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Relationship of using e-resources with academic performance of medical students: Effects of gender and sector

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ABSTRACT
Objectives:
The current study explored the relationship of using e-resources with academic performance of medical students. Academic performance is measured through grades, writing assignment, research skills and information literacy skills. Effects of gender and sector (public/private) of students on the relationships are e-resources and academic performance is examined.
Methods
We adopted a quantitative research approach to achieve the objectives. Questionnaire is adapted from earlier literature to collect data from medical students. The data from the target population were gathered using a random sample probability approach. Data was collected from students whose roll numbers were divisible by 10. Descriptive and inferential statistics were used to analyze data.
Discussion
Results showed that there exist a positive correlation between perceptions about impact of e-resources, and actual use of e-resources with academic performance. Barriers in the use of e-resources have negatively affected the academic performance. Gender and sector of respondents have influenced the relationship of using e-resources and academic performance.
Conclusion
The use of e-resources in medical libraries helped students to increase their grades, research skills, information literacy skills and to prepare assignments. Medical institution should increase budgetary allocations and services for provision of e-resources to students.

1. Introduction

Access to information is now more important than ever for academic work in higher education institutions. The primary responsibility of academic libraries is to make information resources available to the entire academic community (Oak, 2016). Use of e-resources added new dimensions to learning and thus changes education in many ways, so

libraries make e-sources available to users (Bajpai et al., 2016). Medical libraries provide access to a substantial selection of textbooks, journals, databases, and clinical recommendations to students (Smith, & Johnson, 2018). This access provides medical students with a plethora of knowledge that enables them to undertake research, broaden their expertise, and make decisions about their studies that are supported by the available data.

Use of e-resources have been found to yield positive results at all levels of education by allowing students to concentrate on answers rather than working on laborious tasks of finding print material. The growing use internet, and e-resources demonstrate positive effects on students, teachers and the educational community as a whole (Ololube et al., 2007). The medical profession involves continuous experimentations, unceasing efforts to uncover alternatives to treatment and nonstop aids aimed at solving societal problems (Torpey, 2014). Medical profession is one of the fastest growing and leading professions that are in high demand (Simoens & Hurst, 2006; Torpey, 2014) for ensuring health promotion, protection, and continuity, safety and quality of living of individuals and communities globally. Thus e-resources are necessary for learning of medical students.

Medical libraries frequently help students with resources to publish their findings and give presentations at conferences (Parker, 2022). These chances help students establish their professional networks and strengthen their academic portfolios. Students who have access to internet databases and e-resources may discover the information they need more quickly, which helps them manage their time more efficiently for their studies (Clark, 2022). Medical students form one of the important components of the profession in a continually cyclical manner with stringent selection procedure (Berghout, 2014) been exercised by many universities around the world.

It is generally accepted that availability and use of e-resources will increase academic performance of students. According to Nalah (2014), academic performance refers to how students manage their studies and how they manage or complete various tasks assigned to them by their teachers. Research has repeatedly showed a favorable association between academic achievement and library resources. Academic performance is positively and significantly impacted by the utilization of library resources. Better grades and general academic achievement are influenced by having access to a variety of knowledge, getting professional advice from librarians, developing critical thinking abilities, and developing better study habits. The most well-known metric of academic success is grades, which are used to quantify this achievement (Ginika, 2017). As a result, academic performance is the capacity to learn, retain, and transmit information either orally or in writing. Reading is one of the most crucial academic abilities since it promotes healthy study habits and academic success.

The increasing use of technologies allow students to more easily access a wider range of e-resources, which can improve their academic performance and help them better understand various fields of study (Brown, 2019). With the use of e-resources, students may conduct in-depth studies of the literature, which is crucial for research projects and academic assignments (Garcia, 2017). Students rely heavily on e-resources to finish courses and submit projects before the deadline. Academic success may be influenced by the accessibility of resources and assistance. Students who have access to rich materials do better on tests, gain comprehensive knowledge, and prepare for examinations. As students advance to clinical rotations, they rely on medical library resources to guide their clinical decision-making (Johnson, 2021).

