PHD STUDENTS' BACKGROUND AND PROGRAM CHARACTERISTICS AS RELATED TO SUCCESS IN KENYAN UNIVERSITIES

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ABSTRACT

Aim/Purpose	Kenya plans to be a middle-income country by the year 2030. To achieve this development target, the country has rapidly expanded its university sub-sector in order to produce the requisite skilled professionals. This has put a strain on the available PhD holders thus heightening the pressure on universities to produce more PhD graduates to meet the required larger pool of highly qualified professionals to service the academia and other sectors of the economy. However, the PhD graduation rate per year is very low and unexplained. This study sought to explain the factors influencing PhD success rates in Kenyan universities.
Background	This cross-sectional study set out to establish how PhD students' background and program characteristics are related to their success. This knowledge will inform policies and strategies to enhance PhD training and success in Kenya.
Methodology	Data on 1,992 PhD students was collected from 10 universities by using the Microsoft Excel data tool to collect administrative data. The researchers utilized the data collection to construct a quantitative research design. The PhD students were enrolled in the following program domains/clusters: Humanities and Social Sciences, Business and Economics, Physical and Life Sciences, Applied Sciences and Medical Sciences.

Contribution	PhD success factors have been extensively studied in developed countries. This paper builds on this body of knowledge with a specific focus on developing countries like Kenya.
Findings	Students' background characteristics (age, nationality, gender, financial support and marital statuses) were not related to PhD students' success, however, full-time employed PhD students had better progression than their part-time colleagues. Program characteristics (program cluster and mode of study) were significantly related to students' success. Students who had delayed for two years or more years had limited chance to graduate.
Recommendations for Practitioners	To improve the PhD education system, practitioners should endeavor to monitor and track the progress of their PhD students. To do this, the researchers recommend that the universities collect and keep good records of these types of data. Universities should come up with strategies to build on or mitigate against the factors that have been identified to influence PhD success.
Recommendations for Researchers	The researchers recommend further research, especially in developing countries, to understand the PhD study systems and inform effective interventions.
Impact on Society	To identify, conceptualize or mitigate against the factors which influence PhD success lead to higher success in PhD training in order to enhance knowledge to solve societal problems.
Future Research	Further research is recommended especially in the context of developing countries to establish how supervisor–student interactions, availability of infrastructural resources, and students' motivation, efficacy and well-being relate to PhD success in Kenyan universities
Keywords	PhD students' success, background characteristics, program characteristic, mode of study

INTRODUCTION

The Kenyan development blueprint, the Vision 2030, outlines the plan to transform the country to a middle-income economy with the ability to offer a high quality life for all its citizens by the year 2030 (Government of Kenya, 2007). However, to achieve this Vision 2030, meticulous planning and implementation of the Kenyan development blueprint is vital. With an average annual population growth rate of 2.7%, the Kenyan population is expected to grow from forty-six million, (46,000,000) in 2015 to ninety-five million (95,000,000) by the year 2050. The UN population estimates for 2015 indicate that 61.7% of the Kenyan population was below 24 years old and the trend is expected to continue in the coming decades (United Nations, 2019). This population growth will increase the burden of available resources including education facilities.

The Government of Kenya recognized the central role education plays in the realization of the Vision 2030. Education, especially university education, is expected to produce skilled professionals through training and research. In addition, the identification of science, technology, and innovation as key enablers to the three pillars of the Vision 2030 has further strengthened the link between the university sub-sector and Vision 2030 in that the country requires quality human capacity to do research and innovation (Government of Kenya, 2007). This necessitates deliberate investment in educational resources including academic staff and facilities.

Kenya has experienced rapid increase in the number of institutions offering university education from 32 in 2011 to 74 in 2017 (Commission for University Education [CUE], 2017; Sifuna, 2010).

University students' enrolment for bachelor's, master's and PhDs programs in the academic year 2016/2017 was 547,316 and the upward growth in enrollment is expected to continue (CUE, 2018). This increase in universities and the number of students has increased the demand for people with PhD level qualifications to undertake administrative, teaching, research, and outreach roles (Sifuna, 2010). In effect, the existing PhD holders have been stretched to their limit. The situation is further complicated by the requirement of the Commission for University Education that by the year 2019 all university academic staff should have PhD qualification (CUE, 2014a). Graduation of more people with PhD qualification is critical in order to meet the economic needs of the country. However, the PhD graduates supply presents a gloomy picture as Kenyan universities graduated a total of 1,203 PhDs in four years; 2012-2015, an average of 300 per year (CUE, 2016). For comparison, South Africa graduated 1,878 (in 2012), 2,051 (in 2013) and, 2,258 (in 2014) PhDs respectively (Breier & Herman, 2017; Cloete, Mouton, & Sheppard, 2015). This mismatch of the economy's demand and supply of PhD holders presents a great challenge to planners and policy makers in the Kenyan university sub-sector.

Establishing PhD completion rates in Kenya has been a challenge since the data needed to calculate completion rates is not usually maintained and most universities do not monitor time to graduation as a quality parameter. A study designed and co-funded by the German Academic Exchange Service (DAAD) in partnership with the British Council to establish the research and PhD capacities in Africa reported that Kenyan universities had challenges in providing accurate data for the computation of PhD completion rates, however, they estimated 11% national average within six years (Barasa & Omulando, 2018). Despite the challenges in establishing the exact PhD completion rates in Kenyan universities, it is factual that there is low PhD output especially when compared to Canada and the United States of America with reported average PhD completion rates of 70.6 % (in nine years) and 56.6% (in 10 years), respectively (Sowell, Zhang, Redd, & King, 2008; Tamburri, 2013). However, the reasons behind these low outputs for Kenyan universities has not been fully explained. There is a large body of research on the factors influencing PhD completion in the western world. However, graduate education systems and students' circumstances differ greatly between regions and even countries. This study, therefore, seeks to identify factors known in administrative systems that are related to PhD students' success in Kenyan universities.

In the next section, the literature review will present the conceptual framework and elaborate on the possible factors that influence PhD success or progress. This is followed by a short description of the PhD system in Kenya and will end with the research questions that guided this paper. Thereafter, the research methodology and the research results are followed by a discussion and conclusion.

