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A TIME SERIES ANALYSIS OF STUDENTS' ENROLMENT IN PAINTING IN LAUTECH ART SCHOOL, OGBOMOSO, NIGERIA

Olugbenga Oladeji ABOKEDE [1]

[1] Department of Fine and Applied Arts, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

ABSTRACT

A superior evaluation of students' enrolment growth in painting in Lautech Art School needs a methodological approach that most research effort lack. Hence, this study generated Mathematical model to assess the trend, direction and students' enrolment in painting with the effluxion of year. It also examined the influence of year factor in enrolment and correlation between enrolment in painting and other specialisation areas. Secondary data were sourced from students' enrolment record in the office of the head of the department from 2003/2004 to 2023/2024 sessions. The analytical techniques employed to assess temporal variation in enrolment were exponential smoothing technique with a smoothing constant of 0.3 and the least square trend analytical technique was used for analysis. Regression and correlation coefficients represented by "b" and "r" respectively were used to examine the changing rate of the students' enrolment in the period of years under investigation. The least square model generated is given with the equation y= 5.147 + 0.224 x, which implies that a unit increase in year, would bring about 0.224 unit increase in the case of students enrolment. Further analysis showed that enrolment exhibited a rising trend with the effluxion of year. The weak positive values (b = +0.224; r = +0.333) associated with enrolment status confirmed the positive lapse rate and direct relationships. The coefficient of determination (r2) in this case is 0.111 which implies that 11.11% of variations in the level of enrolment were influenced by (year factor) changes in year and 88.89% were explained by other factors. There was positive correlation (r= 0.353) between students' enrolment in painting and enrolment in other specialisation areas in LAUTECH Art School. The study concluded that the growing rate of aggregated enrolment in other areas of specialisation is a bit faster than enrolment in painting.

Keywords: Enrolment, Trend, Painting, Retrogression, Exponential-Smoothing

Corresponding Author

Olugbenga Oladeji ABOKEDE,
ooabokede@lautech.edu.ng

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1. INTRODUCTION

Fine and Applied Arts plays a crucial role in artistic, cultural, technological and technological development (Ayodele and Akinde, 2008: 21). Within this broad discipline, painting stand out as a significant area that nurtures artistic talent, promotes aesthetic appreciation, and contributes to cultural preservation. As universities strive to maintain relevance in a rapidly changing world, understanding trends in student enrolment in specific areas of study such as painting, is vital (Akinde, 2022: 46-47). Enrolment trends can provide insight into the popularity, perceived value, and future viability of these specialized courses.

It is vividly observed that in an effort to establish a State of enrolment at various educational institutions and subject disciplines, the habit of studying students' interest in a particular profession and strategy to increase enrolment dominated the limited research efforts. These studies include Akinde (2002) and the work of Babalola (2009) who presented comprehensive students' enrolment in Diploma between 1959-1962 and Bachelor of Fine Arts in Ahmadu

Bello University, Zaria between 1963-2005 respectively. The enrolment record span across eight different specialisations of Fine Arts. Result of the analysis is as follows: Painting 292, Sculpture 248, Graphic and Commercial Design 193, Textile Design 135, Ceramics 100, Glass Technology 038, Art Education 094 and Art History 061. Names of students' listed without identifying their area of specialisation are 246. Hence, total enrolment of Fine Arts students' in the period of study amount to 1,287. Ajadi and Akinde (2019) also mentioned enrollment in their study of art schools in Oyo state. Ige et al (2011) analyses Senior Secondary School Student's interest in teaching profession in Oyo city, in South-western Nigeria. Talbert (2012) discovers that graduating rates have continued to decline over the last decade in post-secondary institutions. Hence, the study uses a conceptual model as strategy to increase enrolment, retention and graduation rates in higher education. Ademola et al (2014) write on influence, effect vis-a-vis consequences of behavioural patterns, socio-educational, cultural and proprietors' reputation on students' enrolment in tertiary institutions in Nigeria. Senimetu (2015) examines educational facilities management and its effects on students' enrolment in south-west Nigerian Universities. Among factors identified are school library and laboratories, school building and in-conducive classroom environment. The result indicates classroom environment as a major factor determinant of students' enrolment. Uchendu et al (2015) studied marketing strategies and students' enrolment in private secondary school in Calabar Municipality, Cross River State, Nigeria. The study find out that adopting effective marketing strategy can enhance increase enrolment in private secondary schools. The increment will eventually expand school income opportunity for sustainability and quality service delivery of the organisation. Mwirigi and Muthaa (2015) also examined impact of enrolment on the quality of learning in primary schools in Imenti Central District, Kenya. The research established that high enrolment trends in schools led to overworking the staff members, inadequate teaching and learning facilities, poor sanitation facilities and inadequate classroom. The increased enrolment influenced largely on the quality of learning in public primary schools. The study recommended that the government put measures in place to avail facilities that match the pupils' enrolment.

