EXPERIENCE OF TEACHING FROM A DISTANCE

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This study is motivated by a desire to understand the challenges tutors and student-teachers of distant teaching and learning at the University of Makeni face as they pursue higher teachers' education in Mathematics/Statistics. The research was carried out in northern Sierra Leone. Data were collected and processed. The study utilizes structured questionnaires to the study population, which were analyzed through tables, frequencies, marginal percentages, and the logistic regression model to produce descriptive and inferential statistics. The statistical analysis was done at a 95 percent significant level using the SPSS version (20). Insufficient time, moderate institutional and individual participation, lack of devices and capabilities to access online teaching and learning materials, and more are the findings. Findings suggest UniMak to do more to sustain effective and balanced teaching and learning system that will satisfy the learners' desires to return to UniMak for future studies or recommend the institution to their colleagues.

INTRODUCTION

In the context of the current Covid-19 crises in Sierra Leone, we have witnessed impressive creativity and a spirits of innovation and collaboration to ensure that learning never stops, using diverse technologies, radio, TV, internet platforms, and other (often hybrid) learning modalities. The coverage and effectiveness of remote educational responses, however, is been challenging in all contexts." The true test of blended learning is how well the two main components (face-to-face and internet technologies) are integrated so that we aren't simply adding to the prevailing strategy" (Patricia Fidalgo, 2020). Yet, in many countries connected technology remain the only link to formal education and, as a result, the right to education has become dependent on internet access, infrastructure, technologies and capabilities that seemed optional "Different teaching methodologies and instructional technologies can be employed in the mixed format to accommodate students with a variety of learning styles, requirements, and interests." (Tseng&Walsh jr.,2016, 2020). This access to internet and infrastructure remains a question if hundreds of millions of students could access educational opportunities including distance students living and studying in Sierra Leone due to insufficient time, poor motivation, lack of computer skills and access. "Students' contentment with blended learning was also investigated, as well as what they consider to be the most significant components of the model, with the results revealing unequivocal agreement that: the students' roles and teachers are central to their satisfaction." (Kurt & Yildirim, 2018). (Tishkovskaya & Lancaster, 2012), indicated that future directions in statistics teaching and learning must take into consideration new innovative pedagogical instructions, educational tools, and the wealth of Web materials already available. The main challenges confronting Sierra Leone's skills development system includes, (1) low basic cognitive skills obtained in general education, (2) low access to training programs, particularly for women and rural population, (3) a supply –driven approach with little or no input from employers' informing the content of training, curricula and delivery, (4) inadequate resourcing resulting in poor quality and relevance of TVET programs, duplication of courses, outdated curricula and equipment, and inadequate faculty/instructors, (5) a lack of reliable information on the performance of the system (monitoring and evaluation) and poor information regarding labor market outcomes of graduates, and (6) a fragmented and complex system for coordination and management of the system etc. (Saffa, 2020). Nonetheless, the University of Makeni, sponsored by the Bishop Natalio Panganelli (Chancellor of the University of Makeni) and Vice Chancellor of the University of Makeni (Rev. Fr. Professor Joseph Alimamy Turay) in their free education drive to improve the Sierra Leone education system, encountered their own set of challenges in providing free access to over a thousand teachers from rural communities in northern Sierra Leone.

The University's distance education program is effectively reaching out to learners who have been denied access by Sierra Leone's restricted systems and structures to obtain free quality basic, and higher education. The beneficiaries include women who are unable to attend the traditional education programs due to household

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responsibilities, as well as men whose farm work prevents them from being away from home.

METHODOLOGY

Data Description

The data used in this study is obtained from structured questionnaires which were evenly distributed by the researchers in the University of Makeni (UniMak) in March and April 2020 to a random sample of Math-Statistics teachers and students in the three independent centers of the outreach program. This was done to investigate the challenges and experience of both teachers and students in the distance education program. Student Respondents were asked to respond to questions such as: Time spent on the program, Individual participation in Mathematics/Statistics education, devices used to access online materials and many others. For teachers, the qualitative research questions focused on (a) their qualifications, (b) their teaching methods (c) how often they engaged in one on one discussion/interactions with students, (d) how important is the role of technology to their distance teaching, and (e) their satisfaction with technology, internet, and network during Mathematics/Statistics teaching and learning. Further, demographic information was collected for both teachers and students.

A total of 150 questionnaires were distributed to the Mathematics/Statistics students sampled, and 132 responses were received and analyzed. A total of six questionnaires were distributed to teachers and all six questionnaires were completed. The respondents were asked to rate their responses in categories depending on the type of question to determine their experiences and challenges with Mathematics/Statistics via distance education technology. Teachers were personally interviewed and their responses recorded to determine (a) both teachers and students' experiences and (b)challenges and access to the progress in distance teaching and learning in Mathematics/Statistics. An ordinal logistic regression model was specified as a result of the ordinal and polytomous nature of the response variable.

