



## Effectiveness of Workshop on Basic Research Skill Development among First Year Postgraduate Medical Students of a Private University in South Karnataka, India

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### ABSTRACT

**Objective:** To assess the effectiveness of the workshop on “Basic Research Skill Development”, conducted for newly admitted post graduate medical students of a private university from Mangalore, South Karnataka, India. **Method:** With a participatory approach, 2 days workshop (in July 2011) was organized for basic research skills development among 57 freshly admitted medical postgraduates. Based on the sessions, predesigned, structured tool (with 39 questions -MCQ or True / false type) was prepared. Initially, participants were exposed to Pretest to record prior knowledge. At the end of workshop Post-test was done with same tool. Data was analysed using McNemar chi square & paired-t tests by SPSS version 17.  $P < 0.05$  was considered to be significant. **Result:** Forty four postgraduates willing to participate in this study were involved. Paired t test showed increased research knowledge & skills significantly ( $p < 0.0005$ , Mean diff SD= 6.227). Post-test showed higher number of correct responses for all questions except one. Significantly higher level of correct answers ( $p < 0.0005$ ) were observed in questions -- Boolean operators in Literature search, Hierarchy of study designs, Nested Case control study, Examples of epidemiological studies, Cross-sectional study, Full form of SPSS. **Conclusion:** A positive findings of summative evaluation of “Basic Research Skill Development” workshop held at the beginning of postgraduate medical courses, justifies the need for such workshop for every medical school.

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## Introduction

"To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, use effectively, and communicate information in its various forms." - *Adapted from the American Library Association Committee on Information Literacy, 1989*

In the 19<sup>th</sup> century, postgraduate research was a rarity, with countries such as the United States only having a small number of candidates across their university spectrum. However, by the start of the 21<sup>st</sup> century, postgraduate research and postgraduate qualifications, had become commonplace (1)

It is important for medical schools to develop critical thinking ability among the postgraduate students. The beginning of the course related research process is full of challenges for most college students. Even though many students may consider themselves adept at evaluating information and applying techniques for tackling one course-related research assignment to the next, the sheer act of just getting started on research assignments and defining a research inquiry was overwhelming for students -more so than any of the subsequent steps in the research process (2). In the same study conducted by Head and Eisenberg (2), for 84% of the students surveyed, the most difficult step of the course related research process was getting started.

Students today are faced with an overwhelming number of resources to meet their information needs, but the research and information-gathering process has become increasingly complex. It is important not only to arm the students with the skills necessary to effectively complete research assignments, but also to help them acquire the skills necessary for life-long learning(3).

Generally, postgraduate research is not intended to yield ground breaking results, discovery or innovation (1). Most of the time, it is actually an apprenticeship for mastering systematic research processes. Toncich (2006), explained that the

objective of postgraduate research is not necessarily to make a breakthrough invention or a major scientific discovery, it is, rather, a mechanism by which graduate students learn how to undertake a systematic investigation, founded upon the work built by peers in the field, and then to extend the current state of knowledge. He has mentioned some basic tenets which are adopted for postgraduate research. They are that -A postgraduate research programme is a means by which a student can learn how to undertake research in systematic and unbiased manner. The research project and the research field are the basis of a task which is set in order for the student to acquire research skills and to demonstrate these to independent assessors. A successful outcome in a research programme is one in which the research student has acquired the basic skills of research and has recognised how these can be more generically applied to other areas or, at a higher level, within the chosen field (4)

Recently there has been a strong push to encourage science students to develop the attributes of 'being a scientist' in their graduate courses, particularly in their approach to science, through the development of skills such as critical thinking, problem solving and appropriate use of evidence. These skills have been developed through activities such as research experiences and inquiry-based classes (5)

A workshop on "Basic Research Skill Development" was organized, in a private medical college at South Karnataka, India; to develop research acumen in newly admitted postgraduate medical students and to enable them to plan, design and carry out research. This study was conducted to assess the effectiveness with reference to the contents of the workshop.