LITERATURE REVIEW

A MODEL FOR STUDENT SUCCESS

A lot of research has been undertaken to understand student retention and success. Tinto's 1993 work attempted to provide an alternative explanation to students' attrition from the writing of earlier scholars who attributed attrition to students' ability and psychological factors, by taking a sociological angle. He argues that academic and social integration are vital prerequisites to improving students' retention and success. Tinto (1993) emphasized the importance of the interaction between personal and institutional factors in explaining students' attrition. His model is still in use for explaining success or drop-out rates in different contexts (Brouwer, Jansen, Severiens, & Meeuwisse, 2019).

Astin's 1984 theory on students' involvement attempts to explain the relationship and importance of a system approach of which the input (students' background characteristic) and processes (curriculum characteristics, faculty environment, and institutional characteristic) determine the quality and quantity of output (graduates). He contends that, although the university has no control over the students' background characteristics, understanding the role they play in students' success allows room

for designing policies to address the needs of specific students' groups. Further, this theory recognizes that processes are within the control of the university, the institutional 'playground' that the management can manipulate to improve the environment for better quality and quantity of outputs. Kahu and Nelson (2018) elaborated Astin's theory to stress the importance of student engagement in studying success.

In this article, the researchers sought to display some input and process factors (students' background and programs characteristics) and how they are related to the output (PhD student Success) of Astin's theory. These theories, although majorly designed in the context of a bachelor's students' population, are applicable to doctoral education and success. Various studies have reported lack of peer and supervisor support, inadequate social, academic, and financial integration are related to attrition in PhD students (Latona & Browne, 2001; Lovitts, 2001; Rockinson-Szapkiw, Spaulding, & Spaulding, 2016). Similarly, different studies have shown that PhD students' success is related to students' background characteristics (Groenvynck, Vandevelde, & Rossem, 2013; Jiranek, 2010), and the university infrastructure and faculty characteristics as described in Astin's input, process, and output model. Studies related to study success or dropout often relate to the situation in developed countries. So far, little or no data is available on studies undertaken to explain PhD students' background and program characteristics as related to their success in Kenyan universities. In this study, the researchers seek to answer the research question: How do students' background and program characteristics relate to their success in Kenyan universities?

The conceptual framework for this study as seen in Figure 1 illustrates the hypothesized relationship between the background and programs characteristics and PhD students' success.
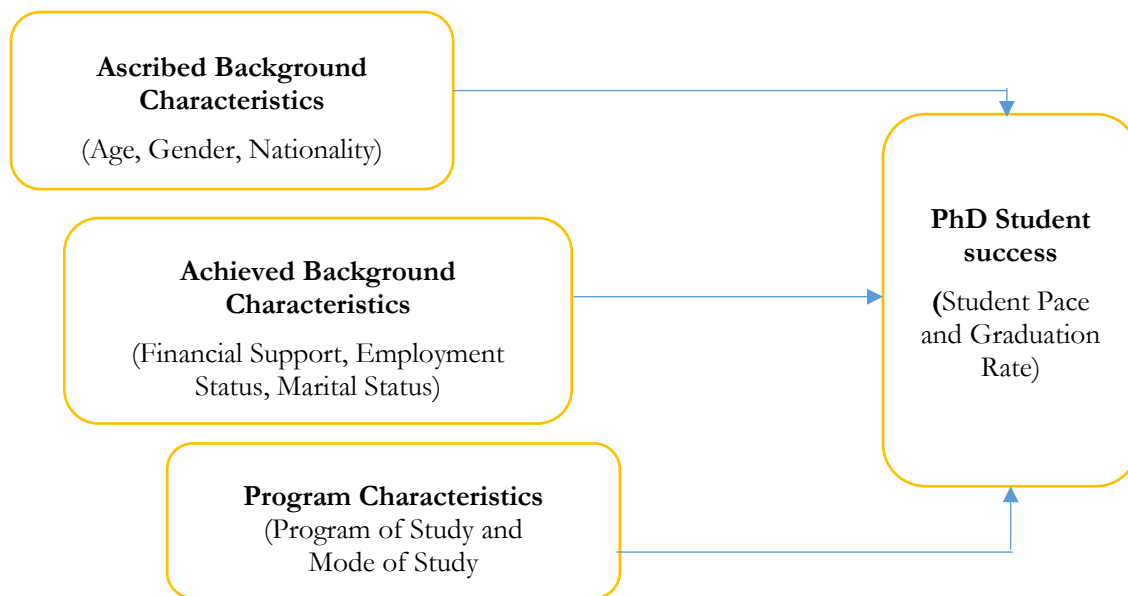
Figure 1: Conceptual Framework

ASCRIBED BACKGROUND CHARACTERISTICS

PhD students' background characteristics like age, gender, financial aid, nationality, employment status, and ability are some of the identified factors that influence their success (Barasa & Omulando, 2018; Council of Graduate Schools, 2009; Groenvynck et al., 2013; Jiranek, 2010; Maher, Ford, & Thompson, 2004). Some studies evaluating the influence age has on completion or attrition rates indicate that older students struggle with degree completion as compared to their younger counterparts

(Groenvynck et al., 2013; Johnson-Motoyama, Petr, & Mitchell, 2014) while others find no significant relation between age and PhD students' success (Wright & Cochrane, 2000). The influence of gender on students' success has mixed results across studies and discipline of study. Some studies have found no significant difference on the odds to attrition or degree completion between men and women (Park, 2005; Wright & Cochrane, 2000), whereas there are studies, especially in men dominated careers, that report males as more likely to succeed as females face higher chances of attrition mostly due to unfavorable environment created by males dominating the field (Groenvynck et al., 2013; Jiranek, 2010).

In her study on the gender issues affecting attrition of graduate students, Ferreira (2003) notes that more women than men were likely to leave the laboratory-based graduate school with no degree; this was attributed to the fact that males who dominated the laboratories viewed women as competitors. In contrast, Thune et al. (2012) in the report titled "PhD education in a knowledge society" reported that in Norway, despite women experiencing more and longer study interruptions, they had the same completion rates with men. Moreover, Johnson-Motoyama et al. (2014) in their study on success in doctoral social work education noted that there was no relationship between PhD students' gender and successful completion of PhD program.