Etega et al (2020) investigated into pattern or rate of students' enrolment into primary and secondary school in Anambra state. The research indicated that significant difference exists between enrolment of male and female students in the state. Moreover, eight states has increment, while thirteen states have a decrement in the students' enrolment in the year 2020. Ekatte (2020) examines trend of school size, location and enrolment figures of Junior Secondary Schools in Akwa Ibom State of Nigeria with a view for sustainable development between the year 2008 and 2016. Findings uncovered that higher rates of enrolment were recorded in large and urban schools. Moreover, the mean differences in the enrolment trend among urban and provincial schools were huge. Hence, there is an upward pattern in enrolment in all the schools from 2008-2013 and a descending pattern from 2015-2016. Mensah and Kwegyiriba (2021) assessed students' enrolment growth and its' implications for educational planning at Takoradi Technical University.

The research determined the rate of growth in first year enrolment and predicted first year enrolment for management decision making. Results indicated that the year under review witnessed marginal improvements over the previous year's ratios and rates of the key indicators. Adejimi and Nzabalirwa (2021) researched into students' enrolment trends in school of Education, College of Education, University of Rwanda. Imarghiagbe and Igbinekewa (2023) analysed the enrolment pattern and classroom situation in Edo State public primary schools from 2016 to 2020. Result of the findings revealed that pupils' enrolment in the schools was high and on the increase yearly. Enrolment for gender was higher for male than female. The study also found that classroom situation was not conducive enough for learning. Analysis showed that students' enrolment trend increased over the years. A wide gap was observed in enrolment trend based on gender across departments. Rise in students' enrolment trend across departments particularly, Mathematics and Science Education was also obvious.

The little research effort on a time series analysis that has somehow managed to explain the trend has been based on sketchy evidence backed up by inadequate empirical information, casual references and ungrounded methodological approach. However, until now, enrolment and interest trends in painting in the Department of Fine and Applied Arts, Ladoke Akintola University of Technology, Ogbomoso, Nigeria that constitutes LAUTECH Art School has not attracted research enquiry. Systematic analysis of enrolment trends in painting unit of the Department of Fine and Applied Arts, over several years can offer valuable data on whether interest in this specialization is rising, stagnating, or declining. Such data is essential for informed decision-making regarding curriculum development, resource allocation, and strategic planning.

Over the years, there has been growing interest in analysing enrolment trends in various academic disciplines as a means to assess their relevance and popularity. While some studies have focused on general enrolment patterns in Fine

and Applied Arts, limited attention has been given specifically to painting as a specialization. Existing research in the broader field of Fine and Applied Arts often overlooks the nuanced dynamics within individual specializations, leading to a gap in understanding the specific trends affecting painting. Furthermore, while time series analysis has been employed to study enrolment trends in other fields, its application to painting within Fine and Applied Arts remains under explored. A time series analysis of students' enrolment in a course of study has been a holistic approach, especially in the area of generating early warning system for preparedness against retrogression in enrolment growth. However, the concentration of research efforts on students' enrolment with unjustified neglect of the actual direction of enrolment growth retards the search for analytical explanation and effective strategies to combat enrolment dwindling.

