

THE SIGNIFICANCE OF THE UNDERGRADUATE RESEARCH: A REVIEW

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ABSTRACT

Research is an important tool which leads to explore new knowledge, new findings, and novel concepts through scientific procedures. The undergraduate research is an important opportunity for the students to get an idea about the scientific method of exploration of new knowledge. This may assist the students to find the gap between the existing knowledge in their respective fields. The engagement of research in the initial set up would enhance the tendency of the students to carry on the same at their later professions as well. The importance of the in-cooperation of research into the undergraduate curriculum is also emphasized in literature. The perception towards research including the knowledge, attitudes and the barriers has been studied in various studies worldwide. When consider about the medical field, the clinical research play an important role in finding evidences with respect to various novel treatment methods, diagnosis methods and so on. Therefore, this review primarily focuses on various studies that have been performed to see the above three factors with regard to research and would pay the attention towards the significance of the undergraduate research.

Key Words: knowledge, attitudes, barriers, research, undergraduates.

1. INTRODUCTION

Research can be defined as a methodical process which is developed to discover new knowledge, science and creations by means of scientific procedures which includes investigation and collecting of new information (Memapour *et al.*, 2015). Research act as a basis for the development of medicine as well as the technology (Gupta, 2016) where it opens up new pathways in number of fields such as medicine, agriculture, business as well as in education (Singh and Choudhary, 2015).

Scientific progress in a society can be evaluated by the extent of research implementation and its influence at the society level (Vujaklija *et al.*, 2010). Therefore the interest over scientific research has been uplifted in many countries worldwide (Memapour *et al.*, 2015).

Research areas differ according to the field that a person undertakes and can be clinical/ medical, and scientific. When considering clinical research, it is with the objective to discover mechanisms, advancement and reversal of a disease condition (Nel *et al.*, 2014). Health research has an influence in treating, preventing and diagnosing disease conditions and the importance of using such research evidences in developing health policies (Lavis *et al.*, 2008) has been

emphasized in literature. National strategy documents also emphasizes the significance of implementing evidence based practice as the basis of a primary care (Jowett *et al.*, 2000). It is found that the contemporary medicine that seeks for the evidences lead to proper diagnosis of conditions where clinical decisions which are not supported by evidences cannot be applied in the clinical setting (Askew *et al.*, 2002).

The physician-scientists are considered as the task force of clinical research who are applying the scientific approaches in clinical setting (Nel *et al.*, 2014). Therefore the continued expansion of medical field is basically determined by the scientists who are involved in clinical research (Moreas *et al.*, 2016) and this stresses why the physicians should focus more on research in order to find the evidences (Murdoch-Eaton, 2010). Regrettably it is noted that the number of this physician-scientists are decreased over the period hence the exposure to research (Nel *et al.*, 2014; Khan *et al.*, 2006). Lack of interest towards research at the undergraduate level could be one of the reasons for this. Therefore in order to continue research activities later in the profession, the subjects should be familiarized with the research studies earlier in their curriculums at the undergraduate level to enhance the ability of thinking and affirmative outlooks towards research (Khan *et al.*, 2006; Amin *et al.*, 2012; Shewan *et al.*, 2005).

Undergraduate research can be defined as discovery of a certain fact in a given field by an undergraduate student which leads to an original contribution to the disciplines (Gupta, 2016). In order to discover certain facts, research based learning is important since the beginning of the undergraduate education. The importance of standardizing the research based learning is also highlighted by a report prepared by the Boyer commission, "Reinventing undergraduate education" highlights (Boyer Commission, 1998). According to that, they believe that it would be rather useful for the faculty, administrators and the community to recognize the significance being added by incorporating research into education. With regard to the significance, if the ultimate goal is to obtain the advantages of conducting undergraduate research, it is better to identify what they are and their existence.

Though there is a conviction regarding the importance of conducting research for the students' knowledge and development of career, the benefits of such research projects to university students, faculties have been identified lately (Hunter *et al.*, 2007; Bauer and Bennett, 2016; Lopatto, 2004; Seymour *et al.*, 2004). Seymour *et al* (2004) had shown several benefits that students attain through undergoing research projects including subjective gains, acquisition of various skills, transferring of believes to work as researchers and as well as to think like scientists. It is also assumed that the students are motivated to follow more advance and unconventional degrees in Science, Technology, Engineering and Mathematics (SETM) by the undergraduate research projects (Russel *et al.*, 2007).

2. PERCEPTION TOWARDS RESEARCH AMONG UNDERGRADUATES

According to the literature, it is found that the attitudes, knowledge and the barriers are the three main factors which influence towards research accomplishment (Memapour *et al.*, 2015; Amin *et al.*, 2012; Khan *et al.*, 2006; Khan *et al.*, 2007; Khan *et al.*, 2009; Vodopivec *et al.*, 2002; Burgoyne *et al.*, 2010). Attitudes and knowledge towards scientific research has been evaluated

in both developed and non-developed countries (Vodopivec *et al.*, 2002; Khan *et al.*, 2006; Amin *et al.*, 2012).