A significant and well-established link exists between use of resources and the academic success of medical students but the impact of using e-resources on academic performance

may be affected by the student's effort, previous education, parental education and family income, their own motivation and learning preferences. Miller and Brich (2007) noted that a variety of factors can have a favorable or negative impact on students' academic achievement following access to e-resources. It is generally believed that students who have performed better or better in their studies go beyond their online research efforts to find material that will help them be more successful in future academic years. According to Amponsah and Onuoha (2013), academic libraries and student learning outcomes have a beneficial association. Test scores are higher for students who visit libraries often than for those who do not. For a variety of reasons, including a lack of knowledge on how to use the catalog, which helps library users find or identify the materials they need, and a lack of student library orientations or seminars, the majority of students no longer use libraries. Other issues raised concern the dearth of library materials, the arrangement of items on the shelves, outdated collections, and inadequate infrastructure. The current study is designed to check the effects of gender and sector (public/private) on the association of e-resources with academic performance.

2. Research Questions

According to Ginika (2017), library staff, resources and infrastructure are set up to facilitate learning of academic community. These facilities may result in educational growth and improved academic outcomes. This study aims to determine the effects of gender and sector of institutions on the relationship of using e-resources with academic performance of students of medical institutions in Lahore. The following research questions are designed to achieve these objectives:

1. What are the perceptions of medical students about the impact of e-resources, actual use of e-resources and barriers in using e-resources?
2. What is level of academic performance of medical students?
3. What connections do exist between use of e-resources and academic performance of medical students?
4. How gender and sector of institutions have impacted the relationship of using e-resources and academic performance?

3. Review of literature

3.1 Relating use of e-resources with academic performance

Academic performance often improves for students who utilize library services frequently. Numerous studies have revealed a positive relationship between using libraries and academic performance. Ololube et al. (2007) examined the impact of the internet and libraries on students, teachers. They found positive and moderately high achievement at all educational levels from computer use in school subjects. It allows students to focus on strategies and interpretation of answers rather than spending time on tedious computational calculation. There was an improvement in academic performance and understanding as a result of access to a wide range of academic resources, including books, journals, databases, and reference materials (Smith, & Jones, 2018)). Students who have access to library resources are better able to locate reliable reference sources, which lowers the possibility of plagiarism in their academic work (Brown, 2019). Libraries frequently provide quiet study areas and materials that support concentrated learning (Harris, 2020). Mandrekar (2020) claimed that there is a notable and substantial relationship between library use and student achievements and performance. This study

proposed that students should learn how to use information programs to become more aware of the contents, services and facilities. Making effective use of library resources can increase students' self-efficacy and confidence. Students are more likely to succeed academically when they believe they can discover and use knowledge efficiently (Clark, 2021).

3.2 Relating using of e-resources with grades

Previous literature showed that examination grades had positive association with use of library resources. Scoulas et al. (2019) examined connections between student visits to the library, use of library resources, and satisfaction with library space with student academic achievement. The majority of students' use of library resources (such as journal articles and databases) was positively associated with their GPAs, while visits to library students and satisfaction with the library environment were negatively associated with student GPAs. A study conducted by Jan et al. (2019) found a positive relationship of emotional intelligence, library use and grades of students. The students who scored relatively higher on emotional intelligence regularly went to the library at their educational institution. The academic achievements (GPA) of these students and emotional intelligence were found to have a favorable significant association.

Exam performance can be enhanced by using medical resources from libraries, such as books and online databases. Medical students' test performance is considerably impacted by library resources including textbooks, medical databases, and study areas. Students who have access to thorough resources are better prepared, comprehend difficult subjects, and perform well on exams. As medical students go into clinical rotations, library resources become increasingly important for making knowledgeable clinical judgments (Johnson, 2021).

3.3 Impact of e-resources on critical thinking, writing and publishing

Impact of using e-resources on critical thinking, writing and publishing skills was found by earlier researchers. Students are better prepared to write well-structured, well researched papers and presentations when they use e-resources for research and information collection (Roberts, 2018). Medical students' use of library resources helps them develop their critical thinking abilities. They gain the ability to interpret study results, judge the reliability of sources, and make wise clinical judgments (Taylor, 2020). Publishing research is dependent on use of library resources. Medical students frequently use libraries to publish their research and share their findings at conferences. These opportunities not only strengthen students' academic records, but also develop their capacity and aptitude for research (Harris, 2021). Library resources help people hone their writing abilities (Parker, 2021).

3.4 Impact of using resources on personality development

Earlier studies also found positive effects of using library resources on personality development, communication skills and time management. Srivastav (2018) conducted a study to establish the influence of library consumption on academic performance. According to the findings, there is a beneficial relationship between library study and students' academic achievement, knowledge and personality development. However, spending time in the library is not always necessary for good academic performance, as academic success also depends on hard effort and dedication. According to Taylor (2019),

utilizing services and facilities of libraries helps students improve their time management abilities, which are crucial for academic achievement.