This study seeks to fill this gap by employing time series analysis to evaluate the trends in student enrolment in painting over a specified period. The findings shall provide a clearer picture of whether interest in painting is increasing or declining. The result shall also provide actionable insights for the department's future planning and development. The research is a time series analysis of students' enrolment for over a period of two decades in LAUTECH Art School also known as Ogbomoso Art school (Abiodun and Akinde, 2024: 97). The study examines the fluctuation pattern in students' enrolment in painting specialization within Department of Fine and Applied Arts in two decades. It assessed direction and speed of students' enrolment. It also examines the percentage at which time factor (change in year) influenced the direction of enrolment and correlation between enrolment in painting and other specialisation areas. This is with a view to generating mathematical model using least square techniques and understanding the influence of change in time (year factor) and other factors determining the direction of enrolment trend.

2. MATERIALS AND METHODS

The study area is Ladoke Akintola University of Technology (LAUTECH), Ogbomoso in Oyo State, Nigeria. The University, a State owned Institution located in Ogbomoso was established in 1990 while Department of Fine and Applied Arts was established in 1992. Data for this study were mainly from secondary source. Enrolment records on students specialized in painting were collected from the office of the Head of Department of Fine and Applied Arts. Temporary variation in nature of enrolment on painting for a period of twenty (20) years from 2004-2024 was examined using the exponential smoothing and least-square techniques. These techniques were employed to present the information/data in a graphical format. Rationale is to aid adequate understanding of the trend of enrolment in painting unit of Department of Fine and Applied Arts. Therefore, mathematical characteristics of the exponential smoothing trend analysis is given as:

$$T\lambda = \beta(\theta)+(1-\beta)(\alpha) \quad (1)$$

Where $T\lambda$ = predicted value or new trend; β = a smoothing constant; θ = actual/ interest value for current period; and α = trend value for last period.

In this technique, the trend value for the first data is the same as value for the first raw data. For subsequent data, the trend value was calculated using the formula. The commonly used smoothing constant ranges from 0.3 to 0.5 and a smoothing constant 0.3 was used in this study. The exponential smoothing technique was used to smoothen pattern of enrolment fluctuation (bring out the rising or fallen trend of enrolment). The least-squares technique was used to explain pattern and rate of student's enrolment. This is not all, least square was used to obtain regression line that gave the clearest picture of the rising or falling pattern of enrolment, and determine the linear relationship between years under investigation and their students' enrolment. The mathematical characteristics of the least-square techniques is given as:

$$y=a+bx \quad (2)$$

Where y = predicted future enrolment; a = slope intercept the value of y when; x = 0; b = regression co-efficient, constant representing the amount of change in Y that corresponding to a change in one (1) unit in a year x.

For predictive purpose, mathematical model was generated from regression analysis. Regression coefficient b and Pearson's Product moment correlation coefficient (r) was employed to determine the speed (strength of the rate of decrease or increase) of enrolment with the efflux of time in the study area.

The percentage contribution of x (period of year) to variation in y level of students' enrolment for painting) is determined using the coefficient of detrimentation (r^2), r^2 in this case is got by simply squaring "r" value then multiplied by 100. Therefore, r^2 is 100 x r^2.

3. RESULTS AND DISCUSSION

Table 1: Trend Values for Students' Enrolment in Painting.

Year	Emperical Value	Exponential Smoothing Tλ= β(θ)+(1-β) (α)	Least Square Y=a+bx
2003/2004	06	06	5.372
2004/2005	02	4.80	5.596
2005/2006	04	4.56	5.820
2006/2007	06	4.99	6.044
2007/2008	03	4.39	6.268
2008/2009	04	4.27	6.612
2009/2010	06	4.79	6.716
2010/2011	12	6.95	6.940
2011/2012	08	7.27	7.164
2012/2013	12	8.69	7.389
2013/2014	04	7.28	7.613
2014/2015	12	8.70	7.837
2015/2016	08	8.49	8.061
2017/2018	15	10.44	8.509
2018/2019	05	8.81	8.733
2019/2020	15	10.67	8.957
2020/2021	12	11.07	9.181
2021/2022	07	9.85	9.405
2022/2023	04	8.10	9.629
2023/2024	04	6.87	9.853

