and career aspiration. Results were analysed utilising SPSS™.

Results

Replies were received from 81 of the 144 house officers (56.25 %) of 1 – 10 (median 3) years experience. Forty-three (53.4%) of the 81 were female. The diagram (Appendix 1) is a representation of the sum of the responses comparing the creativity scores for best and worst teacher (BSUM, WSUM). As aggregates, I have simply represented these sums, rather than subjecting them to statistical comparison, but they suggest that the best teacher of the respondents scores much higher on summated creativity parameters than the worst teacher. However, as tables 1 and 2 show (Appendix 1), there *is* a significant difference between best and worst teachers, in each of the *itemised* scores on both *clinical problem-solving* (Table 1) and also on utilising creativity in *teaching* (Table 2). With the exception of one parameter in each category (which scored at a level $p=0.001$), the other questions scored at the highly significant level of $p<0.0001$. The less significant scores were to 1) "In problem solving, the best/worst teacher divided the problem up into novel ways which often lead to a solution.", and 2) "In teaching, the best/worst teacher used analogy not as a comparison but to stimulate thought."

There was no significant difference (by X^2) in the responses with regard to sex, experience or career aspiration.

Discussion

I believe that this study has provided preliminary evidence for the importance creativity in medical teaching. The sample return was modest, yet not unusual. In the best hands, the response rate may be only in the order of 60-65% (Abrahamson, 1979). Since junior hospital doctors tend to be an homogenous group, in terms of academic achievement, it may be that my findings are capable of generalisation to medical education generally. However, since this is a preliminary study, it would be disingenuous to believe this necessarily to be the case. In addition, I have taken no account of the difference in cognitive or learning style of the learners. Therefore, one may only present these findings as being representative of junior hospital doctors 'at this hospital'. Having said this, the case for this is not straightforward since most of the juniors will have been 'on rotation' to disparate units at various hospitals in this and other towns and will perforce have been attached to many consultants already. One still may only

present the results in the fashion of 'In *this* group of learners, *given these caveats*, there *seems* to be a higher representation of creativeness in better teachers' Not the least, the concept of creativity, by its very nature, can be a nebulous and ephemeral one to capture.

To the author, this point was brought home very clearly on sitting in on a colleague's teaching session. At the end, one was uplifted, one felt inadequate by comparison, and yet one could not *quite* grasp what it was that had made the experience so special. The nearest by which one could explicate the phenomenon (utilising an insufficient vocabulary) was that this teacher had used her *imagination*; yet one had a real sense that even so, this was not quite 'it'. Although clearly a charismatic teacher, her teaching session was suffused with *creativity*. In order, however, to be able to start to tease out the phenomenon (and also to be able to adjudge statistical significance between categories) criteria derived from Torrance were a starting point.

The findings might benefit from triangulation utilising alternative methods and also from the thick description (Gillham, 2000) and increased subtlety of qualitative techniques, although Silverman advises caution over such triangulation and allows us sometimes to 'celebrate the partiality' of our data (Silverman, 2000, p 99). In particular, one might be able to elaborate further on the conditions under which creativity might effectively be utilised. Does, for example, such an academically homogenous group indeed have different learning styles and expectations and what might these implications be for the formulation of a creative response? And, are there really no variations in these phenomena, along the lines of gender, ethnicity and career aspiration or would a differently-designed study have been more sensitive to these issues? Further, what constitutes creative learning here, rather than creative teaching and, are creative teachers necessarily charismatic and does that factor have an influence on the findings?

As I relied upon the respondents' memory in order to allot scores to the best and the worst teacher, there may have been an element of 'type I' bias (that is, an increased likelihood of 'false positive' errors): the results will require interpretation in this light (Dyer, 1995). It is conceivable that there may have been an element of 'wishful thinking' or 'looking at the world through rose-coloured spectacles' in the respondents' scoring. In medicine, the better teacher acquires over the years an almost mythical status of enhanced personal significance: the respondents could have possibly 'picked up' on the purpose of the questions used and, recognising that the better teacher should score higher, and the worst teacher, lower, they might have over-emphasised the good qualities of their 'favourite'. Also, there is in real life a continuum between the best and the worst. Further, even though I have found a statistical difference in the use of creativity by each type of teacher, there are problems in awarding this creativity a causal position in the excellence or otherwise of the teacher: creativity may not be the only causal effect of good teaching; it may only be a part of a 'causal network' for as Hage and Meeker say:

