Assessment Of Research Skills In Undergraduates Students

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Abstract

Research is the best way through which one can get a full understanding of a topic. No matter which discipline you take, Research is the basis for every achievement in the world. To keep its importance, Research is introduced as a semester in the academic curriculum of the undergraduates. Students who are exposed to research will be able to use their research skills in the future to create something new and help society progress. Question that arises here is, Are the students being incorporated to learn research skills properly? Are they able to develop the basic research skills through their course research project work? The study was conducted with a view to exploring the facts relating to obtaining research skills by undergraduates. Three different field's of education are selected to do the research work, They are graduates of civil engineering, Management, and physiotherapy. The results obtained, which were analyzed using SPSS, showed that there is a significant difference in the gap between the required and observed skill set with respect to information seeking skills. There is a significant difference in the gap between the required and observed skill set with respect to methodological skills.

Keywords: Research skills, Methodological skills, Information seeking skills, Undergraduates, Research.

Introduction

Every graduate student has to undergo a semester where he/she has to do research work in their related fields. The aim of incorporating a specific semester where the students are made to focus on doing research in their respective fields is to let the students experience the importance of the research (Meerah & Arsad, 2010). Incorporating the semester specified for research work for graduate-level students seems to be beneficial as the students are successful in gaining research-related knowledge (Meerah & Arsad, 2010). It is seen that through the research work incorporated into graduate levels the students acquire research skills and knowledge relating to the research (Meerah & Arsad, 2010). Introducing research at undergraduate levels is proven to be the way to improve the education levels of undergraduate students (Gilmore et al., 2015). Many studies conclude that incorporating one or two semesters specifically for research purposes at the graduate level is to inforces the

universities to require its students to study more than just their study books (Gilmore et al., 2015).Incorporating research work for graduate-level students aids in the development of research skills (Gilmore et al., 2015). There is a need to give greater prominence to the improvement of the research experience to meet the undergraduate students' beliefs and expectations (Linn et al., 2015). Students must gain a basic understanding of the concepts that underpin their research project before they can apply that understanding to emulating the research question (Thiry et al., 2012). Need to master the key concepts and should develop the critical thinking skills to solve problems that they will face in their research work. Students should be able to determine what their next step will be in their search work; they should be able to design their research work (Thiry et al., 2012). When the students engage themselves in scholarly activities such as publishing papers, books, etc., It paves the way for the students to be scientists. However, more qualitative research is needed to get more approximate data (Szymanski et al., 2007). When it comes to self-efficiency, it is stated that men have stronger research self-efficiency than females, which has proven to be wrong. Gender and research have been shown to have no relationship (Bieschke et al., 1996). The large amount of study undergone by a students in their academic life is what the professors instructs them to study. There is no student choice about what to study. It's like the students study what their professors teach them. The research is the work completed solely by the student. There is no involvement of the teacher in it, which helps the student to use all his/her ability to think creatively and bring out something new. This is the reason why many students like the research part of the studies more than the usual curriculum study where already prepared data is handed over to them to refer to (Gilmore et al., 2015). In the process of making students aware of the research, the students are asked to prepare a project work where they have to submit a report on what they have done in the given semester. The prepared reports are assessed internally and externally, and marks are given based on the evaluation (Meerah & Arsad, 2010). When students are encouraged to participate and persevere, it often helps them to change and strengthen their perception of themselves as scientists (Linn et al., 2015).It is seen that the