Y=5.147+0.02241x

Exact Direction and Speed of Fluctuant Pattern

Data in students' enrolment in the Department of Fine and Applied Arts, Ladoke Akintola University of Technology, Ogbomoso from 2004 to 2024 were manipulated (Table 1) and plotted as a time-series data (Figure 1). This is with a view to establishing the trend of students' enrolment over the years under study. Empirical data on students' enrolment did not show any easily discernible pattern or trend. However, infographic analysis through the exponential smoothing values and the least-square values made the rising trend of enrolment become glaring in painting unit of Department Fine and Applied Arts in the study area (Figure 1). However, the rate of rising was very slow. This was attested by weak positive values of the regression (b = + 0.224) and correlation coefficient (r = + 0.333), meaning that with time, the frequency of enrolment in painting increased in the Department of Fine and Applied Arts, Ladoke Akintola University of Technology, Ogbomoso. Moreover, the relationship between level of students' enrolment in painting with the efflux of time was very weak and direct. The coefficient of determination (r^2) in this case is 0.1111. Therefore, (11.11%) of variation in the level of students' enrolment was influenced by time factor (change in year). So, 88.89% was explained

by other factors which might include a faulty system of education, erosion of teaching method and poor treatment of students' among others. The least-square model generated is given in this equation:

$$\mathbf{Y = 5.1474 + 0.2241x} \qquad (3)$$

The model implies that a unit increase in year would bring about 0.224 unit increase in the case of students' enrolment.

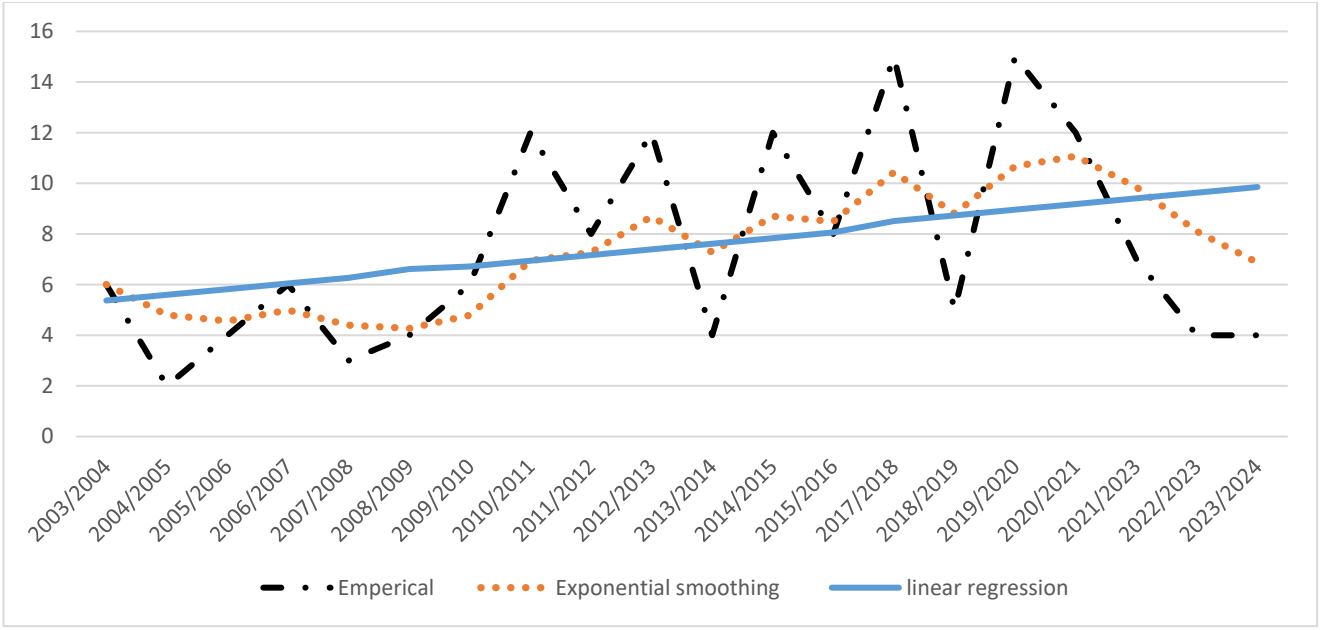

Figure 1: Infographic Trend lines of Students' Enrolment in Painting.

