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PERCEPTIONS OF INTERNS PERFORMANCE: A COMPARISON BETWEEN A PROBLEM BASED AND A CONVENTIONAL CURRICULUM
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ABSTRACT

Background: **Medical education is changing. Increasingly, there are calls for major curriculum reform based on premises of what might improve undergraduate medical education. Against this background, innovative methods of teaching and learning have emerged. Problem-based and student-centered approaches are increasingly being adopted with less reliance on the conventional didactic lecture forums.**
Objective: **To compare the effects of two different instructional methods (problem based learning and conventional teaching), on the professional competencies of pre-registration house officers (PRHOs) or interns, as perceived by the graduates themselves and their clinical supervisors.**
Design: **A cross-sectional survey design was used to identify a causal relationship between the method of instruction and ratings on outcome for two different groups.**
Setting: **Selected medical board-accredited internship training centres throughout the country.**
Subjects: **Interns from Moi and Nairobi Universities who qualified in the academic year 2002/2003 and thus completed their internship in August/September 2004. For the supervisors, they needed to have supervised at least four groups of interns.**
Results: **Graduates from Moi University perceived themselves to be more prepared for two of the nineteen broad competencies and six of the twelve specific skills listed. The clinical supervisors perceived Moi graduates as better prepared in four of the broad competencies. They found no significant differences for any of the specific skills.**
Conclusion: **Overall, the study showed that Moi University graduates, felt and are perceived as better prepared for their role as interns. The differences in curriculum contribute significantly to these findings.**

INTRODUCTION

During the last decade, recommendations on medical education have been published that have strongly influenced undergraduate curriculum development. Emphasis is on a rigorously defined and integrated core curriculum, getting rid of the traditional discrimination between the preclinical and clinical parts of the undergraduate course. The core must define the needed range of practical skills, and should be presented in ways that encourage student-centred learning, allow indepth study in areas of particular interest, and provide them with insights into the scientific method and the discipline of research.

The concept of Problem based learning (PBL) is presented as a useful instructional alternative to conventional approaches. It has been suggested that it may solve some pertinent problems of medical education such as, the irrelevance of some knowledge which students have to acquire in conventional curricula, the lack of integration of subject matter from different medical disciplines, and the need for continuing education after graduation (1,2).

What is PBL and what is conventional instruction? PBL at its most fundamental level is an instructional method characterised by the use of patient problems as a context for students to learn problem-solving skills and acquire knowledge about the basic and clinical sciences. "The basic outline of the PBL process is: encountering the problem first, problem solving with clinical reasoning skills and identifying learning needs in an interactive process, self-study, applying newly gained knowledge to the problem, and summarising what has been learned"(3). On the other hand, conventional instruction for the most part, is marked by instructor-provided learning objectives and assignments, large-group lectures, structured laboratory experiences and periodic tests of achievement. Where outcomes of entire medical curricula are compared; the conventional

curriculum tends to be characterised by a 1-2 year basic science or pre-clinical segment followed by a period of clinical clerkships and then various amounts of elective clinical experiences. However, there is little information available on the effects of problem based undergraduate curricula on doctors and their performances after graduation. Even less material is available on comparisons between practicing doctors trained on innovative programmes and those trained conventionally. Research results, (1-9), indicate that graduates from innovative curricula perform well during their pre-registration period and residencies when compared to graduates of conventional programmes. Specifically, they tend to perform well in areas that are considered typical features of PBL such as critical thinking, patient communication, teamwork, clinical-decision making, knowledge acquisition and self directed learning. The differences were mainly seen when graduates rated themselves or compared themselves to others, (1,8-10), whereas ratings by supervisors showed fewer or no difference in these areas (10).

In Kenya, there are currently two medical schools. Nairobi University follows the conventional approach, while Moi University uses PBL. Selection to the two institutions is usually random, following attainment of certain nationally determined grades after high school and thus no prior differences in the two student populations at the beginning of medical school.

