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Full Length Research Paper

The relationship between performance and year of enrolment at an architecture school, Kumasi, Ghana

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Abstract

Performance can be related to factors such as learning styles, students' background, tutors years of experience, and number of contact hours. Due to the complexity of the associated factors, it is not an easy task to predict performance. The students of the Department of Architecture, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana have the notion that colleagues who are admitted at odd academic years perform better than those at even years. To investigate this assertion, a pilot study was organised to evaluate the assertion. Moreover, results of architectural design studio grades of first year students (859) from the year 2000 to 2012 formed the focus of observation. Mean grades, maximums, minimums, percentage grades and standard scores were calculated. The output results indicated that the assertion of odd enrolment year having a better performance was found to be baseless. However, mean scores of mean maximum studio grades were slightly higher (0.4%) in odd years. Moreover, more students (57%) were found to do better in even enrolment years considering a base grade of 64%. Students in smaller classes performed best and this result was found to be significant. School authorities are to plan for smaller class sizes to maintain good performance at architectural design studios.

Keywords: Students, Performance, Architecture, Design Studio

INTRODUCTION

The multi-facetted nature of Architecture makes it difficult to enrol students with a specific background, such as Arts or Science. Architecture schools around the globe have different entry requirements for high school students with interest in Architecture. Whereas some lay emphasis on the ability to sketch, others are of the view that physics, mathematics and geometry should form the basis of the course. Moreover, certain schools are keen to enrol students with diverse backgrounds, due to the multi-facetted nature of the course. Consequently, tracking and predicting students' performance becomes a dynamic process (Crowther, 2010).

Students' performance can also be related to experience of tutors. Teaching is said to be one of the few professions in which professionals are assumed to be able to exhibit excellence even at the first year on the job (Klecker, 2003). Klecker (2003) study on students' performance illustrated the general view of a positive relation between teacher experience and students' achievement; however, results have not always been significant.

The aim of architectural education is to prepare students to develop a critical understanding and approach to the issues and events that will most likely impact society and architecture (Bermudez, 1999). Much effort is required of architecture students to understand current issues and probe ways of giving answers to future problems. The process of learning how to design and contributing to the built environment takes place in architectural design studios. According to Crowther (2010), a design studio seeks to create an environment in which students work on individual design projects while tutors move from student to student, offering formative feedback on the projects and reviewing the work in progress as illustrated by a set of architectural drawings and models. The challenge has always been to match individual learning styles with the requirements of the course. Turesky and Gallagher (2011) demonstrated various learning styles (Kolb, 1984) that require different sorts of attention to achieve a good performance. Four main groups are identified; divergers, assimilators, convergers and accommodators. Divergers have an imaginative ability to perform best in situations calling for the generation of many alternative ideas and implications (Turesky and Gallagher, 2011 and Kolb, 1984). Furthermore, assimilators are strongest in understanding a wide range of information and putting it into a concise, logical form whiles convergers are good at setting goals, solving problems, decision making and testing new ideas. The last group are the accommodators, with strength in carrying out plans, tasks, initiate activities and getting involved in new experiences (Turesky and Gallagher, 2011 and Kolb, 1984). All these backgrounds (learning styles) have a relation to performance at design studios.

Crowther (2010) shares the general view that the first year architecture curriculum has a substantial focus on drawing skills and seeks to develop students' understanding of the process of architectural design. The process of architectural design is known to favour students with arts and technical drawing backgrounds (easy communication through sketches) (Koranteng et al., 2013). Published studies on academic performance have concluded that students' background is paramount and various learning needs are to be employed (Turesky and Gallagher, 2011; Esen, 2010; Furnham et al., 2009; Botvinick et al., 2004; Klecker, 2003; and, Minnaert and Janssen, 1999).

In order to maintain a good performance of a class, tutors are to give additional help to minimized groups at risk (Atanas, 2012). Quality assurance is a key issue in educational institutions. Efforts are seen through the use of machine learning algorithms for the purpose of predicting performance; however, none has been identified as the best algorithm for all cases (Atanas, 2012).