> The search backward for more ultimate causes and forward for more intervening mechanisms…can be never-ending. In this sense, the construction of a causal theory is always open-ended.
>
> (Hage and Meeker, 1993, p 84)

Conclusion

In spite of these reservations, however, I believe that there are dimensions to medical learning that transcend a didactic or rigorously-structured competency model; this study adds some weight to this belief. At the least, this snapshot of the situation serves mainly to situate my thoughts as a practising teacher and education manager, and provides a direction for further study.

I suspect that modelling of the creative thinking of their seniors is a potent tool in the juniors' learning, but can one take it further? Some aver that creative thinking is innate and cannot be taught (Prince, 1992), yet Torrance (who has probably done more work on creativity in learning than most) suggests that it can (Torrance, *op cit*). With methodological caveats concerning generalisability, some preliminary evidence is presented that creativity, a parameter infrequently referred to in medical learning, is important. This seems to be the case for approximately sixty per cent junior doctors in this teaching hospital. These findings may be of universal applicability, but further work should afford greater insights into this process.

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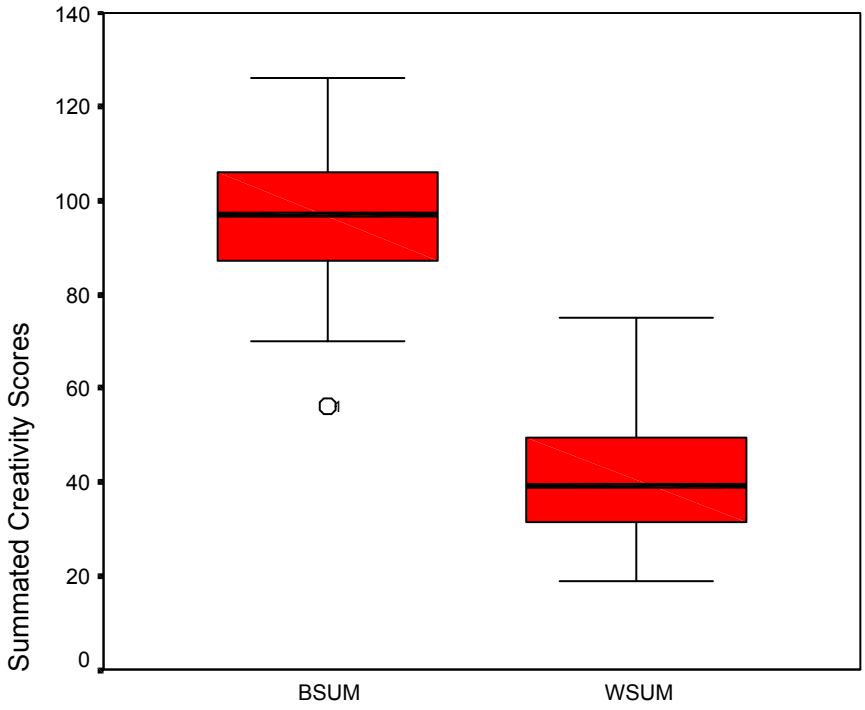
Appendix 1

Diagram and Tables

Diagram to illustrate summated creativity scores

(WSUM=sum of scores of worst teacher; BSUM=sum of scores of worst teacher)



	Best teacher		Worst teacher			
					Chi -sq	p value
	Mean	SD	Mean	SD		
Alt hypotheses	5.28	1.22	2.35	1.24	60.28	<0.0001
Challenging	5.64	1.05	2.27	1.12	28.55	<0.0001
Innovation	5.32	1.36	2.24	1.33	51.28	<0.0001
Dominant	6	0.91	2.3	1.27	38.6	<0.0001
Brainstorm	5.21	1.32	2.35	1.43	36.9	<0.0001
Analogy	5.3	1.29	2.21	1.32	63	<0.0001
Novel	5.03	1.05	1.94	1.43	43.15	0.001