Table 2: Correlation between Students' Enrolment in Painting and Other Areas of Specialisation.

Year	Painting Students'	Students' in other area of Specialisation	Total No. of Enrolment
2003/2004	06	15	21
2004/2005	02	28	30
2005/2006	04	18	22
2006/2007	06	20	26
2007/2008	03	21	36
2008/2009	04	19	25
2009/2010	06	33	39
2010/2011	12	22	34
2011/2012	08	10	18
2012/2013	12	23	35
2013/2014	04	46	50
2014/2015	12	65	77
2015/2016	08	94	102
2017/2018	15	92	107

2018/2019	05	45	50
2019/2020	15	09	24
2020/2021	12	73	85
2021/2022	07	64	71
2022/2023	04	20	24
2023/2024	04	24	28

Correlation between Students' Enrolment in Painting and Other Areas of Specialisation

Here, comparative analysis using correlation method was carried out to examine the level of relationship between students' enrolment in painting and enrolment in other specialisation. There is a weak positive correlation (r = 0.353) between the students' enrolment in painting and students' enrolment in other areas of specialisation in Lautech Art School, Ogbomoso. As enrolment increases in other areas of specialisations, so does it in painting. The coefficient of determination (r^2) is 0.1246. It implies that 12.46% was influenced by the year factor (change in year) while 87.54% are influenced by other factors.

Table 3: Trend Values for Students' Enrolment in Other Areas of Specialisation.

Year	Emperical Value for Students in other Specialization	Exponential Smoothing $T\lambda = \beta(\theta)+(1-\beta)(\alpha)$	Least Square $Y=a+bx$
2003/2004	15	15	19.36
2004/2005	28	18.9	21.22
2005/2006	18	18.73	23.08
2006/2007	20	19.11	24.94
2007/2008	21	19.38	26.81
2008/2009	19	19.27	28.67
2009/2010	33	24.39	30.53
2010/2011	22	23.67	32.39
2011/2012	10	19.57	34.25
2012/2013	23	19.60	36.12
2013/2014	46	27.52	37.98
2014/2015	65	38.76	39.84
2015/2016	94	55.33	41.70
2017/2018	92	66.33	43.56
2018/2019	45	59.93	45.43
2019/2020	09	44.65	47.29
2020/2021	73	53.15	49.15
2021/2022	64	56.41	51.01
2022/2023	20	45.49	52.87
2023/2024	24	39.04	54.74

$$Y = 17.495 + 1.862x$$

Trend Values for Students' Enrolment in Other Areas of Specialisation

Empirical analysis for students' enrolment in other areas of specialisations in Lautech Art School was very ambiguous, for it was characterised with undiscernible sinusoidal pattern containing crest and trough (Figure 2 and Table 3). Infographic analysis through exponential smoothing and least square showed increased patterns in students' enrolment. The rate of rising was low and direct. This is attested to by correlation coefficient (b + 1.862 and regression coefficient (r = 0.4144). The coefficient of determination ((r^2 = 0.1717) reveals that 17.17% of rising in other areas of specialisation is influenced by time factor (change in year) while 82.83% of rising in enrolment is influenced by other factors. The Least Square Model generated is:

$$\mathbf{Y = 17.495 + 1.862x} \qquad (4)$$

The model implies that a unit increase in year would bring about 1.862 units increase in the case of aggregated enrolment growth in other spealised areas.