Performance is highly dependent on tutor-student relationship. A key issue is the conduct of juries or assessments of design projects. During assessments, the tutor's role changes dramatically, from one of guidance, academic challenge and constructive collaboration during the design process, to confrontation and judgment (Osborne and Crowther, 2011). The changes in attitude and roles could have a negative impact on academic performance. Tutors are advised to employ constructive alignment to improve on students' performance (Biggs, 2003). Constructive alignment includes that, but it differs (a) in talking not so much about the assessment matching the objectives, but of first expressing the objectives in terms of intended learning outcomes, which then in effect define the assessment task; and (b) in aligning the teaching methods, with the intended outcomes as well as aligning just the assessment tasks (Biggs, 2003).

The discussion above connotes the relationship of students' performance to factors such as tutor experience, learning style, students' background and students' behaviour. The aim of the study is to investigate the assertion that odd enrolment years have better performing students at the Department of Architecture, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. Knowledge on the outcome would inform tutors to develop learning needs to match enrolment year.

Approach

A pilot study (based on a questionnaire) was conducted with 315 students enrolled in the undergraduate programme of the Department of Architecture. In addition, a total of 12 years (from 2000 to 2012 academic years) data, comprising 859 first year students results formed the core of the study. The method involved the use of random-number tables (Weiss, 2008) to select 75% of enrolled students in each year. Attention is concentrated on the first years, since they have a strict curriculum and the assertion of performance starts to form right after enrolment.

The analysis of the relative standing (performance) of a class made use of: means, standard deviations, maximum, minimum values, and standard scores (descriptive measures). The standard scores provide information on the number of standard deviations that an observation is from a mean value. In addition, Chebychev's rule (Weiss, 2008)) was applied in the estimation of relative standing of observations. The rule states that "for any data set and any real number $k>1$, at least $100(1-1/k^2)\%$ of the observations lie within k standard deviations to either side of a mean value" (Weiss, 2008).

Moreover, students' grades above 59%, 64% and 67% (B-, B, and B+ (good grades), (70% - 100% are excellent grades)) were extracted from the selected classes to determine the percentage of students in each category. The number and marks of the students were important in analysing the notion of good performance of the various years. The results have been tabulated and graphed using MS Excel application.

RESULTS

The result of the pilot study in confirmation of the validity

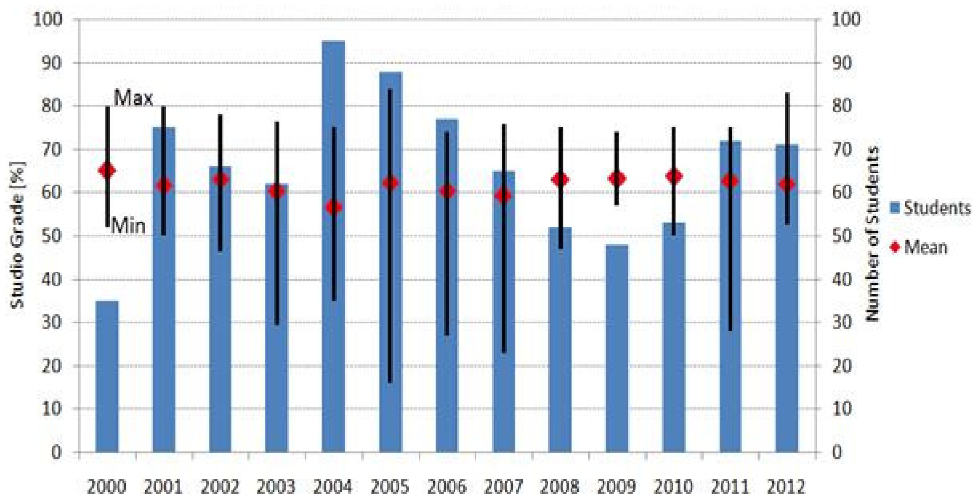

Figure 1. Mean, minimum (Min), maximum (Max) scores in relation to selected number of students per enrolment year