students possessing higher caliber are found to be doing the project work independently, where as the students with lower caliber face the difficulty of completing the project work, where as the teachers are also expected to guide the students in helping to acquire the research knowledge (Meerah & Arsad, 2010). Three scenarios relating to undergrad students are seen: High-scoring students are creative, excited, and try to complete the research work; average students are high in spirit but are not seen to take the research work seriously; and low-scoring students are not interested in completing the research work and are forced to do so (Meerah & Arsad, 2010). There is a relationship between research interest and knowledge and the self-efficacy of students in research. When the students have high levels of research interest and research-gaining knowledge, they are more self-efficient in research (Lambie et al., 2014). There are different tools available to measure self-reflection, such as the RSD frame work (Gyuris, 2018). It is seen that the students lack the motivation to practice writing skills and critical thinking. It is required that the students are motivated and engaged in the given task to extract full knowledge (Gyuris, 2018). When the students do research work and when their research skills are assessed and helped to grow, it is seen that less experienced students gain more skills, whereas students who have prior experience do not show growth in their skills. At the end of the semester, the less experienced and more experienced students both get the same levels of marks, leading to the research skill development course (Timmerman et al., 2013). A structured assessment of research and the individual competence of research can help the students and the faculty improves the research involvement of the students in research (Bieschke et al., 1996). Giving the course work to the students helps the students to acquire research skills and helps the students to increase their ability to search for new knowledge and information on their own or with their group members (Meerah & Arsad, 2010). It is seen that students who are involved in publishing research articles and books are seen to have higher research self-efficiency compared to those who are not engaged in publishing research articles and books (Lambie et al., 2014). The level of difficulty should be appropriate for the students to make them learn and also complete the research work at the

same time. The documentation process helps the students to think critically and helps them to improve their writing skills and communication skills. to assist students in achieving high levels of knowledge in terms of research skills so that they can learn and perform at their best (Gyuris, 2018). The research shows that motivation is the determining factor in whether the students are doing their research work voluntarily or just to complete the course program. It is also seen from a study that there is no relationship between motivation and research expertise progress (Gilmore et al., 2015). The graduate level students are primarily focused on making them learn how to read and write literature reviews and evaluate research questions. The student with more experience is able to develop the ability to bring out the alternate solution for a particular problem, the ability to choose the appropriate data in response to one's question, etc., but these skills are seen to be used very little, stating that the deeper research skills are required later in a graduate career than their early career sample (Timmerman et al., 2013). For students to be accomplished researchers, they need to address their failures and analyze them along with their successes. Then they will become accomplished researchers (Gyuris, 2018). It is seen that the fieldwork and project work help the students acquire research knowledge (Meerah & Arsad, 2010). When students submit their research proposals, it is seen that there is improvement in the first and second research proposals in their research work. The students' scores varied with their first submission of a proposal, increasing positively with their second submission of the proposal through the instructions given and making the students deliberate practice (Gyuris, 2018). Linn and colleagues, 2015). For the time being, no such complaints or issues have been noticed relating to the guiding faculty members (Gilmore et al., 2015). But it is evaluated that the graduate students do have research interests to some extent, and it needs to be enhanced more by the teachers by adopting different methods (Bieschke et al., 1996). Students who have high research skills seem to have higher scores in all parts of the research work, such as during submitting pre and post research proposals (Gilmore et al., 2015). The literature review of the graduates helps to examine the performance of the students in their research work (Timmerman et al., 2013). When

interviews are conducted, it helps the students gain confidence in their research work presentation when compared to their prior performance to the later performance after multiple interviews have been conducted (Thiry et al., 2012). About 49% of students in a study stated that laboratory research has helped them gain research experience. This shows us that the students need to be more engaged in laboratory or experimental work. (Lachance et al., 2020). Research tools should be invented to measure the research skills of the students where the rubric of science writing is conducted to measure the writing skills of the students. It is seen that measuring tools such as rubrics do provide reliable results in measuring the students' writing skills. However, it is just a tool and not the answer. Proper alignments regarding all the course work, etc., should be there in proper coordination, which is required for the tools like rubrics, which may result in generating miscellaneous data. This leads us to the conclusion that we cannot rely solely on research skill measurement tools (Timmermana et al., 2011). There is a need to develop specific standards concerning the quality of the teachers when it comes to making the students learn the research skills. To put it into practice, more empirical research must be conducted in order to develop standards for teachers (Stokking et al., 2004). Students need to be assigned a good number of assignments of standard legitimacy and controllability where they can get in touch with the concept of research more and more (Stokking et al., 2004). When new research ideas are brought out by the students, these ideas are being cut off and fragmented. Students should be given opportunities to amalgamate their research work experience so that they can strengthen their point of view as scientists (Linn et al., 2015). Students need to self-monitor their own performance and capabilities and try to enhance their learning and performance. This is evaluated as the most beneficial method among other methods, though the reason for its effectiveness remains unknown (Andrade, 2019). Teachers are expected to teach difficult research skills to students, to assist students in exploring new ideas, and to keep students working on it until they receive results. However, it has been observed that teachers are vulnerable when competing for these tasks (Stokking et al., 2004). Research internships, or cross-sectional studies, are considered more effective in