Assessment is a key method of improving standard as well as establishing competency (6). Multiple choice questions (MCQ) is considered a reliable instrument for its content specificity compared to essay questions (7) and it tests factual knowledge and comprehension (7). Based on the contents of the workshop sessions the study tool was developed using MCQ or True /

false type questions. Besides, MCQ is the only objective instrument in the entire battery of summative assessment (7). Alternatively, the validity of MCQ can be improved by changing the true/false format of MCQ to a single best answer or extended matching multiple choice questions (7).

## Method

A workshop on “Basic Research Skill Development” was conducted for two days in July 2011 for newly admitted postgraduate medical students of a private college from Mangalore, South Karnataka, India. The workshop consisted of 5 scientific sessions viz: Introduction to research with types of research and research designs, formulation of research proposal in the context of synopsis and ethical issues in research, role of information/knowledge resources and information communication technology (ICT) in research, data collection methods and techniques, descriptive statistics and tests of significance. Emphasis was given for interactive methods with group dynamics and participatory approach. After preliminary presentations by each facilitator for about half an hour, small assignments were given in groups and further discussions were held by presentation by each group. All the participants were given full freedom to contribute and to clarify their doubts, if any. Based on the contents of the sessions, predesigned, structured tool was prepared with 39 questions of MCQ or true/ false type. This

tool was validated beforehand. 57 freshly admitted postgraduates in medical sciences attended the workshop; however 44 postgraduates willing to participate in this study were exposed to the tool for pretesting on the first day in the beginning of the workshop to record their prior knowledge and again on the 2<sup>nd</sup> day at the end of the workshop as post-test. By referring to a key of correct answers for the tool all pretest and post-test papers were assessed considering score of one mark each for correct answer and zero for wrong answer. Total score was calculated for each paper. Cumulative and each item-wise score of pretest and post-test were compared. To avoid the bias of the pre-workshop knowledge, post-test data was evaluated against pretest findings. Data was analysed using MC Nemar chi square test & paired t test by SPSS version17.  $P < 0.05$  was considered to be significant.

## Result

The study was concerned with the evaluation of the effectiveness of the workshop in terms of technical know-how and the contents covered during the workshop were considered for measurement. Post-test showed higher number of correct responses for all items except one.

The workshop was found to be significantly effective ( $p < 0.0005$ ) in empowering the participants with basic research skills, as seen in the Table 1.

**Table 1: Mean and SD of Pretest and Post-test evaluation for the workshop on basic research skill development.**

	N	Mean Score	Std. Deviation	Mean diff	P Value
Pretest	44	18.45	4.38	6.23	< 0.0005
Post-test	44	24.68	5.75		

Paired-t test:  $P < 0.0005$

For item wise analysis each item was examined separately to judge the effect. Among the 12 items related to the study protocol and research designs (assessed by MCQ; and fill in the blank type); 7 items found to be statistically significant

( $P < 0.05$ ) by application of Mc Nemar Chi square test. This indicates that the majority of the participants understood - how the study title should be framed, salient features of Vancouver style, hierarchy of study designs, nested case

control study design, examples of prevalence study and full form of SPSS (Table epidemiological studies, cross-sectional or 2).

Table2: Distribution of pre and post-test Items<sup>#</sup> with correct responses