Following the undergraduate course, there is a pre-registration year, or internship; a period of service providing general experience under supervision prior to the acquisition of full registration. It is seen as an extension of the undergraduate course, with a significant educational component and with gradually increasing responsibility for patient care. Interns engage in clinical practice, albeit under supervision, and both their patients and employers are entitled to assume that their provisional registration, granted to them by the Medical Practitioners and Dentist's Board (MPDB), attests to satisfactory completion of an approved undergraduate course and, by the time of qualification, to a level of competence commensurate with their responsibilities as house officers.

Internship is usually carried out in any of the nine provincial hospitals and several accredited mission hospitals. The graduates rotate in four main departments, surgery, internal medicine, paediatrics and obstetrics and gynaecology. Supervision takes place at the level of these specialties.

Broad objective: This study aimed at examining the effect of the two different instructional approaches on the perceptions of professional competence of interns and their clinical supervisors.

Specific objectives

(i) How do perceptions of competence of interns from Moi University compare with those of their colleagues from Iniversity of Nairobi?
(ii) What are the supervisor's general ratings of graduates from the two institutions?
(iii) What are the perceptions of the graduates from the two institutions on their preparedness to work as interns in the various hospitals to which they are posted?
(iv) How does the instructional approach contribute to the observed differences?

MATERIALS AND METHODS

Design: This was a group-comparison (ex-post facto) study. A cross-sectional survey design was used to identify association between educational approach, and perceptions on outcome.

Subjects: A convenience sample of all graduates of academic year 2002/2003 from the two institutions and thus completing their internship in August/September 2004 and their supervisors. Those interns trained elsewhere or from different academic years were excluded. A list of the interns was obtained from the Ministry of Health and an attempt made to reach all of them.

For the supervisors, they needed to have supervised for at least four years. This period was considered long enough for them to be able to have a good general impression on the intern performance from the two universities. All the supervisors were conventionally trained.

Settings: Nine hospitals in the country were visited in September and October, 2004. The hospitals chosen were those with specialists in all the areas where the interns rotate. They were mainly provincial hospitals with comparative workloads and facilities except for Kenyatta National Hospital which is a national referral centre with better facilities and more staff. Approval to do the research was obtained from Moi University Centre Institutional Research and Ethics Committee and also the Ministry of Health and a supporting letter of introduction and request for participation issued.

Data collection: A self-administered questionnaire was used. After a verbal introduction and brief discussion, the questionnaire was left with the respondents and collected the following day. All respondents available and meeting the inclusion criteria were approached. For those absent or could not fill the questionnaire within this time, a self-addressed envelope with the questionnaire was left behind for mailing.

The questionnaire was designed to measure perceptions of levels of preparedness for their roles as interns using a list of broad areas of competence and skills developed using the General Medical Council's 'The New Doctor', and The MPDB core curriculum as a guide. They were used as the basis for defining the competencies required of a medical school graduate rather than the individual curricula of the two institutions as they may have biased the results. This also enabled us to evaluate the two approaches against national recommendations. 'The New Doctor' lists broad areas of competence, e.g. "communicating effectively", as well as specific skills e.g. "suturing", which in turn represent composites of knowledge, skills and attitudes that should be built on in general clinical training. An almost similar questionnaire has been used by Jones *et al* (11) and found to have good content validity.

The result was a questionnaire of 34 questions, in two sections. Answers were rated on a five point Likert type scale, with 'very well prepared/competent' and 'not at all prepared/competent' as the range; the mid-point label was 'quite well prepared/competent'. A similar questionnaire was sent out to the supervisors.

Supervisors were asked to respond on the basis of a general perception of graduates rather than on an individual. They compared the two instructional approaches based on their ratings of graduate performances. Where they felt unable to rate, they were asked to leave the item blank.

Data analysis: SPSS Statistical package for windows version 10 was used with raw scores on various aspects of competencies summed up and means used for comparison. T-test for independent sample means was used to determine any significant differences between the two groups of interns and the two institutions. Due to different wordings of questions for the interns and supervisors, it was inappropriate to test for significant differences between the two groups.

RESULTS

Graduates: The response from Nairobi graduates was 44/70 (63%), and 32/38 (84%), for the Moi graduates. About 30 graduates were missing because they could not be reached or did not meet the criteria.