Students studying medicine who utilize libraries for research and assignments frequently show improved communication skills. They can successfully communicate medical topics both in written and spoken presentations (Taylor, 2020). Students who have access to internet databases and library resources may discover the information they need more quickly. This ability of searching helps them manage their time more efficiently for their studies. Information retrieval is streamlined by having access to research databases and library resources, which enables students to schedule their time wisely for their studies (Clark, 2022).

3.5 Factors affecting relationship of e-resources and academic performance

Some authors have examined different factors affecting the relationship of using e-resources and academic performance. Miller and Brich (2007) noted that a variety of factors can have a favorable or negative impact on students' academic achievement following access to library and internet services. This may be due to the student's effort, previous education, parental education and family income, their own motivation and learning preferences. It is generally believed that students who have performed better or better in their studies go beyond their online research efforts to find material that will help them be more successful in future academic years.

According to the results of a study conducted by Vichea et al. (2017) on the impact of library use on students' academic performance and their perception of whether library use contributes to improving their academic performance, 13.79% of female students strongly agreed that use of library improved their academic performance. Overall, men view library uses as a more important factor than women in boosting academic achievement.

4. Research Methodology

The current study used quantitative approach. According to Creswell et al. (2009) “quantitative exploration is a means for testing goals and speculations by analyzing the relationship among factors. These factors, thus, can be estimated by an instrument”. This is a quantitative research in terms of nature. Although there are several instruments available for gathering data from a population, including questionnaires, interviews, and observations, the researcher chose to utilize the questionnaire to get information from the audience being studied. As per Blaxter (2010) stated that a questionnaire is the ideal tool for collecting data from a large, dispersed group. According to (Rea & Parker, 2005), one of the advantages of questionnaires is that they can be reproduced in different communities or within the same population after a few years. A questionnaire is a technique that many researchers use when they have a large population in their study.

Questionnaire was adapted through review of literature keeping in mind the objectives of the study (attached in the annexure). To ensure that the questionnaire's content is legitimate, an expert review is required. To get their insightful opinion on the questionnaire, three experts were provided the draft of it. Experts were chosen based on their expertise, professionalism, and participation in library initiatives at both public and private institutions in Lahore. Experts made insightful ideas to raise the questionnaire's validity. Pilot testing is carried out on a limited scale to detect errors and issues about data collection. Students at Lahore's medical institutions verified the validity of the data collection tool. The questionnaire was filled out by five (05) students, who were also asked not to complete it again during the final data collection procedure. To test the tool's

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reliability, the entire questionnaire was subjected to Cronbach's alpha analysis. Cronbach's alpha value ranges from 0.72% to 0.84%, for different items which is quite good.

The data from the target population were gathered using a random sample probability approach. According to Sheble et al. (2009), probability sampling approaches provide every member of the population an equal chance of being chosen. After twelve years of education in science, students are enrolled into universities to study medicine. MBBS program in Pakistan is a discipline that starts with 12 months in preliminary science-based courses, 18 months preclinical/Basic Medical Sciences (i.e. human anatomy and physiology and medical biochemistry) and 42 months as clinical training in teaching hospitals. The population of this study was the current enrolled MBBS students of public and private Medical Colleges of Lahore. As per (PMDC, 2023) The total number of students of public and private medical colleges are 17900. These students are enrolled in the twenty-three (23) public and private medical institutions in Lahore. Data was collected from students whose roll number was divisible by 10.

For collection of data, the questionnaires were distributed to students at several medical institutions in Lahore. Students were also followed up periodically to ensure that they had returned the questionnaires. The information collected was incorporated into version 22 of the Statistical Package for Social Scientists (SPSS). The questions were assigned different codes and numbers. Descriptive and inferential statistics were used to resolve the assertions independently and illustrate the results. The frequency was determined to examine the effects of consumption of library resources on the academic achievement of students of Lahore Medical College. SPSS file was bifurcated on the basis of gender and sector to examine differences in relationship through Pearson Correlation.

4. Results

4.1 Demographic information of the respondents

The table 1 shows that out of 343 respondents, 143 (41.7 %) were male and 200 (58.3%) were females. Its shows that majority of the respondents were female. In respect of studying in public or private sector, 168 (49 %) belonged to public sector and 175 (51%) belonged to private sector. Its shows that majority of the respondents were from privet sector.