generating the data on the research skills of the students who are undergoing the research internship (Szymanski et al., 2007). Teachers should decide on enhancing particular key skills with the coordination of other teachers of different subjects to the same degree. This process will help the teachers develop key skills in their students. Introducing the grading system and marking systems along with the feedback on the guidance provided to the students may help the students improve their research skills. At the same time, introducing the work of the teachers through an online system may also help the teachers to lessen their work load (Fernández-Santander et al., 2012). It is stated that if we redesign the starting introductory programmes in a way the students can learn the basics of the life sciences, then the students are expected to go far behind their capabilities. Even if the students don't take life science, science, or any field as their major, they will be able to use the science skills in a scientific literate way (Coil et al., 2010). The students who have learned to learn and perfect themselves and go into science as their major will be coming to their teachers with more advanced skills and new ideas. However, this is only possible if the introductory classes are redesigned and make the students learn earlier (Coil et al., 2010). Research is a must-need for every discipline. It is an evaluation process through which we evaluate how much the students are developing their subject knowledge along with assessing their research capability (Stokking et al., 2004). Research assessment is done on the overall fields of our study. We particularly aim to do research on different courses in Civil Engineering, Business Management (BBM), and Physiotherapy, which haven't been focused a lot until now. All research assessment studies on graduate students are done mostly outside of India. Our study focuses on doing a research assessment on students from Kadapa, Andhra Pradesh, India. Comparative research assessment on information seeking skills and methodological skills is done on undergraduate students. Where we will be able to assess the research skills of undergrad students in the selected disciplines.

Objectives:

☐ To evaluate the research abilities of undergraduate students in the selected fields of civil, management, and physiotherapy research.

☐ To analyze the gap between the required and observed skill sets with respect to information-seeking skills in the students.

☐ To analyze the gap between the required and observed skill sets with respect to methodological skills in the students.

Hypothesis:

Hypothesis H1:There is a significant difference in the gap between required and observed skill set with respect to Information seeking skills

Hypothesis H2: There is a significant difference in the gap between required and observed skill set with respect to methodological skills

Methodology:

The present study is conducted in 3 different fields: civil engineering, management, and physiotherapy. The sample size of the study is n = 150. The questionnaire is distributed to N = 180 students and from the feedback obtained, the sample size is reduced to 150. The personal interviews are conducted with the students to extract the maximum data from them. The research work was done between 2020 and 2021. In the final year, students who have completed their research work or are undergoing their research work are considered for the study. Each student interview lasts approximately 20 to 30 minutes. Civil Engineering students were about 60, Business Management students were about 60, and Physiotherapy students were about 60, giving us a total number of students of about 180. 3 colleges of Civil Engineering, Business Management studies, and Physiotherapy are included in the study. The study was done in Kadapa district, Andhra Pradesh, India. The respondent's data and college names are kept confidential. Descriptive statistics are done to compare the methodological skills and information-seeking skills of the students using SPSS. The questionnaire adopted in the study is

taken from (Ismail & Meerah, 2012) and (Meerah & Arsad, 2010).