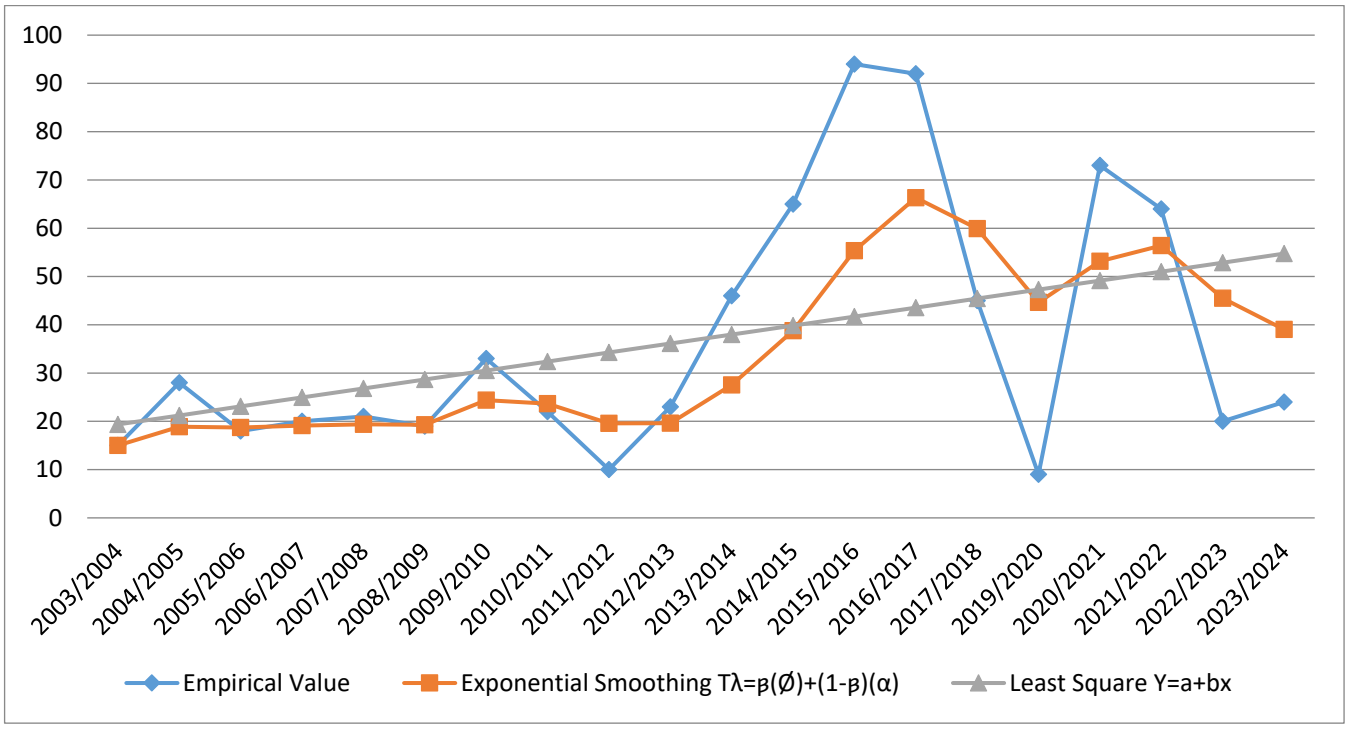

Figure 2: Infographic Trend lines of Students' Enrolment in Other Area of Specialisation.

4. CONCLUSIONS

The students' enrolment in painting experienced an upward trend at a very slow speed with changes in year that had little influence on the students' enrolment. Invariably, 11.11% of variation in the level of students' enrolment in painting was influenced by changes in year (time factor) and 88.89% was influenced by other factors other than change in year. In contrast, the speed at which change in year influenced rising trend in enrolment for painting is slower than that of aggregated enrolment in other areas of specialisation. The study therefore concluded that unit increase in students' enrolment in painting with changes in time is lesser than unit increase in students' enrolment for other area of specialisation with time changes. According to the literature review on enrolment growth, the rising trend in enrolment would be a result of the institution to make name in superior innovation, technological advancement and teaching of students' not only intellectually, but in an all-round education that will make them fit into different society. For a policy-

oriented remark, it is therefore suggested at this time that a concerted and intensified effort be ensured not only to provide institution with modern instruments that can attract students but equally equip the students with the trend of advancement for sustainable economy.

CONFLICT OF INTERESTS

None.

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