Tables 1 and 2 show comparative data for graduate responses to how well they felt prepared in broad areas of competence and the preparedness for performing specific skills. Statistical significance was set at $P<0.05$. PBL graduates scored better in two of the broad competencies, and in six of the specific skills.

Table 1

Graduates mean scores on broad competencies. "How well did the course prepare you for.....?"

Item	Moi graduates (n=32)		Nairobi graduates (n=44)		P-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Possession of general academic knowledge	4.03	0.595	3.98	0.628	0.706
Possession of profession relevant knowledge	4.03	0.740	3.86	0.734	0.331
Understanding the principles of evidence based medicine	3.94	0.716	3.66	1.033	0.169
Understanding the disease process i.e. linking basic and clinical sciences	4.06	0.801	4.11	0.689	0.766
Understanding the relationship between primary and social care and hospital care	3.78	1.157	3.55	0.926	0.327
Research activities, including data collection and analysis	3.78	1.184	2.57	0.974	0.000
History taking	4.50	0.508	4.55	0.548	0.714
Physical examination, selection, and interpretation of diagnosis tests	4.38	1.008	4.41	0.693	0.862

Making use of laboratory and other diagnostic services	4.09	0.777	4.18	0.724	0.613
Diagnosis, decision-making and the provision of treatment	4.19	0.738	4.30	0.632	0.495
Communicating effectively	4.25	0.672	4.20	0.734	0.783
Developing appropriate attitudes towards personal health and well-being	3.97	0.861	3.89	0.970	0.703
Recognition of the social and emotional factors in illness and treatment	3.91	0.818	3.86	.734	0.812
Being aware of own limitations and assets	3.97	0.647	3.93	0.873	0.833
Working in a team	4.13	1.008	4.05	0.888	0.717
Being aware of legal and ethical issues	3.66	0.90;2	3.16	1.140	0.045
Using opportunities for disease prevention and health promotion	3.63	0.907	4.27	0.920	0.550
Efficiency and time management	3.81	0.780	3.75	1.059	0.778
Use of and keeping medical records	3.25	11.078	3.36	0.967	0.631

Table 2

Graduates mean scores on specific skills. "How well did the course provide you with a competence in…?"

Item	Moi graduates (n=32)		Nairobi graduates (n=44)		P-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Venepuncture	4.75	0.440	4.48	0.762	0.053
Basic CPR	3.66	0.787	3.20	1.002	0.038
Urinary catheterization	4.75	0.440	4.41	0.948	0.040
Suturing	4.69	0.535	4.16	1.098	0.007
Nursing skills e.g. NG-tube insertion, oxygen therapy	4.59	0.756	4.05	0.987	0.010
Management of labour	4.25	0.718	3.95	0.888	0.126
Side laboratory procedures	4.13	0.922	2.50	1.023	0.000
Performing an ECG	3.68	1.137	2.20	1.047	0.000
Lumbar puncture	4.47	0.718	4.14	0.905	0.089
Ascitic taps	4.63	0.554	4.32	0.857	0.080
Calculating accurate drug doses	4.34	0.827	4.20	0.734	0.442
Writing a prescription	4.50	0.762	4.41	0.726	0.599

Supervisors: A total of 111 supervisors met the inclusion criteria. Sixty five questionnaires were received back, a response rate of 59%. Among those who did not respond were those who found difficulty in identifying graduates from the two different schools and also those who were away. A few did not respond because they thought they would be biased.

PBL graduates scored better in four of the nineteen listed broad competencies (Table 3). There were no significant differences for any of the specific skills (Table 4).

Table 3

Supervisors mean scores on broad competencies. "Please rate the Nairobi/Moi University interns on their competence in the following ... ?"