Table 1: Demographic information of respondents (N=343)

Demographic information		
Gender	**Frequency**	**Percent**
Male	143	41.7
Female	200	58.3
Nature of institutions		
Public	168	49.0
Private	175	51.0
Total	**343**	**100.0**

4.2 Perception about impact, actual use and barriers in using e-resources

The score for perception of students about the impact of e-resources on academic performance shows that students rated it higher as compared to actual use of e-resources. They feel that use of electronic resources is good for increasing their academic capabilities. The mean score for actual use of e-resources shows that students sometime used e-resources. Their score is less than always or often. The average score for barriers in the use of e-resources shows that students faced less barriers.

Table 2: Perception about impact, actual use and barriers in using e-resources (N=343)

Constructs	**Mean**	**St.Dev**
Impact of e-resources	3.55	1.34
Actual usage of e-resources	2.49	0.86
Barriers in the use of e-resources	2.72	1.56

4.3 Academic performance of medical students

The table 3 shows an overview of the distribution of grades or performance levels among the group. It indicates that the majority of students fall within the 61-80% grade range, with smaller proportions (17.2%) are achieving 81% and above grades. Less percentage of students (6.1%) remained below 60%.

Research skills, information literacy skills and writing assignments, notes or presentations received slightly lower but moderately positive ratings. Higher mean ratings suggest greater confidence in these areas, indicating a positive perception of respondents' abilities. Research skills were rated at 3.32, with an average positive perception of their performance. Information literacy skills were rated at 3.36, with an average positive level of performance. Overall, respondents felt they perform well in various aspects of their work.

The respondents generally felt they perform fairly well in completing writing assignments, with an average rating of 3.30. They also had a slightly more positive perception of their ability to prepare presentations, with an average rating of 3.41.

Table 3: Grades and skills

Grades	**Frequency**	**Percent**
Below & 60%	021	06.10
61-70%	124	36.20
71-80%	139	40.50
81% & above	059	17.20
Type of Skills	**Mean**	**Std. Deviation**
Information Literacy Skills	3.36	01.02
Research Skills	3.32	01.10
Writing assignments, notes and presentations	3.29	0.92
Total	**343**	**100.0**

4.4 Effects of gender on relationship of using e-resources with academic performance

A positive correlation exists between the perception about the impact of e-resources with four indicators of academic performance. There is difference on the basis of gender on this relationship. Perceptions about the impact of e-resources for female students have significant relationship with grades but no significant relationship for male. The perception of impact of e-resources have significant relationship with information literacy skills, research skills and writing assignments on the basis of gender. In case of research and information literacy skills, the relationship for female is strong (value of Pearson coefficient is double) as compared to male students but for writing assignments, relationship for male is strong as compared to female students.

Actual usage of e-resources has no relationship with grades and writing assignments. It has significant relationship for research and information literacy skills and there is a difference in this relationship on the basis of gender. The relationship of actual usage of e-resources with information literacy skills is stronger for female and with research skills is stronger for male students.

In respect of barriers in using e-resources, significant negative relationships exist for grades and information literacy skills for only male students and no such relation is found for female students. Research skills and writing assignment are not affected by the barriers using e-resources (See table 4).

Table 4: Effects of gender on relationship of using e-resources with academic performance

Types of correlation	**Male (143)**		**Female (200)**	
	Pearson Coeff.	**Sig**	**Pearson Coeff.**	**Sig.**
Impact of e-resources and grades	.085	.313	**.180***	**.011**
Impact of e-resources and IL skills	**.234***	**.005**	**.423****	**.000**
Impact of e-sources and research skills	**.203***	**.015**	**.466****	**.000**
Impact of e-resources and writing	**.308****	**.003**	**.232****	**.001**
Use of e-resources and grades	.020	.787	.122	.085
Use of e-resources and IL skills	**.352****	**.000**	**.186****	**.008**
Use of e-resources and research skills	**.101**	**.230**	**.234****	**.001**
Use of e-resources and writing assignments	.055	.515	.030	.669
Barriers in using e-resources and grades	**-.165***	**.050**	-.120	.090
Barriers in using e-resources and IL skills	**-.174***	**.037**	-.128	.071
Barriers in using e-resources and research skills	-.053	.528	-.125	.077
Barriers in using e-resources and writing assignments	-.082	.328	-.002	.979

4.5 Effects of sector on relationship of using e-resources with academic performance

A positive correlation exists between the perception about the impact of e-resources with three indicators of academic performance except grades. There are slight differences on the basis of sector of respondents on this relationship. For students of private medical colleges, the relationship scores for impact of e-resources with research skills and writing assignment is higher but lower for IL skills.