In Asia, a study by Khozaei, Khozaei, and Salleh (2015) reported that family commitments and responsibilities affected the progress of PhD students in that they had to work and /or allocate time to cater for family needs. They also reported psychological stress and worry over safety and wellness of the family while away for studies. Ho, Wong, and Wong (2010) likewise reported family commitments' negative influence on PhD students' success. Similarly, Maher et al. (2004) noted that late - finishing female PhD students had experienced family related major event like losing a loved one or bearing a child during the course of their studies. Various research results indicate that foreign students graduate faster than residential students (Jiranek, 2010; Park, 2005).

ACHIEVED BACKGROUND CHARACTERISTICS

In a study conducted in Italy, Geven, Skopek, and Triventi (2018) reported that well-timed and structured financial support is significantly related to reduced attrition rates and time-to-degree completion. Unstable funding has been shown to greatly influence students' success as they struggle to balance between work commitment and school activities since the school cannot be funded without the work. They worry due to lack of financial stability, which poses a major obstacle to success in their PhD studies (Bair & Haworth, 2004; Groen, Jakubson, Ehrenberg, Condie, & Liu, 2008; Jiranek, 2010; Khozaei et al., 2015; Maher et al., 2004; Mohamed, Ismail, Mustaffa, & Mohd, 2012). Students who are not funded have been shown to take longer time to graduate or drop out altogether, leading to wasted resources (Herman, 2011; Khozaei et al., 2015; Maher et al., 2004; Van der Haert, Ortiz, Emplit, & Halloin, 2014). Similarly, in a study conducted in the USA, faculty and students indicated that availability of financial support was a positive contributor to shorter time to degree completion (Wao & Onwuegbuzie, 2011).

Park (2005) evaluated students' (2- year research Master's and PhD students) demographic characteristics that could explain graduate students' dropout in the United Kingdom universities and reported that, age (above 40 years), nationality (United Kingdom nationalities), being registered as a part timer, and being in a non-science discipline significantly increased the odds of dropping out. However, this study noted that men and women chances of success were not significantly different. PhD student's success has been shown to vary across modes of study with some studies showing better progression in part-time PhD students (Gittings, Bergman, Shuck, & Rose, 2018; Rodwell & Neumann, 2008) while Martin, MacLachlan, and Karmel (2001) indicated better progress among full-time PhD students.

It is unclear how employment status influences a PhD student's success, as Gittings et al. (2018) reported that being in full-time employment positively influences the odds to completing a PhD program. In contrast, Herman (2011) and Wao and Onwuegbuzie (2011) found that working away from the university or in work that is unrelated to one's research area reduces chances of graduating while increasing time to degree completion. Similarly, Bair and Haworth (2004) in a meta-synthesis on doctoral students' persistence and attrition noted that students who have to work as research assistants in related field or who do not have to work have better progression rates than those working in a different field even in the same institution. In Kenya, a study by Barasa and Omulando (2018) reported that delays in PhD completion were attributable to the PhD students' working circumstances, personal life, and financial constraints.

PROGRAM CHARACTERISTICS

Program structure has been discussed as a determinant to PhD students' persistence in that PhD students' experiences differ based on whether they are undertaking full-time, part-time, or online structured programs. Research has shown that part-time and online (non-traditional) PhD students are more likely to feel isolated and lack in community support than their full-time (traditional) counterparts. This feeling of isolation can contribute to low levels of self- efficacy and motivation often resulting to attrition (Ames, Berman, & Casteel, 2018; Maul, Berman, & Ames, 2018). Martin et al. (2001) noted that full-time students had better success rates and took shorter time to graduate but mostly where the student was funded for their program. Other scholars have reported that studying part-time, especially if working created a conflict in time and energy, led to attrition or long time to degree completion (Herman, 2011; Wao & Onwuegbuzie, 2011). However, a study by Gittings et al. (2018) reported a positive relationship between being a part-time student and successful completion of a PhD program.

Studies have recorded that laboratory sciences PhD students are less likely to drop out of their degree when compared to humanities and social sciences PhD students (Bair & Haworth, 2004; Groenvynck et al., 2013; Herman, 2011). Similarly, other scientists noted that students in the social sciences and humanities courses have lower chances of success; however, if they succeed, they take longer to graduate as compared to physical and life sciences PhD students (Canadian Association for Graduate Studies, 2004; Park, 2005; Sowell et al., 2008). In contrast, Van der Haert et al. (2014) reported that there were no significant differences in completion rates and time-to-degree completion between disciplines of study, especially for unfinanced students. They argue that a big proportion of PhD students in social sciences were not financed as compared to the PhD students in other sciences.

PHD EDUCATION IN KENYA

The Kenyan Higher Education sub-sector consists of universities and middle-level colleges. The Commission for University Education (CUE) is the agency charged with the mandate to regulate University education while Technical and Vocational Education and Training Authority (TVETA) is mandated to regulate the middle-level colleges (Government of Kenya, 2012, 2013). As of January 2018, Kenya had seventy-four (74) universities in the various accreditation statuses that include full charter, Letter of Interim Authority or Constituent College. To be established as a university with Letter of Interim Authority, an institution is required to offer at least two academic programs; while university with a Charter shall offer at least four academic programs (Government of Kenya, 2014). Universities in Kenya differ widely in maturity (years of operation) and in the number of programs and students, hence not all of them offer Master's and PhD programs. Most of the Kenyan universities offering postgraduate programs have post-graduate or graduate schools/boards; however, their roles differ from one university to another.

To gain entry to a university for a bachelor's degree program, students are required to have achieved a C Plus (+) in their Kenya Certificate of Secondary Education (KCSE) or acquired Kenya National

Examination Council diploma or its equivalent. The requirement for admission to master's and PhD degree programs is a bachelor's degree and a two- year master's degree consecutively. PhD programs are designed to take 3 or 4 years, with a requirement for coursework or not as per specific university policy. When the PhD program does not require coursework then the students fully focus on the research project to earn their PhD degree. Coursework in PhD programs takes three to five semesters with about 10 units, followed by a minimum of two semesters of research work. PhD programs take a minimum of three years for full-time students and four years for part-time students. The courses offered in the PhD with coursework programs vary between the universities. Students can study as full-time, part-time, and school-based or any other mode approved by the university Senate and the Commission for University Education. The Universities' standards and guidelines require that a PhD thesis be of at least 50,000 words. To graduate, a PhD student must have published two articles in refereed journals, produced a thesis, and attended a verbal defense of the thesis (CUE, 2014b).