Items	Pre -test n (%)	Post-test n (%)	P- value
1. Research protocol will include all except a. Title b. Introduction c. Objectives d. Study results	33 (75)	37 (84.1)	0.454
2. A bibliography is a list of a) countries b) Someone's life story c) Information sources d) Phone number	31 (70.5)	36 (81.8)	0.359
3. The title of the study should convey a. Objectives of the study b. study population c. Study design d. All of the above	30 (68.2)	42 (95.5)	0.004*
4. The best research evidence is available from the following studies a) Case Control study b) Cohort study c) Cross sectional study d) Case report	19 (43.2)	25 (56.8)	0.268
5. The following are the salient features of Vancouver style except a) Number the reference consequently in the order mentioned in the document b) Title of the journal abbreviated according to index medicus c) The reference submitted but not accepted should be cited as Unpublished observations d) List all authors if number exceeds 3, give 3 names followed by et al.	6 (13.6)	24 (54.5)	0.001*
6. In hierarchy of study designs (from below upwards) the top most design is a) cross sectional survey b) Meta analysis c) Case –Control study d) Cohort study	14 (31.8)	34 (77.3)	<0.001*
7. Nested Case control study is an example of a) ecological study b) Experimental study c) Hybrid design d) Programme evaluation	9 (20.5)	37 (84.1)	<0.001*
8. Following are the examples of epidemiological studies except a) Cross sectional survey b) case control study c) Cohort study d) Randomized control trial	19 (43.2)	38 (86.4)	<0.001*
9. A measure of strength of association between risk factor & the outcome in Cohort study is a) Variance ratio b) Odds ratio c) Relative risk d) Attributable risk	18 (40.9)	20 (45.5)	0.845
10. The decision to select appropriate study design depend upon all of the following except a) immediate goals of the study b) Characteristics of the exposure and disease c) Easy to conduct in short time d) Resources available	18 (40.9)	19 (43.2)	1
11. Cross-sectional or Prevalence study is a) One time study b) Follow-up study c) RCT design d) Intervention study	18 (40.9)	37 (84.1)	<0.001*
12. Full form of SPSS is -----	10 (22.7)	41 (93.2)	<0.001*

\*P<0.05 significant at 95% confidence level using Mc Nemar Chi square test. # Items related to study protocol and research designs.

Among 16 items presented in the form of true/false category, all items except one showed increase in number of correct responses in the post-test papers, however significantly higher

increase was recorded in 3 items ( $p < 0.05$ ) as seen in Table 3.

Table3: Distribution of pre and post-test items (True/false category) with correct responses

Items	Pre n (%)	Post n (%)	P-value
1. Random Sampling is a type of non- probability sampling. True/ False	14 (31.8)	16 (36.4)	0.804
2. Aims & objectives of the study connote same meaning. True/ False	32 (72.7)	34 (77.3)	0.824
3. Questionnaire containing few open ended questions are called semi structured. True/ False	27 (61.4)	34 (77.3)	0.118
4. Blinded Vs Open are types of Cohort study. True/False	15 (34.1)	24 (54.5)	0.049*
5. Interview is a common tool of data collection. True/False	32 (72.7)	39 (88.6)	0.118
6. Case Control study is also called prospective study. True/False	19 (43.2)	23 (52.3)	0.557
7. Cross sectional surveys are exploratory study. True/ False	19 (43.2)	22 (50)	0.664
8. Validity is important, but reliability is not important while formulating study tool. True/ False	31 (70.5)	36 (81.8)	0.359
9. Relative risk indicates strength of association between risk factor & outcome of the study. True/ False	24 (54.5)	27 (61.4)	0.648
10. Synopsis of the study proposal need not contain "Introduction" .True/ False	23 (52.3)	27 (61.4)	0.541
11. Review of literature helps to formulate hypothesis. True/ False	37 (84.1)	35 (79.5)	0.774
12. Bibliometrics is one of the data collection methods. True/ False	23 (52.3)	28 (63.6)	0.383
13. Mode is a most frequently occurring observation in the series. True/ False	27 (61.4)	37 (84.1)	0.041*
14. If we want to know whether one particular drug is better than the other, we apply one tailed test. True/ False	15 (34.1)	31 (70.5)	0.002*
15. Type II error is present when null hypothesis is false & it is accepted. True/ False	21 (47.7)	31 (70.5)	0.076
16.The paired "t " test requires the assumption that differences between paired observations follow a Normal Distribution .True/ False	14 (31.8)	15 (34.1)	1

McNemar Chi square test \* $P < 0.05$  significant at 95% confidence level

There were 11 questions related to literature search. Five of them showed statistically

significant increase in number as depicted in the table 4.