Results:

Table . No.1: Descriptive statistics gap between required and observed skill with respect to information skills

S NO		Requirement	Observed	GAP
1	I premeditate the types of information that I need like books, articles, journals and others.	4.45	1.98	2.47
2	I am aware that information found in journals are more often checked, edited and criticized compared to information found in magazines.	4.55	1.98	2.57
3	I am aware that information can be obtained through various means (e.g. electronic media, images, audio and video).	4.71	2.14	2.57
4	I am aware that the primary source is the first source (original source) that records work related to the literature.	3.73	2.01	1.72
5	I am aware that the secondary source is the source that discusses the work of others.	4.43	2.12	2.31
6	I use other sources besides the library in my institution such as the *inter-library loan* service.	4.26	1.99	2.27
7	I identify and look for synonyms, themes or key words that can be used to find information based on my topic.	4.18	2.28	1.9
8	In order to find information, I read general texts like dictionaries or encyclopedia articles to gain more understanding on the terminologies used in my topic.	4.48	1.92	2.56
9	I need to broaden my search using key words given that the existing source of information indicates that my topic of research is too narrow.	4.23	2.28	1.95
10	I am aware that I can use truncation (or shortcuts) in my search or I can also use root words to start my search.	4.12	2.08	2.04
11	I am aware that I can find a book based on the title given.	4.32	2.32	2
12	I have to conduct the search according to the field in order to identify the materials titles according to a particular field.	4.21	2.07	2.14
13	I will look at the strategy to find information again in order to get exactly what I want if it is not successful the first time.	4.42	2.32	2.1
14	I usually evaluate the writers expertise to see if he/she is qualified in the written field.	4.2	1.97	2.23
15	I evaluate the accurateness of the content by reading other sources mentioned by the writer.	4.33	2.08	2.25
16	I understand the contextual effect for instance how various cultures, history and geography can influence the perspective of the information.	4.41	2.11	2.3
17	I realize that time is a factor that influences the relevance of the information to my topic of research.	4.28	2.27	2.01
18	I get the confirmation of my understanding on a certain topic by getting an opinion or an expert's view (through individual interviews, email, telephone and others)	4.14	2.27	1.87
19	When searching for information, I arrange each item systematically.	4.06	2.13	1.93
20	I am able to adjust with the various quotation styles used.	4.46	2.03	2.43
21	When searching for information using a database, I know how to store it into my disk or to email it to my email.	4.36	2.3	2.06
22	I can record quotations in order to seek information.	3.81	2.34	1.47
23	I write down the important concepts myself using my own words.	4.63	2.27	2.36
24	I use the main ideas obtained from the information researched in order to support my topic.	4.2	2.34	1.86
25	I combine the main ideas from one source or more in order to form a new idea.	4.34	2.37	1.97
26	I can construct my own conclusion based on the information gathered.	4.14	2.46	1.68
	Overall Information Skills	**4.31**	**2.10**	**2.21**

Hypothesis H1: There is a significant difference in the gap between required and observed skill set with respect to Information seeking skills

It is observed from table 1 that for hypothesis H1 for all the twenty-six items of three different departments of research students, that is, management students, engineering students,

and physiotherapy students, dimensions are rejected at a confidence level of 0.95 because significant values for all the twenty-six statements are less than 0.05. The alternate hypothesis is accepted for all twenty-six statements. The gap score of all the twenty-six

statements varies between 1.47 and 0.02. There are significant gaps between the research student's perceptions and expectations of three different department research students in information-seeking skills.

Table. No. 2: Descriptive statistics gap between required and observed skill with respect to methodological skills

S NO		Requirement	Observed	GAP
1	Ability to plan a research	4.34	2.28	2.06
2	Developing a research question	4.28	2.3	1.98
3	Searching for a research problem	4.15	2.14	2.01
4	Doing a literature review	4.15	2.23	1.92
5	Design an experiment study	4.05	2.1	1.95
6	Selecting an instrument	4.22	2.26	1.96
7	Developing an instrument	4.12	1.97	2.15
8	Collecting of survey data	4.26	2.36	1.9
9	Writing an abstract	4.07	2.01	2.06
10	Preparing a manuscript for publication	4.43	2.23	2.2
11	Selecting an appropriate research method	4.06	2.36	1.7
12	Choosing an appropriate method analysis of data	3.93	2.37	1.56
13	Interpretating the result of a research study	4.44	2.19	2.25
	Overall methodological skills	**4.18**	**2.25**	**1.93**