The PhD education system is characterized by low enrollment relative to the master's and bachelor's programs. In the year 2016 for instance, 9,577 PhD students were enrolled compared to the 478,418 and 58,221 bachelor's and master's students respectively (CUE, 2018). The Kenyan PhD students' enrollment numbers in 2016 are slightly above half of the South Africa's 2012 enrollment, which was 13,964 PhD students (Cloete et al., 2015).

The university education system in Kenya is designed so that students can exit after the bachelor's degree, master's degree, or proceed to PhD level. It is common to have mature entry students of students who take long breaks after a bachelor's or master's degree to work or pursue other interests like family.

RESEARCH QUESTIONS

This paper aims to answer the following research questions:
  (1) What is the PhD completion rate in Kenyan universities?

  (2) What is the relationship between the PhD students' background characteristics and their success (graduation and time to degree completion)?

  (3) What is the relationship between PhD students' program cluster, mode of study, and their success?

RESEARCH METHODOLOGY

DESIGN AND DATA COLLECTION

This study targeted all (21) universities listed as offering PhD programs in the Commission for University Education website as of October 2016. Introductory letters and a Microsoft Excel data collection tool were sent to the Vice Chancellors of the 21 universities. Follow-up calls were made to the universities to establish contact with the assigned officer(s), then study visits were made to explain the data tool to the assigned officer(s), to collect the data or to undertake data correction. In this quantitative research design, the researchers sought to collect secondary data from the eligible universities' records on all students enrolled in a PhD program in a Kenyan university between the 2010/2011 to 2015/2016 academic years (six years).

To establish the PhD graduation rates, the researchers collected data on enrollment and graduation for the years which graduation was practical. This included PhD students enrolled in the years 2010 to 2013 who could potentially graduate before 2017. PhD students' age, gender, nationality, financial support, program of study, mode of study, marital and employment statuses were sought to answer the other research questions.

Out of the targeted 21 universities, the study collected valid data from 10 universities (nine public and one private) yielding 1,992 PhD students admitted between the years 2010 and 2016. Some universities did not have in their records information on some of the students' background characteristics, hence the presented data has varying sample size for different variables.

VARIABLES

Table 1 provides the descriptives of the independent variables used in this research.

Age in this study, referred to the PhD students' age as captured by the university at the time of registration for the PhD program. The raw students' ages were captured for analysis, the researchers grouped the various ages into three age categories: 30 and below, 31-45, and 46 and above.

Gender denoted the PhD students' gender as captured by the university at the time of registration for the PhD program. It was analyzed as captured: male and female.

Nationality in this study referred to the nation the PhD student belonged as recorded by the university at the time of registration for the PhD program. Individual PhD student's nationality data was captured, however, for purposes of analysis, this was grouped into two categories: Kenyan and other African countries.

Employment status was the PhD student's employment status as captured in the universities' records. This was captured and analyzed in four categories: full-time employed, part-time employed, self-employed, and unemployed.

Marital status was taken as the PhD students' marital status as captured in the universities' records. Individual's marital status was indicated as married, divorced, separated, members of holy orders, widowed, and single. However, for analysis this was grouped into two categories: married and single.

Program of study referred to the program the PhD students were admitted to and were studying as captured in the universities' records. The individual student's program was retrieved and categorized into five (5) broad clusters: Humanities and Social Sciences, Business and Economics, Physical and Life Sciences, Applied Sciences, and Medical Sciences.

Mode of study denoted the study load of the student, whether the student was registered as full-time, part- time or any other mode. The researchers categorized the various modes into full-time, part-time and others.

Table 1: Descriptive characteristics

Variable	N	Description
Age	602	Mean age 40.43; range 23-62; SD 7.653.
Gender	1990	Male = 60.4%; Female = 39.6%.
Nationality	1890	Kenyan= 98.8%; Other African =1.2%.
Financial support	1971	Financially supported =8.2%; Self- sponsored 91.8%.
Employment status	1598	Full-time employed= 94.8%; Part-time employed= 3.8%; self-employed=1.2%; unemployed=0.2%.
Marital Status	1320	Married =91.8 %; Single=8.2%.
Mode of study	1980	Full time =65.5%; Part time=25.9%; Other = 8.7%.

Students' success: various scholars have operationalized students' success differently. To some, it indicates completion of studies/a program (Watthanapradith, Choonpradub, & Lim, 2016), while to others it denotes graduation qualified by timeliness, meaning the time taken to degree completion is critical (Wao, 2010). PhD education system reality in Kenya makes it challenging to calculate completion rates since some students graduate after being in the system for a long time. This is due to the fact that delayed PhD students are not willing to formally withdraw from the program and most universities do not deregister their PhD students from the system even when it takes a long time. In this study, the students' success variable has been operationalized by combining being graduated and being on track with program timelines (for continuing students) to come up with a students' pace parameter (explained under the subtitle 'student pace'). The student's pace parameter allows for comparisons of progress for students in different levels (years) of study.

Student's Pace: To be able to calculate a student's pace, the official curriculum time as stated by the university was used as cut off point: three or four years. All graduated students irrespective of the years taken were placed in category zero (0) and the other categories by their pace as calculated by relating the year of enrollment with the level attained by 2016 (from on track to delayed for seven years). For instance, a student who was enrolled in 2011 and was in second academic year by 2016 was considered to have delayed for four years. However, to allow ease of analysis and interpretation, the pace variable was classified into four categories (graduated, on track, delayed one year, and delayed two years and above)

THE STUDENTS' PACE AND GRADUATION RATE

The total number of PhD students enrolled between 2010 and 2016 in the 10 universities was 1,992. However, as presented in Table 2, valid data on year of enrollment, level attained by 2016 and year of graduation was available only for 1,924 PhD students. Out of the 1,924 PhD students, 14.7% had graduated or were on track with their programs, 15.7% had delayed for one year, while 69.6% had a delayed for two to seven years in their program. PhD students enrolled between 2010 and 2013 (N=1172) could potentially have graduated by 2016 (second and third columns from the left, Table 2), however, only 13.3 % had graduated, and, notably, more than half of them were delayed for four years or more.

