Importance of Transferable Skills in Pharmacology

P. RAVI SHANKAR[a,*], PRANAYA MISHRA[a], NAGESH SHENOY[a] and PRAVEEN PARTHA[b]

[a]*Department of Pharmacology, Manipal College of Medical Sciences, P.O. Box 155, Deep Heights, Pokhara, Nepal;* [b]*Department of Medicine, Manipal College of Medical Sciences, P.O. Box 155, Deep Heights, Pokhara, Nepal*

As self-directed learning becomes more important in the field of pharmacology, so, too, are "transferable skills." In this study, the attitudes of second year medical undergraduates towards transferable skills in pharmacology were assessed. Differences due to gender, nationality and medium of instruction were investigated. A survey was conducted with the help of a self-administered questionnaire asking the students to rate, first, the importance of the particular transferable skill, second, their own ability in these skills and, third, the effect of integrated teaching. Students were of the opinion that transferable skills were very important in pharmacology. Female students gave a higher rating to the importance of drugs and communication skills than males. The Indian students rated their problem solving skills higher than the other defined demographic groups. Finally, students had a high level of confidence in their own skills. These results suggest that students are well equipped to succeed in the revised curriculum of Kathmandu University, Nepal, which will place a greater emphasis on self-directed learning in the future.

Keywords: Learning attitudes; Educational measurement; Learning; Medical education; Nationality factors; Gender

INTRODUCTION

Transferable skills are those skills which are important both in the pursuit of undergraduate medical education programmes and for the continued process of learning throughout medical careers. These skills are becoming increasingly important in the context of an increased emphasis on self-directed learning. In pharmacology and pharmacotherapeutics, students should be able to solve simple problems in therapeutics, prescribe appropriate drugs for a disease condition and deliver drug-related and disease-related information in a meaningful way to the patient.

Previous studies (Furlanut, 1998; Vlahovic *et al.*, 1998) have shown, however, that a majority of respondents considered the pharmacology teaching they received to be mainly theoretical. In Kathmandu University, Nepal, the seven basic science subjects (anatomy, physiology, biochemistry, pathology, microbiology, pharmacology and community medicine) are covered in the first two years of the MBBS programme in a system-wide, longitudinal integration. Yet the revised curriculum at Kathmandu University suggests changes in the teaching of undergraduate medical students. In keeping with global trends, there is a proposed reduction in the factual content of medical courses and lecture-based teaching and a greater emphasis on problem-based curricula and problem-based learning, PBL (Bligh *et al.*, 2000; Miflin *et al.*, 2000).

In the Manipal College of Medical Sciences, Pokhara, Nepal (affiliated with Kathmandu University), the teaching of pharmacology is by both didactic lectures and problem solving. To begin, the students are given problems related to general pharmacology (pharmacokinetics, pharmacodynamics and their clinical application). Subsequently, problems related to the covered system are given. The importance of pharmacological principles in patient management is emphasized. There is an increased emphasis on self-directed learning and problem solving, in which the faculty of the Department of Pharmacology works in close cooperation with the other basic science and clinical faculty to facilitate learning.

There is now a proposal for changing the examination pattern. The students will be given

*Corresponding author. E-mail: pathiyilravi@hotmail.com; pathiyilravi@rediffmail.com

a case related to the system they had covered in the preceding fortnight. There will be questions related to the case from all the basic science subjects for the students to answer. An increased contact with computers and an increased emphasis on information skills from the first day of the course are other features of the revised curriculum.

A PBL class consists of about 15 students. These "problem-based" learning sessions are one and a half hours in duration. The students are given problems at the beginning of the session which they solve on their own, making use of the college library. After an hour, the preceptor discusses the problems and reviews salient points related to medical practice in the discussion.

