An Analysis of the Correlation Between Academic Library Use and Student's Academic Performance: A Case Study of UDS -Wa Campus

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Abstract

The University for Development Studies (UDS) was established in May 1992 by the Government of Ghana to "blend the academic world with that of the community in order to provide constructive interaction between the two for the total development of Northern Ghana, in particular, and the country as a whole" (PNDC Law 279, Section 279). The UDS Library complex provides information and bibliographic support for the four campuses (Nyankpala, Wa, Navrongo, Tamale) and the Graduate School. The collection of the Wa Campus Library has been split into two: one at Kambali, and the other at Bamahu. The Input-Environment-Output (I-E-O) model was adapted to explain relationships between students' development and students' input and learning environments. This study discusses the impact library usage has on academic achievement and performance of students. Usage statistics were gathered at the Wa campus library (Bamahu and Kambali). The results showed that students who use the library have a higher CGPA and higher academic performance than non-library users. The findings reveals that students' use of the library is statistically significant to student grade point average (CGPA), and that access to electronic resources will be the most beneficial resource students should have in order to attain excellent academic performance and development.

Keywords: Library use, Academic achievements, students' performance, UDS-Wa campus, Ghana.

1. Introduction

The University for Development Studies (UDS) was established in May 1992 by the Government of Ghana to "blend the academic world with that of the community in order to provide constructive interaction between the two for the total development of Northern Ghana, in particular, and the country as a whole" (PNDC Law 279, Section 279)". The UDS was borne out of the new thinking in higher education which emphasizes the need for universities to play a more active role in addressing problems of the society, particularly in the rural areas" (Effah, 1998). The university by its mandate and constituency has a pro-poor focus. This is reflected in its methodology of teaching, research and outreach services. The specific emphasis on practically-oriented research and field-based training is aimed at contributing towards poverty reduction in order to accelerate national development: It began academic work in September 1993 with the admission of thirty-nine (39) students into the Faculty of Agriculture, (FOA), Nyankpala. The Faculty of Integrated Development Studies, (FIDS), Faculty of Planning and Land Management (FPLM) and Faculty of Education (FOE), Wa, School of Business, Wa, School of Medicine and Health Sciences (SMHS), Tamale, Faculty of Renewable Natural Resources (FRNR), Nyankpala, Faculty of Applied Sciences (FAS), Faculty of Mathematical Sciences (FMS), Navrongo and the Graduate School now in Tamale were phased in from 1994 to date.

UDS is unique compared to other public universities in the following ways, its location and multi campuses are spread out in rural northern Ghana where the incidence and intensity of poverty is high. Its vision is pro-poor aimed at addressing the conditions and structural causes of poverty. The UDS has four (4) campuses, seven (7) Faculties, a Business School, one Medical School, one Graduate School and three (3) research centers, several programs are run at these places. The UDS also runs a community-technical interface programme. This is a combination of the academic and community-based field practical work known as the Third Trimester Field Practical Programme (TTFPP).

Academic libraries are essential contributors to knowledge generation and serve a wide spectrum of knowledge seekers. In fact, academic libraries have been described as the "heart" of the university, because they provide a place for students and faculty to do their research and advance their knowledge. The fundamental role of any academic library is to collect process and store, disseminate and utilize information to provide services to the academic and research community (Soria et al., 2013; Wong and Webb, 2011). Librarians and library staff provide numerous services to their users in order to address their diverse needs and interests. Both the faculty and students depend heavily on the library for information that is necessary in pursuing their individual and collective goals. Information is now considered as the fifth factor of production because it is needed in all stages of human development. People need information to learn new skills and also to satisfy their course/academic demands. One primary objective of any library is to maximize the intensive use of its resources and services (Soria et al., 2013). Library materials are acquired to be used adequately in order to justify the huge amount of money invested in such resources. The effectiveness of a library as an instrument of learning is determined by

the success with which it is able to provide the user with relevant information (Wong and Webb, 2011). Traditionally the library's effectiveness was measured in relation to completeness and balance of collection, the adequacy of acquisitions, cataloguing etc. In recent times, the focus has shifted towards the other end of the knowledge communication process: the users. With the advent of online catalogues, online databases, other electronic resources (CD-ROM), access to information and new methods of document delivery, the role of the academic library is changing (Wong and Webb, 2011). Users do not have to be physically present in the library in order to access the library's resources (Soria et al., 2013; Kuh and Gonyea, 2003).