Actual usage of e-resources has significant relationships for grades, research and information literacy skills. The actual use of e-resources has significantly increased the grades of medical students of private sector but no increase for students of public sector

students. The relationships of actual usage of e-resources with IL and research skills are stronger for private sector students.

In respect of barriers in using e-resources, significant negative relationships exist for grades, IL skills and writing assignment on the basis of sector but do not exist for research skills. Barriers in using e-resources have negatively affected grades of private sector students and IL skills and writing assignments of students studying in government medical colleges (See table 5).

Table 5: Effects of sector on relation of using e-resources with academic performance

Types of correlation	Public (168)		Private (175)	
	Pearson Coeff.	Sig	Pearson Coeff.	Sig.
Impact of e-resources and grades	.057	.460	.089	.201
Impact of e-resources and IL skills	**368****	**.000**	**.342****	**.000**
Impact of e-resources and research skills	**321****	**.000**	**.418****	**.000**
Impact of e-resources and writing assignments	**.252****	**.001**	**.271****	**.000**
Use of e-resources and grades	.058	.459	**.215****	**.004**
Use of e-resources and IL skills	**.190***	**.013**	**.296****	**.000**
Use of e-resources and research skills	**.171***	**.027**	**.174***	**.022**
Usage of e-resources and writing assignments	.088	.258	.007	.928
Barriers in using e-resources and grades	.093	.229	**-.200****	**.008**
Barriers in using e-resources and IL skills	**-.174***	**.024**	-.131	.085
Barriers in use e-resources and research skills	-.145	.062	-.023	.759
Barriers in using e-resources and writing	**-.150***	**.051**	-.066	.384

5. Discussion

There is a positive relationship of using e-resources with academic performance of medical students. Use of e-resources should be promoted by libraries of medical institutions. Barriers in the use of e-resources have negative relationship with academic performance. Medical libraries should strive to enhance the use of e-resources by reducing barriers. Gender based interventions are required by libraries as there are differences in the relationships of using e-resources with academic performance with respect to male and female students. There are variations in the relationships of using e-resources with academic performance for public and private sector medical institutions. These results have insights for public and private sector medical students

6. Implications

The current study is a significant contribution in the use of e-resources for medical students. The findings will be useful in understanding how the use of library resources affected the academic performance of medical students. The results have implications for policy. The use of e-resources is essential to the growth of any sort of medical education. The development of library resources use policy is a direct implication of this research. The libraries of medical institutions should encourage users to use relevant and up-to-date electronic resources to ensure the quality of research and academic output. It will also improve the ranking and the global visibility of the medical institution. The policy must guide to conduct periodic assessments of user needs. Providing continuing education for

the use of e-resources will be helpful for students to achieve academic excellence. The introduction of training courses on the use of electronic library resources for medical students and faculty members would be extremely beneficial to their personal and professional performance.

This study has implications for practice. It is helpful for students as well as faculty to introduce themselves with resources of medical libraries. The results have insight for higher administration of hospital and medical colleges to improve the library e-resources. It has also implications for researchers. Library and information professionals should undertake frequent user studies to better identify and resolve problems that library users may encounter (Ullah & Ameen, 2023).

7. Conclusion

The e-resources of medical libraries helped the medical students to update knowledge, improve the research skills and prepare assignments. Medical institution should increase budgetary allocations for subscriptions to more academic databases relevant to students' courses. The administration of medical institutions should provide a favorable and comfortable learning atmosphere by improving ICT infrastructure to provide easy access to electronic resources through fast internet connections. Medical librarians and educators should work together to promote and educate students about vital electronic resources. It is advisable to implement an integrated curriculum ensuring advanced information skills, access and use of available data to support clinical decision making and a basis for learning for life. The institution's academic supervision and mentoring program should work hard to establish effective contact with students to direct online educational resources. Medical faculty and students are regarded as key system stakeholders since their psychological needs are closely related to one another. Therefore, studies about the usage of e-resources by patrons of medical college libraries must also be carried out in underdeveloped nations like ours. For students and faculty to gain more from the learning process in the form of success, the government and policy makers should give the libraries of medical institutions serious consideration. This study suggests that medical institutions should support cutting-edge software to make the most of their library resources. The management of medical institutions should set up workshops, seminars, and training sessions on how to use library e-resources in various ways. Library professional should conduct the information literacy session for their users. Library professionals of medical libraries should watch tutorials available on various sites to enhance their knowledge about e-resources. It is also strongly recommended to adopt standardized electronic measurement tools for data collection and sharing to enable informed decisions.

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