A study done by Vodopivec *et al* (2002) had evaluated the attitudes of medical students towards research and had examined a deprived knowledge regarding the scientific methods at the beginning of their education. However it has been shown that conducting workshops regarding research methods had improved the knowledge and attitudes of Pakistani medical students (Khan *et al.*, 2007). Though the knowledge and the attentiveness about research methodology are the important fundamentals in order to complete a research successfully (Memapour *et al.*, 2015), several studies have shown insufficient knowledge of medical students (Vodopivec *et al.*, 2002; Amin *et al.*, 2012) where they showed a lower knowledge score on a standard knowledge scale. Contrastingly positive attitudes towards research have been described among Irish (Burgoyne *et al.*, 2010), Pakistani (Khan *et al.*, 2007; Khan *et al.*, 2009) and New Zealand (Park *et al.*, 2010) medical students.

Nevertheless, the involvement in research in a compulsory manner had shown to be enhancing the knowledge and attitudes towards research among undergraduate students (Khan *et al.*, 2006). According to literature, number of factors had been discovered that could be predisposing towards positive attitudes for undergoing research among medical students (Amin *et al.*, 2012). These include extensive training through projects in their early careers (Khan *et al.*, 2006), extremely motivated staff members (Burgoyne *et al.*, 2010), motivational remuneration (Shewan *et al.*, 2005) etc.

The ultimate factor which is affecting towards research is the barriers as mentioned above. The factors which are encountered as the barriers towards research among medical students are insufficient perception of study design (Burgoyne *et al.*, 2010), time constraints (Burgoyne *et al.*, 2010; Rosemann and Szecsenyi, 2004; Wang and Guo, 2011; Amin *et al.*, 2012; Nel *et al.*, 2014), inadequate funds to conduct research (Shewan *et al.*, 2005; Subzwari *et al.*, 2009), absence of proper research training (Subzwari *et al.*, 2009; Vujaklija *et al.*, 2010; Nel *et al.*, 2014), hesitation about the capability to carry out a research study of their own (Burgoyne *et al.*, 2010; Wang and Guo, 2004; Vujaklija *et al.*, 2010), absence of interest towards research (Jowett *et al.*, 2000); lack of fundamental facilities such as internet, laboratory equipment's and other resources (Amin *et al.*, 2012) and insufficient guiding or mentoring (Amin *et al.*, 2012; Burgoyne *et al.*, 2010; Levine *et al.*, 2005; Subzwari *et al.*, 2009) etc. All these factors could possibly hinder the students' contribution to research.

Moreover, it has been concluded that the study of research design and statistics are the factors which induce the students' stress and unwillingness towards research (Forte, 1995; Royse & Romph, 1992). Previous studies have revealed that though the students demonstrate readiness to participate in research, poor knowledge about the scientific method has been an obstacle (Khan *et al.*, 2009 and Amin *et al.*, 2012).

3. HOW TO OVERCOME THE BARRIERS

If there is anything possible to transform these obstacles into advantages it would be a great concern. As such, several studies have suggested some ways to overcome these barriers mentioned above. Singh and Choudhary, (2015) had indicated that it is essential to make the students aware about the importance of research in their classrooms. Educators have also mentioned that extra experience in a related research project can be a factor that boosts the involvement in research (Heppner *et al.*, 1999).

Wang and Guo, (2011) had shown the necessity of an instinctive research which might increase the positive attitudes towards research. Also it has been shown that it is possible to improve the attitudes towards research among the students as well as among the overall population by means of introducing a compulsory course on research methodology early in to the curriculum (Vujaklija *et al.*, 2010).

Furthermore, as most of the students are not much aware about the research methods certain approaches have been suggested by Burgoyne *et al* (2010) which includes letting the students know about various research opportunities, promoting research occasions, providing financial support to conduct research, admiration of students who have completed research successfully, conducting meetings to discuss about research and to promote taking part in studies etc.

This inspiration of students regarding the research activities could be more beneficial to fill up the emptiness of physician-scientists in the medical field (Khan *et al.*, 2006). Therefore provision of an appropriate atmosphere to conduct research was identified in certain studies done previously (Vujaklija *et al.*, 2010; Mark and Kelch, 2001). This could be achieved by uplifting the involvement of staff members in students' research activities by securing their time for the supervision (Siemens *et al.*, 2010).

4. CONCLUSION

Learning throughout the life time or engaging in higher studies other than the fundamental studies can be considered as remarkable points of one's career. Research is an important element that finds evidences to update the existing knowledge and concepts. Therefore, if there is an engagement of research in an initial stage of the undergraduate period, there would be a propensity to carry out such explorations in the future in their professions as well.

5. FUTURE DRECTIONS

Undergraduate population is an important group in modulating the future of a country through newly discovered knowledge. However, the above discussed positive and negative factors towards research could be differed for different countries depending upon the level of scientific progression of communities. This emphasizes the relevance of carrying out such studies in different countries and among different populations. If these undergraduates will be informed about the benefits that could be obtained through participation in research and if they will be facilitated with a proper environment to conduct scientific research, they could be easily motivated to go through undergraduate research. In addition to that they could be motivated to continue research in postgraduate studies and hence to develop their carrier and also to develop their respective professions.

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