Hypothesis H2: There is a significant difference in the gap between required and observed skill set with respect to methodological skills

It is observed from table 2 that for hypothesis H2 for all the thirteen items of three different departments of research students, that is, management students, engineering students, and Physiotheraphy students, dimensions are rejected at a confidence level of 0.95 because significant values for all the thirteen statements are less than 0.05. The alternate hypothesis is accepted for all thirteen statements. The gap score of all thirteen statements varies between 1.7 and 0.03. There are significant gaps that are significant between the research student's perceptions and expectations of three different department research scholars with respect to methodological skills.

Discussion:

The study clearly shows that there is a significant difference in the gap between the required and observed skill sets with respect to information seeking skills. The students are not taking their interest in research; they are just doing it as a part of a compulsory course that

needs to be completed in the academics, as shown in table 1. There is a significant difference in the gap between the required and observed skill set with respect to methodological skills, the values of which are shown in table 2. Here are some of the views of the students which were expressed during the interview.

"I dig in to 2 to 3 research articles and from the research papers, I try to take similar work as my research work too, with the consent of my guide."

Here we can see the students are not doing the detailed literature review, rather they are refereeing a few papers and they are putting the same work into their research work too. This shows us that the students who are doing their research work are also not doing their literature review work properly.

We are four in our batch for the research work in B.Tech civil engineering. We search for some already submitted projects of our seniors or from the seniors of other colleges, and then we take their project work and keep it as ours from the internet browser.

The bachelor's project work doesn't have the plagiarism test rules, so I guess this makes the

students easily copy their seniors' project works or the project works which are already done and submitted on the online internet websites. It's very sad to know that the students are not focusing on improving their research skills; rather, they are just taking the easy and convenient paths to finish their research work.

We are divided into groups to complete our project work, and we are given 1 semester to complete our research work. Even though one member is interested in doing the research work, the other members will not show their interest in the research work, so we ended up buying the research work".

This is happening in academia, where research works are sold to students. Reason for it is the low research knowledge of faculty, who let this thing happen to cover their weakness. Knowledge is not obtained by buying it; we have to learn it to earn it. In today's generation, this is the biggest problem. They are trying to buy the knowledge, not trying to know or learn the knowledge.

Our Head of the Department itself sells the project work to the students. We need to do what they say, as everything lies in the hands of our H.O.D in the end when it comes to final marks. Why would someone do hard work when our own teachers are encouraging us to buy the "research works"?

We may say that the academics are working with strict rules, but these are the facts which are untold and only students know these facts. Research work is introduced with a view to making them explore the world of research. It's the teachers' responsibility to make students realize that research work should be done, but unfortunately, they are the ones who are selling it.

The study was conducted with a view to assessing the research skills of the students. From the results, it is clearly seen that the research skills of the maximum number of students are very poor, and the reason for it is evident from the above statements given by the students.

Conclusion:

The results show that there is a significant difference in the gap between the required and observed skill sets with respect to information-seeking skills. There is a significant difference in the gap between the required and observed skill sets with respect to methodological skills. Undergraduate students need to be more exposed to research. Both the hypotheses, H1 and H2, have been proven right. We do not want to incorporate finding an easy way to complete the work and taking the research as just a compulsory course work that needs to be finished in the students' minds. The study was started with the intention of knowing how much the students excelled and assessing their research skills. The answers given by the students have proven that the maximum number of students have not reached the point where they actually understand the importance of the research faculty and guides have failed in doing so.

Future Scope:

The research work is limited to 3 different fields, which can be extended to more fields to assassinate more data. The research work is limited to one particular region of the Kadapa region, Andhra Pradesh, India. Expanding the size of the area and students would give us more scope to assess the research skills of undergraduates.

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