Item	Moi graduates			Nairobi graduates			P-value
	No.	Mean	Std. Deviation	No.	Mean	Std. Deviation	
Possession of general academic knowledge	64	3.38	0.678	60	3.40	0.643	0.834
Possession of profession relevant knowledge	64	3.27	0.597	60	3.27	0.578	0.992
Understanding the principles of evidence based medicine	63	3.22	.771	58	3.07	0.697	0.255
Understanding the disease process i.e. linking basic and clinical sciences	63	3.21	0.722	60	3.23	0.673	0.831
Understanding the relationship between primary and social and hospital care	61	3.44	0.786	56	2.71	0.680	0.000
Research activities, including data collection and analysis	43	2.98	1058	43	2.63	0.926	0.107
History taking	63	3.52	0.840	56	3.39	0.755	0.375
Physical examination, selection and interpretation of diagnostic services	62	3.27	0.705	58	3.43	0.624	0.201
Making use of laboratory and other diagnostic services	63	3.17	0.636	60	3.18	0.676	0.941
Diagnosis, decision-making and the provision of treatment	63	3.13	0.707	60	3.25	0.680	0.328
Communicating effectively	63	3.52	0.877	60	3.27	0.660	0.070
Developing appropriate attitudes towards personal health and well-being	58	3.43	0.840	54	3.06	0.738	0.013
Recognition of the social and emotional factors in illness and treatment	61	3.13	0.922	54	2.85	0.627	0.058
Being aware of own limitations and assets	61	3.13	0.785	56	2.91	0.721	0.117
Working in a team	63	3.65	0.845	60	2.97	0.843	0.000
Being aware of legal and ethical issues	57	2.82	0.928	57	2.63	0.771	0.230
Using opportunities for disease prevention and health promotion	55	3.02	0.952	55	2.73	0.870	0.097
Efficiency and time management	61	3.13	0.903	58	2.76	0.779	0.018
Use of and keeping medical records	58	2.78	0.879	59	2.86	0.681	0.544

Table 4
Supervisors mean scores on specific skills. "Please rate the Nairobi/Moi University interns on their competence in the following ... ?"

Item	Moi graduates			Nairobi graduates			P-value
	No.	Mean	Std. Deviation	No.	Mean	Std. Deviation	
Venepuncture	63	3.76	0.756	58	3.67	0.659	0.491
Basic CPR	53	2.98	0.772	49	3.06	0.747	0.596
Urinary catheterization	54	3.52	0.795	51	3.51	0.731	0.954
Suturing	48	3.38	0.733	42	3.40	0.627	0.828
Nursing skills e.g. NG-tube insertion	47	3.23	1.026	44	3.07	0.900	0.416
Management of labour	22	3.23	0.685	21	3.10	0.625	0.513
Side laboratory procedures	30	2.47	1.167	30	2.57	0.817	0.702
Performing an ECG	23	2.13	1.014	25	2.08	0.759	0.845
Lumbar puncture	36	3.06	1.068	39	3.21	0.923	0.517
Ascitic taps	40	3.40	0.928	40	3.38	0.774	0.896
Calculating accurate drug doses	58	3.12	0.651	50	3.24	0.744	0.376
Writing a prescription	63	3.30	0.891	55	3.31	0.635	0.959

On the responses to the open-ended question 'How well did your training prepare you for work as an intern/ how well did you find the graduate prepared for work as an intern.....' All the Moi graduates felt they were well/adequately prepared while only three (6.8%), of the Nairobi university graduates felt they were not well prepared. Five supervisors (7.7%) felt the Moi graduates were not well prepared in comparison to 13 (20.3%), for the Nairobi graduates.

On the question, 'in what areas did you feel particularly well prepared/In what areas did you find the interns particularly well prepared ...' The answers from the graduates were variable with no common identifiable areas of difference, but the supervisors found the Moi graduates having a much better attitude, well disciplined and responsible, interactive with good communication skills, willing to learn and much more responsive to teamwork. In comparison, the Nairobi graduates were noted to have a poor attitude, lacking in responsibility and in some cases indiscipline. They were perceived as not good learners and were lacking in teamwork skills. This was better reflected in the third open-ended question, 'In what areas did you find the graduate particularly not well prepared' ... where a majority of the respondents reflected the issues of indiscipline, bad attitude, lack of teamwork and communication skills in many of the Nairobi university graduates.

DISCUSSION

Results from the graduates tended to favour Moi university graduates with significant differences in two broad areas of competence and six specific skills. The results from the supervisors were similar for the two universities on specific skills, but supportive of Moi in four broad areas of competence.