The UDS Library complex provides information and bibliographic support for the four campuses (Nyankpala, Wa, Navrongo, Tamale) and the Graduate School. The collection of books and other information materials facilitates teaching, learning, research and knowledge dissemination in the University. In addition, users gain wider knowledge of the world around them, as it provides diverse reading materials on a wide range of subjects. The collection of the Wa Campus Library has been split into two: one at Kambali, and the other at Bamahu. The collection here is on the social sciences --- economics, commerce, finance, sociology, management, etc. Other areas specially covered are psychology, religion, history, geography, political science, law, languages and literature, planning, development.

2.1 Literature Review

Libraries performance and impact on users have long being measured (Soria et al., 2013). The American Library Association as early as 1924 developed a practical guideline and tool for libraries to evaluate their administration, maintenance, and service (Wong and Webb, 2011). In 1950, the Library Association (UK) systematically appraised the United Kingdom's public library service. Institutions and researchers writing about academic library assessment only became more common later. For instances, in 1974, Charles Weinberg developed an interesting and pioneer Bayesian method to assessing the information value of the resources provided by academic libraries, amidst studying user evaluation of individual items (Wong and Webb, 2011). Academic libraries are vital to the fundamental mission of colleges and universities across the nations and Ghana for that matter UDS library is not an exception. To that end, George D. Kuh and Robert Gonyea noted that "the library is the physical manifestation of the core values and activities of academic life […]; the library's central role in the academic community is unquestioned" (Kuh and Gonyea, 2003). Questioning the importance of libraries to student learning, is according to Kuh and Gonyea (2003), "almost heretical"; yet, along with other higher education colleagues, academic librarians face increased external pressure for accountability while also undertaking ongoing internal commitments to improvement (Soria et al., 2013).

Although the literature shows the importance of measuring the relationship between student library usage and their academic performance, only few studies have actually been undertaken in Ghana. One of the most famous studies was conducted by Knapp in 1966. He found that students who attended more library skills programs acquired higher grades and CGPA scores. Robinson and Schegl (2004) found a statistically significant correlation between citation behavior and assignment grade but suggested that the correlation might have been based more on quantity of citations than on quality (Wong and Webb, 2011). In assessing the relationship between book loans and academic success, Barkey (1965) found that students who checked out books got higher CGPAs than others. However, due to the technological limitation in those days, Barkey showed in the same paper that this result was "not very reliable." In a more recent study, De Jager (1997) was able to demonstrate a positive relationship between student course grades and their book loans. However, his study involved only 240 students and two courses. This suggests that, there is little published research findings discussing the measurement of the relationship between student academic performance and their use of library resources (Wong and Webb, 2011). Library research scholarship within the last two decades has increasingly addressed important questions related to the impact of libraries on students' acquisition of information literacy skills and development of critical thinking skills. Kuh and Gonyea's comprehensive, multi-institutional study affirmed that students who attended institutions that promoted the importance of information literacy reported higher levels of information literacy. Early studies demonstrated that participation in academic activities (which included library experiences) was moderately correlated with students' gains in critical thinking skills (Ory and Braskamp, 1988). Similarly, students engaged in more focused library activities reported significant impacts on their critical thinking skills (Whitmire, 1998).