In a study in which problem-based and conventional curricula were compared, PBL-group students reported significantly more positive attitudes towards their curricula and towards their learning environment (Kaufman and Mann, 1996). However, there have been reports of gender differences in the perception of skills and personal attributes in recent medical and science graduates (Nabi and Bagley, 1998; Clack and Head, 1999). Similar gender differences have also been reported in medical undergraduates (Whittle and Eaton, 2001). These differences may affect the performance of male and female students in curricula that place a greater emphasis on self-directed learning.

At the Manipal College of Medical Sciences, there are students from Nepal, India, Sri Lanka and also non-resident Indians. These students come from diverse cultural, socioeconomic and educational backgrounds. Any nationality or educational background differences in students' perceptions of transferable skills may additionally affect their performance.

The aims of this study are to

1. Obtain information on how important the second year undergraduates considered transferable skills in pharmacology, their own ability in these skills and the impact of integrated teaching on students' skill development and
2. Investigate any influence of gender, nationality and medium of instruction on these attitudes at the school.

METHOD

Setting

The study was conducted in the Department of Pharmacology at the Manipal College of Medical Sciences. At Manipal, pharmacology is taught over the first two years of the four-and-one-half-year undergraduate course. The course is followed by a one-year period of a compulsory, rotating internship. The college is attached to the Manipal Teaching Hospital, a 750-bedded hospital for clinical teaching.

Study Design

A cross-sectional survey was conducted on second-year undergraduate medical students.

Study Population

All the second year medical students (a batch of 96) were requested to participate in the study. Seventy of them agreed. Second year students were chosen for the study because they had completed the major part of the two-year course in pharmacology. They had also partly applied their knowledge in a clinical setting during their hospital visits.

Data Collection

A self-administered questionnaire, covering 12 important, transferable skills in pharmacology, was given to the students. The transferable skills were grouped into three categories: problem solving, selection of drugs and prescription writing and communication skills (Table I). The skills included in the questionnaire were important for the successful completion of the undergraduate programme in pharmacology and for proper application of pharmacotherapeutic principles in future practice. Students were not told that the results would be analyzed for gender, nationality and medium of instruction differences.

For each individual skill, a scoring system was valued from 0 to 4 in order of increasing importance. The students were allowed to use only integers. The values for the main category of skills were obtained by adding together the values of the individual skills and then dividing by the number of skills in the particular category. The study protocol used is

TABLE I   Transferable skills in Pharmacology questionnaire

| Problem solving	Relevance to clinical practice
	Application of textbook knowledge
	Development of logical thinking
Selection of drugs and prescription writing	Relevance to clinical practice
	Patient factors
	Rational prescribing
	Importance of format of prescription
Communication skills	Confidence in dealing with patients
	Empathy
	Imparting drug related information
	Imparting knowledge of non-drug measures
	Importance of feedback
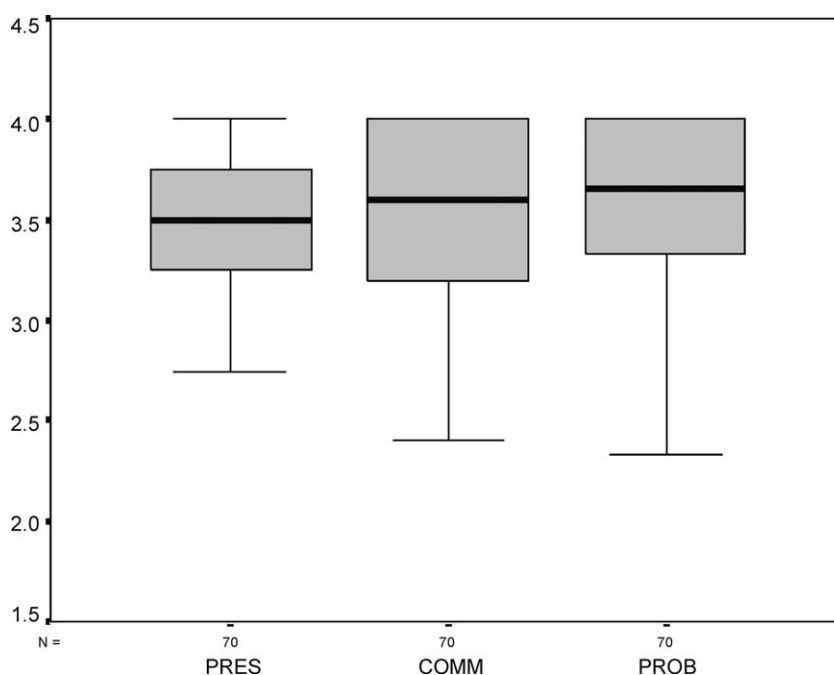
FIGURE 1   Importance of transferable skills in pharmacology. PRES, selection of drugs and prescription writing; COMM, communication skills; PROB, problem solving.