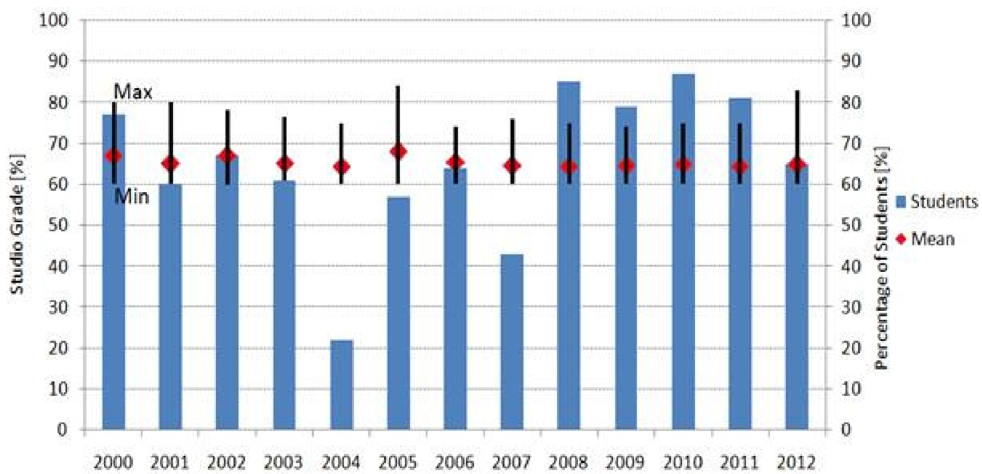

Figure 2. Mean, minimum (Min), maximum (Max) scores in relation to selected percentage of students (grades above 59%, B-) per enrolment year

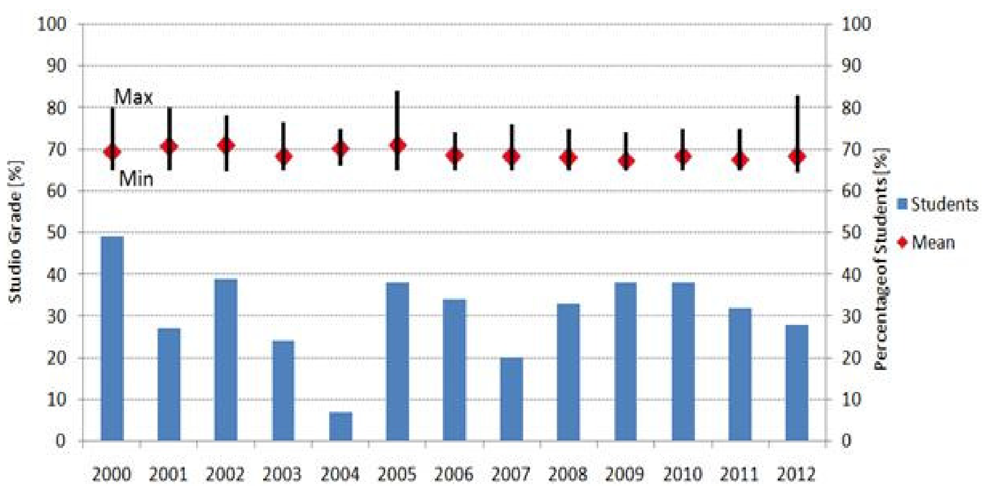

Figure 3. Mean, minimum (Min), maximum (Max) scores in relation to selected percentage of students (grades above 64%, B) per enrolment year