Other studies have examined the association between library use, student learning, and student engagement; found that participation in information and library-related activities (for example, using the library website to find academic resources, asking librarians for help, etc.) were positively and moderately correlated with student engagement in other areas; namely, participation in information technology was associated with factors the researchers labeled as active and collaborative learning (for example, working with other students on class projects, working with other students outside of class, etc.), student-faculty interactions (for example, discussing grades or assignments with faculty, talking about career plans with faculty, etc.), and academic challenges (for example, working harder than students thought they could to meet an instructor's standards,

preparing two or more drafts of a paper before turning it in, etc.) (Thomas et al, 2005). Beyond student participation, researchers have found that the support institutions provide to academic services results in increased engagement. Institutional expenditures on academic support (including libraries) have strong positive correlations to student engagement (Pike et al, 2006). Although, some researchers have examined the association between library use and students' academic performance; however, many of those studies present limitations due to their age or limitations in sample sizes. More contemporary evidence of associations between library use and students' academic performance is needed since more concrete and reliable research is somewhat lacking.

2.2 Conceptual Framework: I-E-O MODEL
Foundation of the research was student development theory which focused on institutional impact on students' development. Astin's (1988, 1993a, 1993b) Input-Environment-Output (I-E-O) model was adapted to explain relationships between students' development and their input and learning environments. Astin stated that students' development is closely related to students' involvement with their friends, academicians and academic programs. This approach gave attention to the impact of institution's education on students. Involvement theory (Astin 1988, 1993a, 1993b) which posits that students' development is related to the quantity and quality of their involvement in various academic and social activities was explored. Active involvement in academic activities, co-curricular activities and interactions with lecturers, friends and other staffs were found to influence students' learning, academic performance and development positively. Students who put in a lot of effort are expected to obtain maximum learning, academic performance and development.

Input factors considered in this research were demographic factors and students' prior academic achievement. Environmental factors considered involve academic and social aspects. Academic achievement as measured by the CGPA and development of competencies were the output in this research. The Involvement theory was explored through environmental factors such as interaction with lecturers, interaction with friends, academic effort, co-curricular activities and instrumental tactics. According to Astin, inputs are personal qualities that the student brings to college, whereas the environment consists of the student's actual experiences during his/her college education. The outputs consist of the student's developmental aspects that the college seeks to influence. In the present study, inputs included students' demographic characteristics and academic preparation. The primary environmental experience of interest was students' use of library resources. Secondary environmental experiences included the student's college or school, credit load, living arrangement, financial situation, and participation in Freshman Learning Communities (FLCs) (Wong and Webb, 2011). The output of interest was students' academic performance. According to Astin, analysis of the effect of environmental experiences on outputs is the main concern of the research on the impact of college. This is because environments can be modified to offer students a better experience and enhance their academic performance or progress. According to Astin, outputs are affected by both inputs and environmental experiences. As Astin's model further shows, inputs are almost always related to environmental experiences.

This therefore presents an analytical challenge: "any observed relationship between environments and outcomes might well reflect the effects of inputs rather than the actual effects of environments on outcomes" (Wong and Webb, 2011). In fact, previous studies that examined the relationship between library resources and academic outcomes failed to take into account that students' use of library resources may be a function of a number of factors, and that these factors, in turn, may be related to student academic outcomes. In other words, self-selection bias is a threat in studies that examined the relationship between student use of library resources and academic outcomes. This is because, in general, students make a decision to use or not to use library resources. Consequently, students who use library resources may differ systematically from those who do not use these resources. To deal with self-selection, we used a quasi-experimental design in order to eliminate, or at least substantially decrease, the relationship between inputs (student characteristics) and the primary environmental variable of interest (use of library resources). This approach allowed us to estimate the impact of library resources on academic outcomes more accurately. As far as Ghana is concern, the researcher has not come across any research on student performance and development that incorporated the I-E-O model and Astin's involvement theory. Hence, this research provided a new perspective in looking at student development and academic performance in the Ghanaian context.

3.0 Research Methodology
This research uses primarily the case study method, supplemented with interviews and questionnaire to gather information from students and library staffs on the use of academic library and students' achievements and performance at Wa campus of UDS.