based on that used by Whittle and Eaton (2001). The following points were considered:

1. The importance of the particular transferable skill in pharmacology
2. Students' own ability in the skill and
3. Their perception regarding the role of integrated teaching in developing the skill.

Statistical Analysis

Results were analyzed using the SPSS statistical package. The Mann–Whitney tests were performed as the test of significance. A p value less than 0.05 was considered as statistically significant.

RESULTS

Seventy students participated in the study and completed the questionnaire; 39 (55.7%) were male while 31 (44.3%) were female. The nationalities of the students included Nepalese 32 (45.7%), Indian 25 (35.7%), Sri Lankan 12 (17.1%) and British 1 (1.47%). Fifty-five students were educated in English medium schools and 15 in vernacular medium schools.

All students considered transferable skills to be important in pharmacology. The three main categories of skills had similar ratings. The skill "application of textbook knowledge" had a low rating within the category of "problem solving" skills (mean = 3.31 compared to a category mean of 3.56). "Rational prescribing" was rated to be the most

important (mean = 3.72) and "format of prescription" the least important (mean = 3.07) within the category "selection of drugs and prescription writing" (category mean = 3.49). The Indian students gave a lower rating to the importance of communication skills than the Nepalese, Sri Lankan and British students ($p = 0.04$). The female students rated the importance of the main categories "selection of drugs and prescription writing" ($p = 0.024$) and "communication skills" ($p = 0.026$) higher than the male students. The students from the vernacular medium schools rated the importance of "communication skills" higher than the English medium students ($p = 0.004$). The importance of the three broad categories of skills in pharmacology is shown in Fig. 1.

In general, "their own ability" in different transferable skills was given a high rating by the students. The students considered their "communication skills" to have the highest rating and their skill in the "selection of drugs and prescription writing" to have the lowest rating. The differences were not statistically significant. The Indian students rated their skill at "problem solving" more highly than the other nationalities ($p = 0.029$). They also rated their skill in "drug selection and prescription writing" higher than the other nationalities but the difference was not significant.

The gender analysis of students' perceptions of their transferable skills is shown in Table II. The male students rated their skill at "problem solving" more highly than the female students ($p = 0.005$). The vernacular-medium students rated their

TABLE II   Gender analysis of students' perception of their transferable skills in pharmacology

Skill area	Male students ($n = 39$)		Female students ($n = 31$)		
	Median	Mean	Median	Mean	*p* value
Problem solving	3	2.99	2.66	2.48	0.005
Selection of drugs and prescription writing	2.75	2.81	2.5	2.52	0.156
Communication skills	2.8	2.93	2.8	2.84	0.635
All skills	3.45	3.45	3.77	3.63	0.037

"communication skills" more highly than the English-medium students ($p = 0.004$).

The integrated teaching course itself had helped to develop their skills in different areas of pharmacology. It was most helpful in developing their skills in "problem solving" and "selection of drugs and prescription writing" and least helpful in developing their "communication skills." The skill "relevance to practice" within the category "problem solving" was considered by students to be the least developed by integrated teaching. In the category "communication skills," the teaching was least effective in developing "empathy" and most effective in "delivery of drug related information to the patient." No gender or nationality differences were observed in the students' assessment of the influence of integrated teaching on skill development. Nationality analysis of the influence of integrated teaching on skill development in pharmacology is shown in Table III.