Table 2: Status of the PhD students enrolled between 2010 and 2013 and between 2010 and 2016

Student pace	PhD students enrolled between 2010- 2013		PhD students enrolled between 2010-2016	
	Frequency	Percent	Frequency	Percent
Graduated	156	13.3	157	8.2
On track	0	0.0	126	6.5
Delayed 1 yr.	8	0.7	302	15.7
Delayed 2yrs	89	7.6	294	15.3
Delayed 3yrs	212	18.1	338	17.6
Delayed 4yrs	284	24.2	284	14.8
Delayed 6yrs	240	20.5	240	12.5
Delayed 6 yrs.	142	12.1	142	7.4
Delayed 7 yrs.	41	3.5	41	2.1
Total	**1172**	**100**	**1924**	**100.0**

ANALYSIS

To answer research question 1, the researchers provided descriptive statistics; for research question 2 and 3, the researchers analyzed bivariate relationships and displayed a simple explanatory model using multiple linear regression analysis with variable being entered simultaneously.

RESULTS

GRADUATION RATE

There were 156 PhD graduates out of the possible 1,172 PhD eligible for graduation (enrolled between 2010- 2013), yielding a graduation rate of 13%. Although there were 156 PhD students indicated as having graduated within the period of study, the year of graduation data for 14 PhD graduates was not registered hence the researchers showed PhD students' pace for 142 graduates (see Table 3).

Table 3: Pace of the PhD graduated students

		On track	Delayed 1 year	Delayed 2 years	Total	N
		Student Pace				
	2013	100.0%	0.0%	0.0%	100.0%	17
	2014	100.0%	0.0%	0.0%	100.0%	34
Year of graduation	2015	64.3%	0.0%	35.7%	100.0%	42
	2016	54.5%	22.7%	22.7%	100.0%	44
	2017	80.0%	20.0%	0.0%	100.0%	5
Total		**74.6%**	**7.7%**	**17.6%**	**100.0%**	**142**

Table 3 shows that almost three quarters of the students who actually graduated, got their graduation in time.

THE RELATIONSHIP BETWEEN ASCRIBED BACKGROUND CHARACTERISTICS AND PHD STUDENTS' SUCCESS

This section examines the relationship between the ascribed students' characteristics and student' success.

The older PhD students (46 years and above) appeared to progress better with their programs as 14.3% of them were either on track or graduated compared to 9.7% and 11.7% in the middle-aged (31-45years) and youngest (30 and below) categories, respectively. However, the differences in success by age were not statistically significant, $\chi2$ (6, N = 602) = 7.2, p = 0.303.

The proportion of male and female in the graduated and on track categories were almost equal at 14.6% of females and 14.8% of males. A further 16.3% of the female PhD students compared to 15.2% of the male PhD students were delayed for one year. A similar trend was found in the students who delayed for 2 or more years (69.1% of female: 70% of males). Hence when a Chi square test of independence was performed, the relation between the two variables was statistically insignificant, $\chi2$ (3, N =1922) = 2.88, p = 0.41

THE RELATIONSHIP BETWEEN ACHIEVED BACKGROUND CHARACTERISTICS AND PHD STUDENTS' SUCCESS

In this section, the researchers showed the relationship between achieved (financial support, employment, and marital status) students' characteristics and PhD students' success.

A bigger proportion of financially supported students graduated compared to the self- supported (11.2%: 7.9%). However, the differences were minimal when we cumulated the graduated and on track (14.3% of supported: 14.8% of self-supported) as well as in the delayed for one year (16.8% of supported: 15.8% of self-supported) and two years and above (68.9% of supported: 69.5% of self-supported). Hence, funded and self-financing PhD students had no statistically significant differences in their success, $\chi 2$ (3, N =1904) =5.3, p =.15

When the researchers compared full-time employed and part-time employed students, the full-time employed PhD students had better progress with 14.7% of them being in the graduated and on track categories while only 5.0% of the part-time employed PhD students were on track and none had graduated. Chi square test showed significant positive association between full-time employed students and their success $\chi 2$ (1, N =1563) = 4.425, p =0.035.

There was barely any difference on the proportions of single and married PhD students in the graduated and on track categories: 14.9% and 14.4% respectively. Therefore, even though single PhD students were more successful than the married ones, this difference was statistically insignificant, $\chi 2$ (3, N =1311) = 3.15, p =0.37.

THE RELATIONSHIP BETWEEN PROGRAM CHARACTERISTICS AND PHD STUDENTS' SUCCESS

The program characteristics included program cluster and PhD students' mode of study. The PhD programs were grouped into five (5) clusters, namely, Humanities and Social science, Business and Economics, Physical and Life Sciences, Applied Sciences. and Medical Sciences (see Table 4).

Table 4: Program cluster and students' pace

						Students' pace
		N	Gradu-ated	On track	Delayed 1 year	Delayed 2 years and above	Total
	Humanities and Social sciences	1058	7.7%	6.3%	13.7%	72.3%	100%
Program cluster	Business and Economics	291	14.4%	1.0%	17.9%	66.7%	100%
	Physical and Life Sciences	114	6.1%	14.9%	19.3%	59.6%	100%
	Applied Sciences	340	3.8%	7.9%	20.3%	67.9%	100%
	Medical Sciences	115	12.2%	8.7%	12.2%	67.0%	100%
	Total	1918	8.2%	6.5%	15.7%	69.6%	100%

Physical and Life Sciences and Medical Sciences clusters had the highest proportion of graduated and on track PhD students (21% and 20.9%), while Humanities and Social Sciences (14%) and Applied Sciences (11.7%) had the least successful PhD students. The differences in students' success across the program clusters were statistically significant, χ^2 (12, N =1918) = 66.181, p =0.00 as shown in Table 4

The students' mode of study was classified as full-time, part-time, and other. About two thirds (65.4%) of the PhD students were full-time, 25.7 % were part-time students. while 8.7 % were on another mode of study. Student's pace significantly varied from one mode of study to another, χ^2(6, N =1915)= 46.145, p =0.00 with full-time students being the least in the graduated and on track category (13%) while part-time students fared better at 15.9%. The category others which consisted of students who were indicated as school based or any other mode other than full time or part time had 24.7% in the graduated and on track levels (see Table 5).