3.1. Case Study
The study adopted a case study research design. The term "case study" may mean different things to different people. This is often a source of confusion and misunderstanding (Collis & Hussey, 2003). Benbasat (1984),

Bonoma (1985), Kaplan and Ducchon (1988), Stone (1978), and Yin (1984) defined a case study as an examination of phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups or organizations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used. The case itself may take many forms, although the focus of inquiry is usually small in scale, as not only are case studies frequently characterized by micro level research but are also typically descriptive and qualitative in nature. As an approach to research, case study has much to offer in terms of both theory and practice. The choice of case study in this research is based both on its own nature as well as the specific attributes of the research. Another important reason for employing case studies in this research is that it provides a basis for the closer integration of theory and practice. Case study research is the most appropriate methodological tradition, given that the purpose of the study emphasizes the context of library use and students academic performance/achievements. To gather accounts of different realities constructed by the two groups of individuals in the same environment, both qualitative and quantitative methods are drawn upon: questionnaire was administered to students and face-to-face interviews were conducted with the library and school staffs.

This study adopts a quantitative and qualitative approach. The methods were chosen to allow the researchers to reach out to considerable numbers of the students and sample from the entire population of students who are regular library users of the University for Development Studies. This sample was chosen from the students who registered with the library. A total of 1,000 students were chosen from the 5,000 regular library users. The researchers arrived at this figure using Israel (2003) model which stipulates for instance, that given a total population of N= 1000, if (-+5%) is taken for precision levels where confidence level is 95% and P =.5, the sample should be 286. In this study, the population of regular library users is 5,000 and (-+) 3 is taken; this gave a total of 909 which is within the range of the sample of 1,000. A purposive sampling technique was embarked upon to select 200 students from each of the four faculties of the University. Purposive sampling was used to ensure that each faculty was equally represented. In addition, a total of 17 library and school staff were interviewed. These include the head of departments, the registrar, faculty officers, the deans from the four faculties of the Wa-campus, the campus librarian, and two other senior library assistants.

3.2. Survey Questionnaire

A survey questionnaire tagging uses of the academic library scale developed by the researchers was used. They were in line with the content of what is being measured, thereby ensuring the content and the validity of the questionnaire. The reliability of the questionnaire was determined via a test-retest reliability method at two weeks' intervals. The reliability co-efficient via Cronbach Alpha return at r = 0.87. This indicates that the questionnaire is highly reliable and can adequately help to achieve the objectives of the study. The survey questionnaire included items to establish individual students' use of the school library, the academic achievement/performance of the students who use the library and those who do not use the library.

3.3. Interview

In addition to the questionnaire administered to the students to collect data on their uses of the library, a face-to-face interview was also conducted for the library users, library and school staffs to gather information on the academic achievements of students who use the library. In this regard, the questions asked were based on two themes: 1) does academic library use contribute to high CGPA and better academic performance? 2) What impact does the environment of academic libraries have on student's outcomes?

3.4 Procedure of Data Collection

The questionnaire was administered to the respondents in their respective faculty during faculty core courses/ lectures. This is a course that is compulsory for the entire student population in a particular faculty/department at a particular level or year, which all must be present at a particular time for lesson. Arrangement was made with each lecturer in charge of this course in each of the four faculties. Respondents were briefed regarding what the exercise is all about and the rationale behind it. The administration of the questionnaire was hitch free, and the return rate was 100%. The interview was conducted in the library and the respective offices of the interviewed respondents based on the arrangement with the researchers.

3.5 Data Analysis

Quantitative data collected in this study were analyzed, using descriptive statistics which include frequency count and percentages. SPSS Statistical Package for Social Science was used for coding the scores from the study. On the other hand, qualitative data collected were analyzed and presented thematically.

4.0 Results and Discussions
4.1 Students Use of the Library
In seeking the answers to the question how often students use the library, the study reveals that 1800 (36%) students visits the library once every month. The number of students who visited the library to borrow books and for reference/research constituted 12%. Regarding whether if the students who visit the library find the resources they need revealed that, over 90% of students who visit the library usually do not find the resources they need.

4.2 Resources and Services Available at the Library
On the resources, respondents were asked how often they use the following library resources and services. The findings reveal that 13% of students do not use print books during their study at the library. The findings further reveal that 11% of the sampled students used databases and e-journals monthly. About 10% of the students who use database and e-journals are usually graduate students. The use of Audio/CD-ROMs was not common, over 95% of respondents indicated that they do not use Audio/CD-ROMs except the 1% of French language students who use Audio/CD-ROMs. .