DISCUSSION

This study has demonstrated that students are highly aware of the importance of transferable skills in pharmacology. This could be due to the emphasis on the problem-based approach to learning pharmacology. The benefits of PBL reported in an earlier study include an increase of learning resources, an interdisciplinary focus and the making of learning more fun (Antepohl and Herzig, 1999). Another study had shown that PBL was effective in changing student attitudes towards medical school in spite of the low student opinion regarding it; the students, after acquiring these skills, can develop them during their course in pharmacology and throughout their medical career (Birgegard and Lindquist, 1998).

There were nationality and gender differences in the importance and level of competence in different skills. The students generally had a high opinion of their own skills in pharmacology. The level of competence in a skill refers to how good the students are in a particular skill. Let us consider the role of "patient factors in the selection of drugs." Patients may have different body weights, may belong to different ethnic and racial groups or may be male or female. Their renal and hepatic function may be different. These factors may affect the choice and the dose of the drug used for treatment.

Competence means the ability to take these factors into consideration and modify the choice and quantity of drug used for treatment, if necessary. The high opinion of transferable skills may be because the students lack the experience for proper self-evaluation (Guest *et al.*, 1999). Self-evaluation improves students' insight into their own strengths and weaknesses (Sullivan *et al.*, 1999) but is often neglected during the student's academic career. Integrated teaching has contributed to an increase of students' transferable skills in most areas of pharmacology, but the high student opinion of their own skill levels may be a confounding factor. The low influence of integrated teaching on "communication skills" development might be because of the use of simulated patients, of conducting the exercise in English and of lack of integration within the clinical sciences.

At present, 3 min is the time allotted for the communication skills exercise during the training sessions and in the exams. It is believed that more time should be allotted; student should be formally

TABLE III   Nationality analysis of the influence of integrated teaching on skill development in pharmacology

Skill area	Nepalese ($n = 32$)		Indian ($n = 25$)		Sri Lankan ($n = 12$)		British ($n = 1$)	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Problem solving	3	2.81	3.33	3.21	2.83	2.91	2	2
Prescription writing	3	2.93	3.25	3.13	2.76	2.77	1.5	1.5
Communication skill	3	2.8	3.2	2.96	2.3	2.38	1.8	1.8
All skills	2.96	2.85	3.05	3.1	2.79	2.69	1.77	1.77

evaluated in communication skills around four times in the two-year course in Pharmacology. Informal assessment could be done four times for each individual student during the teaching sessions.

The higher importance attached to "communication skills" by the Sri Lankan students could be due to the higher proportion of women among the Sri Lankans, in that there is a higher level of literacy and social development in Sri Lanka. Literate patients have higher expectations from their doctors and good communication skills may partly help in meeting the high patient expectations.

The observation that females rate the importance of transferable skills in medical education more highly than men is a similar result to that observed in a previous study (Whittle and Eaton, 2001). However, in this study there were no gender differences in the students' assessment of their own skill level.

The medium of instruction at school had influenced transferable skills, however. As a greater proportion of the Sri Lankan students were educated in their mother tongue as compared to the Nepalese and the Indian students, vernacular students rated their communication ability higher than the English medium students. In the end, this result is difficult to explain given the fact that communication skills are conducted in English on simulated patients.

In developing countries there has been a rapid change in medical curricula and an increasing responsibility on medical students for managing their own learning. It is here believed that the skills investigated in this study are both important for students to manage their own learning in pharmacology and therapeutics and for the development of successful medical career pursuits. In pharmacology, at the undergraduate level, it is concluded that there should be less emphasis on animal experimentation and pharmacy practicals and more emphasis on the practical therapeutic aspects. A reorientation of pharmacology educators is therefore urgently required.

All over the world, with an increasing number of medical colleges admitting students from diverse backgrounds, the findings of this study should find application in curriculum planning and student development all across the map. However, the small sample size of our study could be a limitation.