Table 5: Students' mode of study and students' pace

		N	Gradu-ated	On track	Delayed 1 year	Delayed 2 years & above	Total
			Student pace				
	Full-time	1287	6.2%	6.8%	14.8%	72.1%	100.0%
Mode of study	Part-time	455	10.8%	5.1%	14.7%	69.5%	100.0%
	Others	173	15.6%	8.7%	25.4%	50.3%	100.0%
	Total	1915	8.1%	6.6%	15.8%	69.5%	100.0%

SIMPLE EXPLANATORY MODEL

A multiple linear regression analysis was used to come up with an explanatory model. Since the program cluster and mode of study are nominal variables, the researchers created dummies to compare the pace of students among the program clusters. In this model, the PhD students' pace was the dependent variable and the independent variables were students' gender, students' financial support, mode of study, and program cluster/domain. Table 6 shows the regression model, which explains 6.5% variance in PhD student success.

There was no significant prediction of success by gender nor by the type of financial support. Full time students progressed slower β = 0.407, p = 00.0) compared to the Part time PhD students (β = 0.263, p =00.0).

PhD students' progress across the five (5) program cluster variables was significantly varying using Humanities and Social Sciences as the reference category. PhD students in Applied Sciences progressed fastest β = -0.83, p = 0.001), followed by those in Physical and Life Sciences, β =- 0.079, p = 0.001); those taking Humanities and Social Sciences courses were the slowest in pace.

Table 6: Multiple Linear Regression model

Model	Standardized Beta	t	Sig.
PhD students' Gender	.009	.404	.686
Financial support	-.005	-.222	.824
Mode of study- Other	reference		
Mode of study- Full time	.407 **	10.760	.000
Mode of study- Part time	.263**	7.044	.000
Humanities and Social Sciences	reference		
Business and Economics	-.067**	2.912	.004
Physical and Life Sciences	-.079**	3.452	.001
Applied Sciences	-.083**	3.379	.001
Medical sciences	-.068**	2.964	.003

R	R Square	Adjusted R Square	Std. Error of the Estimate
.263	.069	.065	1.98445

**significant at .00 level

Note: A negative coefficient means that there is a positive effect on the student pace (refer to student pace variable description)

DISCUSSION

To answer research question one, which was to establish the PhD completion rate in Kenyan universities, the researchers' analysis showed a very low completion rate and that a big proportion of PhD students enroll and do not make any progress towards the achievement of the program objectives. Although PhD completion rates and time to degree completion is a concern in many countries, a rate of 13% is very low compared, for instance, with the average PhD completion rates of 70.6 % (in nine years) and 56.6% (in 10 years) reported in Canada and the United States of America, respectively (Sowell et al., 2008; Tamburri, 2013). This low graduation rate can be explained by a number of factors. First, this may be the effect of the job market demand particularly in Kenya for PhD enrollment as opposed to PhD graduation; some employers in Kenya demand evidence of enrollment to a PhD program for certain positions as opposed to PhD completion, hence students would enroll to a program to get the job positions with no aim or plan to complete the program. In addition, the results of this study show that most students were full-time employees while at the same time being full-time students with no financial support. This combination of factors could possibly explain the low graduation rate, as the students seem to have competing demands on their time.

On research question two, where we sought to establish the relationship between the PhD students' background characteristics (age, gender, nationality, financial support, employment, and marital status) and their success, the study found that those background characteristics were not predictors of PhD students' success except employment status, with full-time employed students progressing better than the part-time students. These results compare to those of a study done by Wright and Cochrane (2000) who found no relationship between the PhD students' age, gender, and success. Although the findings on the full-time employed PhD students progressing better than the part-time employed were not expected given the time constraints that employed PhD students have, similar

finding have been reported by Gittings et al. (2018). This could be as a result of the high level of planning and organization skills that are required to manage as a full-time employed PhD student. Financial support has been shown to be strongly correlated to PhD students' success, mainly due to the controls within the terms of the financial support and the ample time the support grants the PhD students to focus on their studies instead of working to finance themselves (Groen et al., 2008; Ho et al., 2010; Maher et al., 2004). However, in this study, financially supported students did not show better or worse progress than those who were not funded. This could be due to the absence of scholarships' controls (e.g., is time to graduation a condition for financial support) and the inadequacy of the scholarship funds to cater for the needs of the students, hence not allowing them to fully concentrate on their studies. In-depth investigations can further explain this, although as Pitchforth et al. (2012) found, financial aid does not necessarily improve students' success. Employments and marital status have been shown to relate to PhD students' success in that they are additional responsibilities to the PhD student (Ho et al., 2010; Lindsay, 2015; Maher et al., 2004). However, in this study, most students were married, full-time students and fully employed, making it hard to compare the differences in how this relates to PhD students' success.

With reference to the third research question, how PhD students' program cluster and mode of study relate to their success, there was significant variation in success among the five program clusters. The relatively higher success rates in the Physical and Life Sciences and Medical Sciences clusters could be attributed to better-structured research guidelines and departmental support in the laboratories and research sites between peers and supervisors/ mentors. Although different scholars have attributed success in laboratory-based sciences to the availability of funds (Bair & Haworth, 2004) and the fact that in Kenya, Medical Sciences are more funded due to financially supported research projects, this study did not find any relationship between being funded and being successful. Full-time PhD students were less successful than their part-time counterparts. Similarly, Rodwell and Neumann (2008) and Gittings et al. (2018) reported that PhD students who study as part-time were more likely to graduate and in a shorter period than full-time students. This is however contrasting to the findings of Martin et al. (2001) that full-time students progressed faster as they were expected to have more time to work on their research. The faster progress by the part-time PhD students in this study could be due to intrinsic motivation, goal setting, commitment, and planning capabilities. Full-time students may be affected by procrastinating tendencies due to their perceived abundance of time unlike part-time students who have time pressure requiring better planning and execution.

The regression model reveals that the background characteristics (gender and financial support) were not significant in predicting the PhD students' success; this compares with findings of others scholars who found that students' background characteristics do not predict the PhD students' success (Bair & Haworth, 2004). However, the program characteristics (program cluster and mode of study) were significantly related to the PhD students' success. Similar findings have been reported by Bair and Haworth (2004), Council of Graduate Schools (2009), and Wamala, Ocaya, and Oonyu (2012). While the bivariate analysis showed that PhD students in Physical and Life and Medical Sciences progressed faster, regression analysis revealed that PhD students in Applied Sciences were the fastest. This could be explained as the effect of including the other variables (gender, financial support, and mode of study) in the model. However, the predicting factors in this study explain only six point five percent (6.5%) of the total variation in PhD students' success, a minor proportion of the whole variance in PhD students' success.