On the issue of library services such as use of online catalogue, interlibrary loan and reference queries. This study reveals that 5% of students monthly use the online catalogue to find information available in the Library. Approximately, 4% of students' monthly requested documents through interlibrary loan and about 11% of students weekly approached the library staff for reference queries. Students have a high expectation that the university library will develop electronic/online resources as indicated by 70% of sampled students whiles another 25% of the sampled students are of the opinion that there is a strong need to improve print books in the library. About 99% of students strongly indicated that, there is the urgent need for the university library to improve the space and other library facilities such as individual study carrels and group study room as well as online resources. Another 62% of sampled students indicated that the university library should make concerted efforts towards the provision of IT services particularly printing and photocopying services.

Understandably Library usage varies between academic schools and there are often pedagogic reasons for low usage, but it would appear that, students who 'read' more, measured in terms of borrowing books and accessing electronic resources, achieve better grades. For this study, however, book borrowing, accessing online resources and visits to the library were used as indicators of library use. The researcher found out that there is a high correlation significant of borrowing books, accessing online resources studying in the library and students marks (CGPA) and overall academic performance. This study has concluded that borrowing of books, spending time in the library and accessing online resources indeed correlates significantly with academic achievement and students' performance. Previous studies (Soria et al., 2013) showed that borrowing books of undergraduate students has a positive relationship to their grade point average. This study supports (Soria et al., 2013) that the more library books, e-resources and audiovisual materials students use, the higher their CGPA.

4.3 Influence of Input and Environmental Factors on Output
In this research, input factors explained some of the variations in academic achievement as measured by the CGPA. This finding is consistent with Hoffman's (2002) which indicated that input and involvement are the main predictors in explaining variations in academic achievement. Opp's (1991) also identified input factors as the major predictors in explaining variations in academic performance. Research by Watson (1994), however, showed that students' background (input factors) was less influential in explaining academic achievement compared to environmental factors such students use of library resources, credit load, living arrangements, condition of the library and interaction with lecturers. This is very logical because when students feel they have positive relationships with their lecturers, study in comfortable place, have less credit load and have access to online resources, they report higher involvement especially in learning activities.

For all competencies studied in this research, input contributed less in explaining variations in the competencies compared to the environmental factors. Terenzini et al. (1999) identified environmental factors as very important in the development of problem solving and group skills.

Environmental factors such as course content, academic effort and interaction with friends explained positively development of all competencies measured in this study. This highlights the importance of curriculum, quality and quantity of students' effort in academic aspects and academic relationship with peers in fostering competency development. Interaction with lecturers, writing activities, and computer and library usage were some of the activities that explained variations in learning and development. This finding is supported by (Swigart & Murrell 2001). The importance of interaction with lecturers towards development has also been documented by Chickering and Gamson (1987) as one of the 'Seven principles for good practice in undergraduate education'. However, in this research interaction with lecturers showed negative association with development in competencies. Therefore, academicians must be more concern with their students, committed in conducting teaching and learning process and adapt various teaching techniques to ensure students' mastery of the curriculum and development in critical competencies sought by employers and vital for students well being

in the society.

The teaching and learning process and academic facilities were very important in explaining learning outcomes in this study. Interaction with friends showed positive impact on CGPA

In short, this research supported Astin's (1988, 1993a, 1993b) theory that students' development can be evaluated through their involvement and efforts while at the institution. Students are expected to be actively involved in the learning process. Educators are encouraged to put less emphasis on what they do but instead on what students do in the learning process. Learning outcomes and development will not be maximized if education emphasis is on course content, teaching techniques, books and sources other than the students (Astin 1988).

4.4 Impact of academic library use on Academic performance Achievement

Academic performance and achievement, in this context, considers formal learning associated with the set curriculum and performance in national or local tests. This includes processes associated with reading literacy, attainment of subject knowledge, and information literacy.

The survey revealed statistically significant differences in cumulative GPA between students who used at least one library service compared to students who did not use any library services.