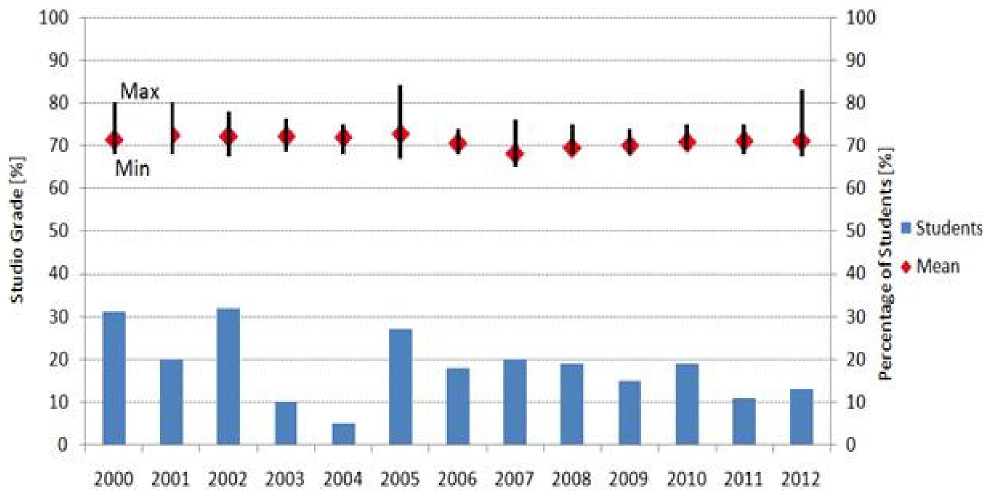

Figure 4. Mean, minimum (Min), maximum (Max) scores in relation to selected percentage of students (grades above 67%, B+) per enrolment year

Table 1. Descriptive values (in percentage) of classes from 2000 to 2012 academic year

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mean (class)	65	62	63	60	57	62	60	59	63	63	64	63	62
Mean (grade > 59%)	67	65	67	65	64	68	65	65	64	65	65	64	65
Mean (grade > 64%)	69	71	71	68	70	71	69	68	68	67	68	67	68
Mean (grade > 67%)	71	72	72	72	72	73	71	68	70	70	71	71	71
St. Dev (class)	6,3	6,4	7,4	8,2	6,1	9,4	9,8	8,2	4,6	3,9	4,7	5,7	5,2
Standard Score (class)	0,5	0,0	0,2	-0,2	-0,8	0,0	-0,1	-0,3	0,3	0,4	0,4	0,2	0,1
Standard Score (grade > 59%)	0,3	0,5	0,5	0,6	1,3	0,6	0,5	0,7	0,3	0,3	0,2	0,3	0,5
Standard Score (grade > 64%)	0,7	1,4	1,1	1,0	2,2	0,9	0,8	1,1	1,0	1,0	1,0	0,8	1,2
Standard Score (grade > 67%)	1,0	1,7	1,2	1,4	2,5	1,1	1,0	1,1	1,4	1,7	1,5	1,5	1,7
Chebychev: k>1, $100(1-1/k^2)$%, (grade > 67%)	N/A	64,7	32,9	50,6	84,3	23,0	N/A	19,2	48,1	64,9	54,4	54,0	67,1

of the assertion on performance based on year of admission into the architecture programme showed that a total of 82% of the students had the notion of better results for odd enrolment years. Furthermore, the performance of the students from 2000 to 2012 academic years is presented (Figure 1 to Figure 4). The line plots in the graphs depict minimum, mean and maximum studio grades of the various years. The bars represent the number (percentage) of students selected for the study per year.

DISCUSSION

The investigation of the assertion that students who enrol during odd academic years perform better in architectural design studios has made use of first year studio results from 2000 to 2012.

The mean, minimum and maximum scores are demonstrated in Fig. 1. From the year 2000 to 2003, a better performance is seen for the even enrolment years. The odd years have a higher mean score from the year 2003 to 2006. Significantly high performance cannot be seen from 2008 to 2012; rather, a slight decrease from 63% to 62% is registered. The maximum and minimum values depicted on the line plots do not show a definite trend for any of the enrolment years. The highest number of students enrolled is in year 2004 and 2005 (see Figure 1). The lowest mean score (57%) is shown for the year 2004. Large classes can result in negative emotions such as frustration, intimidation and being overwhelmed (Osborne and Crowther, 2011) which can lead to poor performance. In addition, tutors effort on the use of methods to enhance creativity in architectural design studios (Kowaltowski et al., 2010) may not lead to the desired results in large classes. A wider dispersion is demonstrated for the year 2005. Comparatively, the year with the minimum number of students (year 2000), has the best performance among all the enrolment years. This is because of the quality time that tutors could spend with the students. A good studio atmosphere is known to contribute to a better performance which is also related to well aligned teaching methods, intended outcomes and assessment tasks (Biggs, 2003). Moreover, positive feelings of enjoyment, support and satisfaction (Osborne and Crowther, 2011) definitely lead to success.