LIMITATIONS

This study is limited due to the secondary data used and most of the data required was mined manually from students' files and sometimes was not captured at all. This led to some universities submitting incomplete data while others were not able to collate and submit the data at all. In addition, this study presents results on the success of PhD students from a sample of Kenyan universities, hence the findings may not be generalizable.

IMPLICATIONS OF THE STUDY

This study documents the PhD graduation rates in Kenyan universities providing university education stakeholders with a basis for policy review to improve the graduation rates and consequently accelerate the development of the human capacity required to steer the research and innovation necessary to achieve the country's Vision 2030. Moreover, the differences in PhD students' success found across the program clusters and the modes of study may raise the necessary enquiry and understanding to the causes of the differences in success and hence allow the university stakeholders to design appropriate strategies to improve PhD success per specific domain. Similar findings to this study have been reported in other countries, such as South Africa, USA, and Australia, and, therefore, they are not unique to Kenya (Bair & Haworth, 2004; Breier & Herman, 2017; Cloete et al., 2015; Council of Graduate Schools, 2009; Gittings et al., 2018). In addition, this study paves way for more research on PhD education in developing countries and especially in Kenya. To improve the PhD education systems in Kenyan universities, practitioners should continue to monitor and track the progress of PhD students. Therefore, good records of these types of data are necessary to allow the progress monitoring. In addition, universities should come up with strategies to build on or mitigate against the factors that have been identified to influence PhD students' success.

CONCLUSION

From the results, the study concludes that PhD completion rates in Kenyan universities are low. PhD students' background characteristics are not related to success with the exception of the PhD students' employment status. Part-time PhD students progressed faster in their studies than their full-time counterparts. In addition, PhD students in Applied Sciences progressed faster than the other four categories with the slowest being in Humanities and Social Sciences. The study provides a useful baseline data from which interventions on PhD education can be designed and measured as well as provide an anchor for more research on PhD education. It would be interesting to see how supervisor-student interactions, availability of infrastructural resources, students' motivation, and self-efficacy relate to PhD success in Kenyan universities, and thus, the researchers recommend future studies along these areas.

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DECLARATION OF INTEREST STATEMENT

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REFERENCES

Ames, C., Berman, R., & Casteel, A. (2018). A preliminary examination of doctoral student retention factors in private online workspaces. *International Journal of Doctoral Studies, 13*, 79-107. https://doi.org/10.28945/3958

Astin, A. W. (1984). Student involvement: A development theory for higher education. *Journal of College Student Personnel*, 297-308.

Bair, C. R., & Haworth, J. G. (2004). Doctoral student attrition and persistence: A meta-synthesis of research. *Higher education: Handbook of theory and research, XIX*, 481-534. https://doi.org/10.1007/1-4020-2456-8_11

Barasa, P. L., & Omulando, C. (2018). *Research and PhD capacities in Sub-Saharan Africa; Kenya report*. African Network for Internationalisation of Education (ANIE). Retrieved from https://www2.daad.de/medien/der-daad/analysen-studien/research_and_phd_capacities_in_sub-saharan_africa_-_kenya_report.pdf

Breier, M., & Herman, C. (2017). The PhD conundrum in South African academia. *Higher Education Quarterly, 71*, 352–368. https://doi.org/10.1111/hequ.12134

Brouwer, J., Jansen, E., Severiens, S. & Meeuwisse, M. (2019). Interaction and belongingness in two student-centered learning environments. *International Journal of Educational Research*, *97*, 119-130. https://doi.org/10.1016/j.ijer.2019.07.006.

Canadian Association for Graduate Studies. (2004). *The completion of graduate studies in Canadian universities.*

Cloete, N., Mouton, J., & Sheppard, C. (2015). *Doctoral education in South Africa.* Cape Town: African Minds.

Council of Graduate Schools. (2009). *Ph.D. completion and attrition: Findings from exit surveys of Ph.D. completers.* Monograph Released Sept. 2009.

CUE (Commission for University Education). (2014a). *Harmonized criteria and guidelines for appointment and promotion of academic staff in universities in Kenya.* Nairobi.

CUE (Commission for University Education). (2014b). *Universities standards and guidelines.* Nairobi.

CUE (Commission for University Education). (2016). *State of university education in Kenya*, Nairobi.

CUE (Commission for University Education). (2017, November 21). *Accredited universities in Kenya by November 2017.* Nairobi. Retrieved from www.cue.or.ke.

CUE (Commission for University Education). (2018). *University statistics.* Nairobi, Kenya.

Ferreira, M. (2003). Gender issues related to graduate student attrition in two science departments. *International Journal of Science Education, 24*(8), 969-989. https://doi.org/10.1080/09500690305026

Geven, K., Skopek, J., & Triventi, M. (2018, August). How to increase PhD completion rates? An impact evaluation of two reforms in a selective graduate school, 1976–2012. Research in Higher Education, 59(5), 529–552. https://doi.org/10.1007/s11162-017-9481-z

Gittings, G., Bergman, M., Shuck, B., & Rose, K. (2018, July). The impact of student attributes and program characteristics on doctoral degree completion. *New Horizon in Adult Education & Human Resource Development, 30*(3), 3-22. https://doi.org/10.1002/nha3.20220

Government of Kenya. (2007). *The Kenya Vision 2030.* Nairobi.

Government of Kenya. (2012, December 13). The Universities Act No. 42 of 2012. *Kenya Gazette Supplement, 92*(Special), 1850-1914.

Government of Kenya. (2013, January 25). The Technical and Vocational Education and Training Act, No. 29 of 2013. *Kenya Gazette supplement, 44*(special). Available at http://www.education.go.ke/index.php/downloads/file/92-technical-and-vocational-education-and-training-act-no-29-of-2013

Government of Kenya. (2014, June 12). The universities' regulations. *Kenya Gazette Supplement, 86*(Special), 473-504.

Groen, J., Jakubson, G. H., Ehrenberg, R. G., Condie, S., & Liu, A. Y. (2008). Program design and student outcomes in graduate education. *Economics of Education Review, 27*, 111-124. https://doi.org/10.1016/j.econedurev.2006.09.010

Groenvynck, H., Vandevelde, K., & Rossem, R. V. (2013). The Ph.D. track: Who succeeds, who drops out? *Research Evaluation, 22*, 199-209. https://doi.org/10.1093/reseval/rvt010

Herman, C. (2011, September). Obstacles to success - Doctoral student attrition in South Africa. *Perspectives in Education, 29*(1), 40-52.