Table 1: Differences in GPA between Students Who Used Library Services and Those Who Did Not Use Library Services

	Non-Users of library services		Users of library services				
	n	M(SD)	n	M(SD)	t	SE(95%CI)	d
GPA	1514	2.98 (0.77)	3804	3.18 (0.66)	-9.09ᵡᵡᵡ	0.02[-0.25.0.16]	-0.28

Students who use the library had an average CGPA of 3.18 compared with the average CGPA of 2.98 for students who did not use the library. The effect size (denoted by Cohen's d) suggests that the difference is close to medium. Further, the data suggest a significant association between library usage and students' first to second year retention ($\chi2 (1) = 6.86$, $p < .01$). Our first model predicting students' CGPA by whether they had used any library service was statistically significant, $F(12, 5190) = 61.32$, $p < .001$. The model explains 12.4% of the variance in cumulative GPA. The model suggests that library usage is positively associated with students' CGPA, with students who used the library reporting a higher grade point average (high academic performance) over students who did not use any library services holding other data constant in the model. Our second model predicting students' GPA by type of library services used was statistically significant, $F (24, 5178) = 34.28$, $p < .001$. The model explains 13.7% of the variance in CGPA. The first logistic regression analysis was conducted to predict student persistence into their second year by whether they had used the library services at least once during their first trimester. The odds ratio suggests that students who had used the library at least once during their first year were 1.54 times more likely to return for the following year.

The second logistic regression analysis was conducted to predict student academic performance by whether they had used different types of library services during the trimesters. A test of the full model against a null model was statistically significant, indicating that the predictors are reliably distinguished between high CGPA and low CGPA ($\chi2 = 99.01$, $p < .001$, $df = 24$) and the model correctly classified 96.7% of the observed cases.

The data suggest that students who used the library at least once in the trimester had higher grade point averages compared to students who did not use the library at all during the trimester. Further, the data suggest that students who used the library at least one time during the trimester had higher CGPA. Both of these findings held when controlling for demographic characteristics, pre-university academic characteristics, and college experience variables. Further, we discovered that the types of library services that students used were also differentially associated with their academic achievement and performance. Four particular types of library resources were significantly and positively associated with students' academic achievement: using the library workstations (indicating physical presence in the libraries), accessing online databases, accessing electronic journals, and checking out books. Only two library activities were associated with students' performance: studying at the library and use of online databases.

When asked "What do you think you have gained by using the library?": 1) Technical or specialist knowledge in your main subject, 2) General knowledge, 3) New aspects or new perspectives, 4) Emotional fulfillment, 5) Critical thinking, 6) Information Literacy (know how to find information), 7) Fun of study/learning, 8) Developed the habit of learning by yourself. Respondent responses showed a high correlation (coefficients of over 0.4) between uses for resource and research and the acquisition of technical or specialist knowledge, demonstrating high correlativity between them. Just because using the library as a place, for instance, does not involve resource utilization, sometimes it is not considered a proper use. The focus group interviews,

however, clarified students' reasons for such use (e.g. "it gives more motivation to study than at home") and the responses showed that students perceive this type of library use somewhat positively as an act that led to "Fun of studying/learning" and "Developed the habit of learning by yourself." Using the library for its materials or research purposes is the most likely usage that has a direct connection to students' achievement and performance of educational outcomes. Thus there is a clear need for libraries to promote this kind of usage. The types of library use that is immediately beneficial for students to achieve relevant educational outcomes, however, this is lacking in the UDS library as indicated by respondents.

5. Conclusion

This study provides evidence for the importance of libraries in students' academic achievement and performance. There exist many indicators to measure the effectiveness of library usage to student learning and academic achievement. These indicators could be borrowing of books, attending library workshops/ sessions, use of automated library system, library services such as one to one session, reference service or assistance among others. This study suggests that there is a positive impact of library usage (borrowing of books, online resources, visits to the library) on students' academic achievement and performance. Since students' use of the library is statistically significant to student grade point average (CGPA), access to electronic resources will be the most beneficial resource students should have in order to attain excellent academic performance and development.

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