The mean of the mean scores for all the years shows a 0.5% increase over the odd years (62% for even years). The mean of the maximum mean scores is 77.6% for the odd years as against 77.2% for the even years. The difference is not significant to predict a better performance. Moreover, calculated mean of the mean scores for odd and even years from 2009 to 2012 shows a score of 62.9% for all years.

Considering the mean scores of students for the enrolment years in Figure 2, a similar trend of performance can be observed (see Figure 1 and Figure 2). The years 2000 to 2003 have a better performance for the even years and the odd years have higher scores from 2003 to 2009 (2006 and 2007 have same mean score (65%)). The years 2010 to 2012 have higher scores for the even years. The percentage of students scoring grades above 59% (B) is higher in year 2008 and 2010 (a class size of 52 and 53). This outcome is significant (smaller classes performing better). The even years generally depict a higher percentage of students scoring grades above 60%. An outlier is the highest class (year 2004, Figure 1) which has only 22% of students with good studio grades (B onwards, Figure 2). This is the lowest percentage of students recorded for good grades among all the years (Figure 2). Crowther (2011) assertion of the possibility of learning environments to experience problems of control, motivation, mentoring and general lack of quality could have taken place at year 2004 (largest class). The calculated mean of the mean maximum scores (odd and even years) has the odd years having a slight urge (77.6%) over the even years (77.2%). The mean of the minimum and mean scores from 2009 to 2012 show minor deviations between the grades (0 to 0.4%). This result does not substantiate the assertion that odd years perform better than even years.

A detailed look at Figure 3 illustrates that even years have an upper urge (1% difference) over the odd years when grades above 64% are considered. The difference between the minimum and maximum of the mean scores is 4%. A maximum score of 84% and 83% is observed for year 2005 and 2012. The calculated mean of the mean maximum scores still shows the odd years as the highest at 77.6% as against 77.2%.

In Figure 4, plots of grades above 67% are demonstrated. The mean scores do not show major differences between the grades. The percentage of students scoring excellent grades ranges from 5% (2004) to a maximum of 32% in 2002. There is the need to understand problems related to performance in order for tutors to make best use of learning technologies to target the solutions (Laurillard, 2008). Perhaps, not only should design theories in architectural education be taken seriously, but the ability of students to design and put measures to test the theories should be considered to improve creative thinking.

Tabulated standard deviation, standard scores and Chebychev's percentage values are outlined (see Table 1). The standard deviations and scores do not show a significant trend for an enrolment year. The difference in calculated mean standard scores and deviation for all years is in the range of 0 to 0.7%. Based on Chebychev's rule (Weiss, 2008), a percentage range of 19 to 84 of the scores (grades above 67%) lie within a standard deviation range of 1.0 to 2.5. Derived mean scores for odd and even years show that 46% of observations made for grades above 67% lie within 1.4 standard deviations and 57% lie within 1.5 standard deviations to both sides of the mean scores (71.0% and 71.1%). It can be concluded that better grades (performance) are in favour of even enrolment years using a base grade above 67%. Nevertheless, learners at all levels (enrolment years) need personalized advice, guidance and support for all key activities involved in the learning process such as listening, reading, discussing, practicing, experimenting, exploring, adapting, reflecting, producing, and articulating (Laurillard, 2008). As tutors, the understanding of personal learning styles and those of others is paramount in the educational discourse to achieve success. Indeed, tutors can adapt learning styles to be more effective communicators, learners, leaders and managers (Turesky and Gallagher, 2011).