Ho, J. W., Wong, P., & Wong, L. (2010). What helps and what hinders thesis completion: A critical incident study. *International Journal of Existential Psychology and Psychotherapy, 3*(2), 117-131.

Jiranek, V. (2010). Potential predictors of timely completion among dissertation research students at an Australian faculty of sciences. *International Journal of Doctoral Studies, 5*, 1-13. https://doi.org/10.28945/709

Johnson-Motoyama, M., Petr, C. G., & Mitchell, F. M. (2014). Factors associated with success in doctoral social work education. *Journal of Social Work Education*, 50, 548-558. https://doi.org/10.1080/10437797.2014.916955

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research & Development*, *37*(1), 58-71. https://doi.org/10.1080/07294360.2017.1344197

Khozaei, S. F., Khozaei, N., & Salleh, N. A. (2015). An exploratory study of factors that affect the research progress of international PhD students from the Middle East. *Education and Training*, *57*(4), 448-460. https://doi.org/10.1108/et-09-2013-0115

Latona, K., & Browne, M. (2001). *Factors associated with completion of research higher degrees.* Canberra: Higher Education Series, Report No. 37.

Lindsay, S. (2015). What works for doctoral students in completing their thesis? *Teaching in Higher Education, 20*(2), 183 -196. https://doi.org/10.1080/13562517.2014.974025

Lovitts, B. E. (2001). *Leaving the ivory tower: The causes and consequences of departure from doctoral study.* Lanham: Rowman & Littlefield.

Maher, M., Ford, M., & Thompson, C. (2004). Degree progress of women doctoral students: Factors that constrain, facilitate, and differentiate. *The Review of Higher Education, 27*(3), 385-408. https://doi.org/10.1353/rhe.2004.0003

Martin, Y. M., MacLachlan, M., & Karmel, T. (2001). *Postgraduate completion rates.* Occasional Paper Series, Higher Education Division, DETYA (now DEST), Canberra.

Maul, J., Berman, R., & Ames, C. (2018). Exploring the psychological benefits of using an emerging video technology to coach and retain doctoral learners. *International Journal of Doctoral Studies, 13*, 49-78. https://doi.org/10.28945/3954

Mohamed, A., Ismail, A. H., Mustaffa, M. M., & Mohd, N. (2012). Exploring factors influencing the success of doctoral students in engineering. *Social and Behavioral Sciences, 60*, 325-332. https://doi.org/10.1016/j.sbspro.2012.09.387

Park, C. (2005). War of attrition: Patterns of non-completion amongst postgraduate research students. *Higher Education Review*, *38*(1), 48-53. Available at https://www.lancaster.ac.uk/staff/gyaccp/war%20of%20attrition.pdf

Pitchforth, J., Beames, S., Thomas, A., Falk, M., Farr, C., Gasson, S., . . . Mengersen, &. K. (2012). Factors affecting timely completion of a PhD: A complex systems approach. *Journal of the Scholarship of Teaching and Learning, 12*(4), 124-135.

Rockinson-Szapkiw, A. J., Spaulding, L. S., & Spaulding, M. T. (2016). Identifying significant integration and institutional factors that predict online doctoral persistence. *Internet and Higher Education, 31*, 101-112. https://doi.org/10.1016/j.iheduc.2016.07.003

Rodwell, J., & Neumann, R. (2008). Predictors of timely doctoral student completions by type of attendance: The utility of a pragmatic approach. *Journal of Higher Education Policy and Management, 30*(1), 65-76. https://doi.org/10.1080/13600800701745069

Sifuna, D. N. (2010). Some reflections on the expansion and quality of higher education in public universities in Kenya. *Research in Post-Compulsory Education, 15*(4), 415-425. https://doi.org/10.1080/13596748.2010.526803

Sowell, R., Zhang, T., Redd, K., & King, M. (2008). *Ph.D. completion and attrition: Analysis of baseline program data from the Ph.D. Completion Project.* Washington, DC: Council of Graduate Schools.

Tamburri, R. (2013, February 06). The PhD is in need of revision. *University Affairs.* Retrieved from https://www.universityaffairs.ca/features/feature-article/the-phd-is-in-need-of-revision/#latest_data

Thune, T., Kyvik, S., Sörlin, S., Olsen, T. B., Vabø, A., & Tømte, C. (2012). *PhD education in a knowledge society: An evaluation of PhD education in Norway.* Oslo, Norway: Nordic Institute for Studies in Innovation, Research and Education.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition.* Chicago, IL: University of Chicago Press. https://doi.org/10.7208/chicago/9780226922461.001.0001

United Nations. (2019). *World Population prospects 2019*. United Nations DESA/Population Division. Retrieved October 1, 2019, from https://population.un.org/wpp/Download/Standard/Population/

Van der Haert, M., Ortiz, E. A., Emplit, P., & Halloin, V. (2014). Are dropout and degree completion in doctoral study significantly dependent on type of financial support and field of research? *Studies in Higher Education, 39*(10), 1885-1909. https://doi.org/10.1080/03075079.2013.806458

Wamala, R., Ocaya, B., & Joseph C. Oonyu. (2012). Extended candidature and non-completion of a Ph.D. At Makerere University, Uganda. *Contemporary Issues in Education Research, 5*(3), 175- 184. https://doi.org/10.19030/cier.v5i3.7094

Wao, H. O. (2010). Time to the doctorate: Multilevel discrete-time hazard analysis. *Education Assessment Evaluation and Accountability, 22*(3), 227-247. https://doi.org/10.1007/s11092-010-9099-6

Wao, H. O., & Onwuegbuzie, A. J. (2011). A mixed research investigation of factors related to time to the doctorate in education. *International Journal of Doctoral Studies, 6*, 115-134. https://doi.org/10.28945/1505

Watthanapradith, M., Choonpradub, C., & Lim, A. (2016). Demographic and other factors influencing successful doctoral completion. *Social Sciences & Humanities, 24*(2), 873-884.

Wright, T., & Cochrane, R. (2000). Factors influencing successful submission of PhD theses. *Studies in Higher Education, 25*(2), 181-195. https://doi.org/10.1080/713696139

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