In the end, however, these findings do show certifiably that medical undergraduates at Nepal are both aware and have the required level of transferable skills to succeed in the revised course in pharmacology. The students seem well equipped to tackle the challenges of the revised curriculum at Kathmandu University.

References

Antepohl, W. and Herzig, S. (1999) "Problem-based learning versus lecture-based learning in a course of basic pharmacology: a controlled, randomised study", *Medical Education* **33**, 106–113.

Birgegard, G. and Lindquist, U. (1998) "Changes in student attitudes to medical school after the introduction of problem-based learning inspite of low rating", *Medical Education* **32**, 46–49.

Bligh, J., Lloyd Jones, G. and Smith, G. (2000) "Early effects of a new problem-based clinically oriented curriculum on students' perceptions of teaching", *Medical Education* **34**, 487–489.

Clack, G.B. and Head, J.O. (1999) "Gender differences in medical graduates' assessment of their personal attributes", *Medical Education* **33**, 101–105.

Furlanut, M. (1998) "The teaching of pharmacology in Italian medical schools: the point of view of Italian doctors", *European Journal of Clinical Pharmacology* **54**, 801–804.

Guest, A.R., Roubidoux, M.A., Blane, C.E., Fitzgerald, J.T. and Howerman, R.A. (1999) "Limitations of students' evaluations of curriculum", *Academic Radiology* **6**, 229–235.

Kaufman, D.M. and Mann, K.V. (1996) "Comparing students attitudes in problem-based and conventional curricula", *Academic Medicine* **71**, 1096–1099.

Miflin, B.M., Campbell, C.B. and Price, D.A. (2000) "A conceptual framework to guide the development of self-directed, lifelong learning in problem-based medical curricula", *Medical Education* **34**, 299–306.

Nabi, G.R. and Bagley, D. (1998) "Graduates perceptions of transferable personal skills and future career preparation in the UK", *Career Development International* **3**, 31–39.

Sullivan, M.E., Hitchcock, M.A. and Dunnington, G.L. (1999) "Peer and self assessment during problem-based tutorials", *American Journal of Surgery* **177**, 266–269.

Vlahovic, P.V., Vitezic, D., Zupan, G. and Simonic, A. (1998) "Education in clinical pharmacology at the Rijeka School of Medicine, Croatia", *European Journal of Pharmacology* **54**, 685–689.

Whittle, S.R. and Eaton, D.G.M. (2001) "Attitudes towards transferable skills in medical undergraduates", *Medical Education* **35**, 148–153.

Author Query Form

COPY FOR AUTHOR

Dear Author,

During the preparation of your manuscript for typesetting some questions have arisen. These are listed below. Please check your typeset proof carefully and mark any corrections in the margin of the proof or compile them as a separate list. This form should then be returned with your marked proof/list of corrections to Alden Multimedia.

Disk use

In some instances we may be unable to process the electronic file of your article and/or artwork. In that case we have, for efficiency reasons, proceeded by using the hard copy of your manuscript. If this is the case the reasons are indicated below:

☐ Disk damaged ☐ Incompatible file format ☐ LaTeX file for non-LaTeX journal

☐ Virus infected ☐ Discrepancies between electronic file and (peer-reviewed, therefore definitive) hard copy.

☐ Other: ....

We have proceeded as follows:

☐ Manuscript scanned ☐ Manuscript keyed in ☐ Artwork scanned

☐ Files only partly used (parts processed differently:)

Bibliography

If discrepancies were noted between the literature list and the text references, the following may apply:

☐ The references listed below were noted in the text but appear to be missing from your literature list. Please complete the list or remove the references from the text.

☐ *Uncited references*: This section comprises references which occur in the reference list but not in the body of the text. Please position each reference in the text or, alternatively, delete it. Any reference not dealt with will be retained in this section.

Manuscript page/line	Details required	Author's Response
	No queries.	