SD=standard deviation

Table 1: Best/worst teacher. Creativity scores: problem-solving

	Best teacher		Worst teacher			
					Chi -sq	p value
	Mean	SD	Mean	SD		
Ambiguity	5.34	1.27	2.29	1.26	69.2	<0.0001
Anticipation	5.65	1.02	2.36	1.69	36.65	<0.0001
Awareness	5.62	1.1	2.18	1.07	67.46	<0.0001
Building	5.99	0.81	2.27	1.19	45.53	<0.0001
Curiosity	6.12	0.82	1.94	1.15	60.8	<0.0001
Strangeness	5.06	1.31	2.23	1.29	49.08	<0.0001
Mental sets	4.6	1.47	1.87	0.98	50	<0.0001
Viewpoints	5.03	1.3	2.04	1.02	51.183	<0.0001
Provocation	5.03	1.18	2.11	1.14	32.02	<0.0001
Clues	5.01	1.28	2.23	1.38	45.02	<0.0001
Beyond	5.18	1.26	2.04	1.28	83.88	<0.0001
Analogy	4.7	1.3	1.84	0.96	20.82	0.001

SD=standard deviation

Table 2: Best/worst teacher. Creativity scores: teaching

Appendix 2

Creativity Questionnaire

Section A: Background data

1) My grade…….. My age……. Years qualified……..

2) Career aspiration (include general practice)……..
[Don't know (please tick)….]

3) My gender…….

Section B: the best teacher

(Please score your responses by encircling a number along the scale)

	Not at all						Very much
1) in problem-solving:							
was good at generating alternative hypotheses	1	2	3	4	5	6	7
was good at challenging assumptions	1	2	3	4	5	6	7
was good at innovation	1	2	3	4	5	6	7
was good at 'teasing-out' the crux of the problem [or the 'dominant idea']	1	2	3	4	5	6	7
was good at brainstorming	1	2	3	4	5	6	7
was good at analogy	1	2	3	4	5	6	7
often divided the problem up into novel ways which often lead to a solution	1	2	3	4	5	6	7
2) in teaching me:							
would often confront ambiguities and uncertainties	1	2	3	4	5	6	7
used questioning to heighten anticipation and expectation	1	2	3	4	5	6	7
would create awareness of a problem to be solved	1	2	3	4	5	6	7
built on my existing knowledge	1	2	3	4	5	6	7

stimulated my curiosity	1	2	3	4	5	6	7
made the strange familiar or the familiar strange	1	2	3	4	5	6	7
freed me from inhibiting mental sets	1	2	3	4	5	6	7
looked at information from different viewpoints	1	2	3	4	5	6	7
questioned me provocatively to think in different ways	1	2	3	4	5	6	7
provided only enough queues to give direction	1	2	3	4	5	6	7
took me to the next step beyond what was known	1	2	3	4	5	6	7
used analogy not as a comparison but to stimulate thought	1	2	3	4	5	6	7

Section C: the worst teacher

(Please score your responses by encircling a number along the scale)

	Not at all						Very much
1) in problem-solving:							
was good at generating alternative hypotheses	1	2	3	4	5	6	7
was good at challenging assumption	1	2	3	4	5	6	7
was good at innovation	1	2	3	4	5	6	7
was good at 'teasing-out' the crux of the problem [or the 'dominant idea']	1	2	3	4	5	6	7
was good at brainstorming	1	2	3	4	5	6	7
was good at analogy	1	2	3	4	5	6	7
often divided the problem up into novel ways which often lead to a solution	1	2	3	4	5	6	7
2) in teaching me:							
would often confront ambiguities and uncertainties	1	2	3	4	5	6	7

used questioning to heighten anticipation and expectation	1	2	3	4	5	6	7
would create awareness of a problem to be solved	1	2	3	4	5	6	7
built on my existing knowledge	1	2	3	4	5	6	7
stimulated my curiosity	1	2	3	4	5	6	7
made the strange familiar or the familiar strange	1	2	3	4	5	6	7
freed me from inhibiting mental sets	1	2	3	4	5	6	7
looked at information from different viewpoints	1	2	3	4	5	6	7
questioned me provocatively to think in different ways	1	2	3	4	5	6	7
provided only enough queues to give direction	1	2	3	4	5	6	7
took the next step beyond what was known	1	2	3	4	5	6	7
used analogy not as a comparison but to stimulate thought	1	2	3	4	5	6	7