CONCLUSION

The study presented had the aim of investigating the assertion that students who enrol in odd years perform better than those in even years at the Department of Architecture, KNUST, Kumasi, Ghana. The study focused on first year students' (859) results over the last 12 years (2000 to 2012). The architectural design studio grades were used to measure students' performance. The results show that the assertion of odd enrolment years performing better cannot be statistically substantiated. The mean values of the mean maximum scores calculated showed a slightly higher score for the odd years (77.6% with a difference of 0.4% for the even years (insignificant)). Mean studio grades above 64% (B) were found to be in favour of the even years (about 1% difference in grades (insignificant)). Poor performance was recorded in the class with the highest number of students (95). Lower numbers, around 60, perform better in studio. This result is significant and efforts should be made by authorities to improve tutor-student contacts or ratios. Considering the percentage of students scoring good and excellent grades (above 67%), more students (58%) were found in the even years as against the odd years (46%). Tutors are advised to discourage the reliance of better performance by virtue of year of enrolment by students and to help marginalised groups in their studios.

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REFERENCES

Atanas JP (2012). Measuring Students' Performance with Data Mining, J. Edu. Vocat. Res. Vol. 3(5): 132-137, ISSN 2221-2590.

Bermudez J (1999). The Future in Architectural Education, 87th ACSA Annual Meeting Proceedings, Minneapolis, MN: ACSA Press, pp. 321-325.

Botvinick M, Cohen JD, Carter CS (2004). Attention and Performance, Common Mechanisms in Perception and Action, *Trends in Cognitive Sciences, Vol. 8: 539-546.*

Crowther P (2010). Assessing Architectural Design Processes of Diverse Learners, Queensland University of Technology, Sydney, http://eprints.qut.edu.au/39114/1/39114.pdf, Accessed: April 04, 2013.

Crowther P (2011). Beyond the Walls of Academia: Architectural Internship. Proceedings of Architecture at the Edge: Association of Architecture Schools of Australasia, International Conference, Deakin University, Geelong, 18-21 September 2011.

Esen E (2010). Academic Achievement of Turkish and American Human Architecture, J. Sociol. Self-knowledge, Vol. 3(12): 125-140.

Furnham A, Monsen J, Ahmetoglu G (2009). Typical Intellectual Engagement, Big Five Personality Traits, Approaches to Learning and Cognitive Ability Predictors of Academic Performance, *British* J. Edu. Psychol. Vol. 79: 769-782.

Klecker BM (2003). The Relationship between Teachers' Years of Teaching Experience and Students' Mathematics Achievement, Occasional Research Paper No.6, Centre for Educational Research and Leadership, Morehead State University, Kentucky, USA.

Kolb DA (1984). Experiential Learning: Experience as the Source of Learning and Development, Englewood Cliffs, New Jersey, Prentice Hall.

Koranteng C, Assasie-Oppong R, Essel C (2013). An Assessment into the Effects of Students' Background on Academic Performance: The Case of the Department of Architecture, Kumasi, Ghana, Design, Development Research Conference, KNUST, Kumasi, July 18 – 20.

Kowaltowski DCCK, Bianchi G, Teixeira de Paiva V (2010). Methods that may Stimulate Creativity and their Use in Architectural Design Education, Int. J. Design Edu. Vol. 20: 453-476.

Laurillard D (2008). The Teacher as Action Researcher: Using Technology to Capture Pedagogic Form. *Studies on Higher Education, Vol. 33(2): 139-154.*

Minnaert A, Janssen PJ (1999). The Additive Effect of Regulatory Activities on Top of Intelligence to Academic Performance in Higher Education, *Learning and Instruction, Vol. 9: 77-99.*

Osborne L, Crowther P (2011). Butter Paper, Sweat and Tears: The Affective Dimension of Engaging Students during the Architectural Critique, In Association of Architecture Schools of Australasia, September 18 – 21, 2011, Deakin University, Geelong, VIC, http://eprints.qut.edu.au/46003/, Accessed: April 04, 2013.

Turesky EF, Gallagher D (2011). Know Thyself: Coaching for Leadership using Kolb's Experiential Learning Theory, *The Coaching Psychologist, Vol. 7(1): 5-15,* The British Psychological Society – ISSN: 1748-1104.

Weiss NA (2008). Introductory Statistics, Eight Edition, Pearson International Edition, New York, USA.