The measurement of outcomes of undergraduate medical education raises specific methodological issues. This study attempts to measure perceptions of the preparedness of graduates and compare those perceptions across competencies. It picked a particular point in their career at which to collect the data. Differences in outcomes may be more or less apparent at a later stage in their career and so we do not have a true picture of the long -term effects of either approach. The responses could also have been influenced by the confounding effects of shared learning experiences of the two groups such as the presence of resident training, types of patient cases seen, availability of resources and learning materials, number of students, etc. All these could translate into different learning experiences and impact heavily on the scores on the various aspects of knowledge and skills. In addition many relevant competencies such as teamwork skills are difficult to measure directly and may require extended observation periods.

Also, in assessment, supervisors base their ratings on very recent experiences and interactions with the trainee, so they were probably basing their ratings on their house officers at that time. This may not give a true picture of the intended question. Supervisors tend to be more lenient in their ratings than trainees and there is a tendency to rate on overall impression of a graduate rather than specific aspects of performance (12). In addition, they may not have seen the interns performing certain skills or demonstrating certain broad competencies. In such cases, they tend to rate at the mid-point. Knowledge of innovative educational methods or the lack of it may also influence the supervisor view on assessment of certain competencies.

Many of the differences in favour of the Moi University graduates may be attributed to the differences in educational methods and instructional activities associated with PBL. The emphasis on group work, the dynamics of the tutorial process and the holistic approach to medical care and learning in a community setting as well as integrating this with hospital experiences could all be linked with the higher score on the items 'working in a team' and understanding the relationship between primary and social care and hospital care; and developing appropriate attitudes towards personal health and well being. A study in Sweden (2), rated PBL graduates higher in cooperation and inter-personal skills and others in McMaster (12) and Maastricht (7), rated them similarly on dealing with social and emotional problems and also behavioural science information. The PBL course also puts a lot of emphasis on research and thus possibly the higher rating. Similar results were reported McMaster (12). Another area of emphasis is in legal and ethical issues forming a course of its own in the final year of undergraduate training at Moi University.

The supervisors also perceived the Moi graduates as better on efficiency and time management, a finding that can be attributed to the elements of the course that encourage independent learning skills and the ability to organise their own learning environment with minimal supervision.

On specific skills, the findings from the supervisors could be attributed to the fact that most of the time, they do not actually observe the graduates performing these skills and thus a probable tendency to rate at mid-point. For the graduates however, a lot of contextual issues may come into play. The larger number of students at Nairobi University, and the presence of resident training, could result in fewer opportunities to practice procedural skills and thus the resulting difference. In addition, the learning experiences in Moi, such as periods of attachment to district hospitals where the students tend to have a 'free hand' in practicing certain procedural skills could also have played a role.

The responses from the open-ended questions were also in favour of the Moi graduates especially in the areas of attitude, teamwork, communication and interactive skills. This compares well with the findings in literature (2), and also emphasizes the theoretical underpinnings of PBL. However in the other areas such as knowledge and clinical skills, there were no obvious differences, as has been shown before (13).

Overall, the graduates of Moi University who participated in this study appeared to feel more prepared for internship than those from Nairobi University and the supervisors in the selected hospitals felt the same. There is a possibility that this is due to the different methods of instruction that they were exposed to but this needs to be subjected to further study. The research, focused on perceptions and not actual performance. It also did not address the issue of what the underlying theoretical foundations of PBL or conventional approach might be. Rather it seeks to compare them in terms of defined end-points. Research is needed that compares the outcomes of PBL and a conventional curriculum, with outcomes measured by the actual performance of students on a number of different tests. There is no 'gold standard' to serve as a definitive outcome measure. Over time, the approaches tend to blend and any initial differences may fade off. The period over which a curriculum affects student outcomes is long and extraneous variables can influence the results.

In conclusion, even if knowledge and clinical skills are not improved by PBL, the enhanced work environment that promotes collegial interaction and the increased likelihood to engage in lifelong learning make PBL a worthwhile goal.

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