Table4: Distribution of pre and post-test Items of literature search with correct responses

Items	Pre n (%)	Post n (%)	P
1. The Style manual provided by Modern Language Association a) MLA style Manual      b) APA Style Manual c) Vancouver Style Manual   d) PNAS	08 (18.2)	11 (25)	0.607
2. Plagiarism is -a) Using the ideas of another person instead of using only your original thoughts b) Including the ideas of another person in your writing & failing to give them credit c) Failing to use the correct style when citing your sources d) Improperly interpreting the authors in your sources	17 (38.6)	21 (47.7)	0.541
3. Which is the best place to find research published by scholar/ experts a) On amazon.com b) In the newspapers c) In general interest magazines      d) In books & scholarly journals	27 (61.4)	32 (72.7)	0.405
4. The following are Boolean operators in Literature search except a) AND b) OR c) WHAT d) NOT	3 (6.8)	20 (45.5)	<0.001*
5. Which of the following criteria best indicates scholarly research? a) Available in an academic library b) Indexed by MEDLINE c) Reviewed by experts for publication d) Written by University Faculty	18 (40.9)	19 (43.2)	1
6. You want to find journal articles published this year about recent developments in radiation therapy. Where would be the best place to look? a) Library Catalog b) Bibliographic database c) Google d) Journal Index	10 (22.7)	27 (61.4)	0.002*
7. A citation is a a) Brief paragraph that summarizes what a book or article is about b) Book review c) A description of an electronic database d) A record of the identifying elements of a book, journal or website	10 (22.7)	18 (40.9)	0.115
8. Name of software other than End Note that can be used to format references a) Reference Manager b) GNU E prints c) D Space d) Greenstone Digital Library	7 (15.9)	19 (43.2)	0.012*
9. What is the file extension for an End Note Library a) .Enl b) .Pdf c) .Html d) .jpg	19 (43.2)	31 (70.5)	0.017*
10. What does OPAC stand for? a) Only Public Access Content      b) Online Public Access Catalog c) Offering Public Allowed Content   d) Original Properly Available Content	28 (63.6)	40 (90.9)	0.012*
11. An article abstract is a) The name of the journal, the author & public information b) A brief summary of the articles content c) The full text of the article   d) None of the above	33 (75)	33 (75)	1

McNemar Chi square test    \*P<0.05 significant at 95% confidence level

## Discussion

The participants of this workshop were medical students recently joined for the postgraduate courses in medical sciences. It is important to note that emphasis given for research during the undergraduate level medical education is minimum. Hence, a fresh postgraduate finds research related terminologies unfamiliar. In a study funded by the Australian Learning and Teaching Council, it was observed that the students perceive that their research skills improve substantially during a semester when these skills are explicitly developed (8). Peirce reported that students claim that research skills explicitly developed in first year were very useful in subsequent study and, notably, in employment (9). The feedback received in our workshop also showed similar remarks.

In this study, 71.8 % of participants got above 50% score, 59 % of participants got above 60% score and 48.7% obtained above 70% score. In a report of "Evaluation of seven Higher Education Academy research skills workshops conducted in academic years 2009/10 and 2010/11" Carpenter observed that 87% of participants rated the content (the issues / topics covered within sessions and quality of information/ materials) the highest scores (10). In a study conducted by Perneger et al (11), it was noted that the most important covariates of skill levels were current time commitment to research, past experience, and formal training (11). In this study the respondents were exposed to such a type of basic research skill development workshop first time at their entry point to postgraduate courses, however 95% of the participants mentioned that it was very useful. Willison (2009) has also recorded that use of RSD based assessment tends to persist, and academics tend to increase their use overtime (12)

The limitations observed in this study was for few students it was difficult to understand few contents of the course, as observed by the fact that post test scores were same or less than pretest score for 5.1% items (2 out of 39 items) and very marginal increase was seen in post test score of 7.7% of the items (3 out of 39). RSD-

based approaches, as implemented do not suit all students, or at least do not help the development of all students' research skills. Uptake is patchy from course to course in a program of study (13). It is recommended that such workshop should be backed up by follow up workshop to enhance and reinforce research skills.

## Conclusion

The 95% of the participants of this study, who were exposed to basic research skill development workshop first time at their entry point to postgraduate courses, mentioned that it was very useful and the workshop was found to be significantly effective ( $p < 0.0005$ ) in enriching their knowledge and skills related to basic research. Hence higher education institutions must take a lead in framing across all university education the development of the skills for knowledge production through research. These skills will hold students in good stead, whether they are going out immediately into the workforce, or progressing onto higher degrees by research.

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