Model Specification

The Statistical model employed in this study is the Ordinal Logistic regression model. The ordinal logistic regression is used to explain the relationship between an ordinal polytomous dependent variable and categorical and/ continuous independent variables. The model is similar to the multinomial logistic regression model but it takes into account the ordinal nature of the dependent variable.

Suppose y with J categories and explanatory variable x, the function is defined as (Agresti,2007):

$$\log\left[\frac{p(y \le j/x}{1-p(y \le j/x}\right] = \alpha_j + \sum_{i=1}^{k}\beta_i x,\ j = 1,2.....j-1 \quad \text{..... (1)}$$

Where $P(y \le j)$ describes the cumulative probability for category j. The cumulative probability reflect the ordering with $P(y \le 1) \le P(y \le 2) \le ..... \le P(y \le J) = 1$

$$P(y \le j) = \frac{\exp\left(\alpha_j + \sum_{i=1}^{k}\beta_i x_i\right)}{1+\exp\left(\alpha_j + \sum_{i=1}^{k}\beta_i x_i\right)} \quad \text{..... (2)}$$

From equation one (1) and under the assumption of parallel lines, the relationship between all pairs of categories is the same. We obtain only one slope coefficient $(\hat{\beta})$ for the estimated model and different intercepts for each category. The estimated value of the coefficient describes the relationship

between the lowest category against all the highest categories of the response variable and is the same as the coefficient describing the relationship between the next lower category and all other categories McCullagh,1980).

Ordinal Logistic Regression Model specification

In this study, the ordinal logistic regression model is specified to explain the experience and challenges student-teachers and their tutors are facing in the distance education program. Table 2.0 shows the parameter estimates generated. The parameter for multiple categories is calculated relative to the set reference level for each of the covariates(x). It was found that the rating for the overall distance education at UniMak was statistically significant for four explanatory variables: (a) students' feelings about the distance education program, (b) individual participation in Mathematics and Statistics sessions, (c) program support from the University, and (d) students' feelings about Mathematics/ Statistics in the distance education program. However, the non-significant explanatory variables were included in the model to support the fulfillment of model assumptions. To evaluate the goodness of fit of the fitted model, the Likelihood Ratio Test was performed. Under the null hypothesis, the test assumes that the fitted model is not significantly different from a model without any covariates (null model). From the test results as presented in table 2.0, we can conclude at 95% significance level that the fitted model is different from the (null model). Similarly, the proportional odds assumptions of parallel line (i.e. same slope coefficient across response categories) is also justified at 95% significance level. Hence the fitted model can be considered satisfactory.

In general, the estimated model suggests that among all the variables, students' motivation about the distance education program, institutional support, students' individual participation in mathematics and statistics classes, and students' perceptions about mathematics and statistics are the four challenges that highly influenced the students' satisfaction about the distance education program at the University of Makeni. This is also supported by the descriptive statistics of responses in table (1.0)

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RESULTS

The majority of the students surveyed (84.8%) responded that they do not have any devices to access online learning resources, and they do not know how to use a computer or phone for that purpose. A total of 67.4% of student respondents said they spend 7-11 days per term or semester in the distance program, and 48.5 and 30.3 percent said UniMak is moderately or very helpful to them, respectively. Further, 56.1% of students indicated that their individual participation is effective during Mathematics and Statistics sessions, and 84.1% of students described the Covid-19 pandemic as a very stressful period in the distance education program.

In general, the results confirm that students are satisfied with the quality of support UniMak is providing to their distance education program. Additionally, students sought course materials, computer skills, internet access, connected technologies and a properly design framework of the courses and courses materials to compensate for their limited time.

Table 1.0: Response descriptive Statistics

Variables	Response category	N	Marginal Percentage
Students motivation about distance education	Poor	46	34.8%
	Average	40	30.3%
	Good	46	34.8%
Having a device for accessing online Statistics	Yes	20	15.2%
materials for distance learning	No	112	84.8%
Type of device to access online	Laptop	5	3.8%
Mathematics/Statistics learning resources	Others	127	96.2%
Termly time spent on distance education	1-3 days	24	18.2%

	3-7 days	19	14.4%
	7-11 days	89	67.4%
Individual motivation in Mathematics and Statistics distance learning	Not effective	18	13.6%
	Moderate effective	74	56.1%
	very effective	40	30.3%
Aid from your institution towards Mathematics and Statistics distance program	Not helpful	28	21.2%
	moderately helpful	64	48.5%
	Very helpful	40	30.3%
How stressful is your program during covid-19 pandemic	very stressful	111	84.1%
	Average	19	14.4%
	Not stressful	2	1.5%
measure of time management	Poorly	71	53.8%
	Moderately	38	28.8%
	Good	23	17.4%
Feeling of studying mathematics	Yes	30	22.7%
	No	53	40.2%
	no, there are quite a few challenges	40	30.3%
	No, not at all	8	6.1%
	Others	1	0.8%
Help of mathematics and statistics teachers while studying at a distance	not helpful	34	25.8%
	slightly helpful	32	24.2%
	moderately helpful	28	21.2%
	very helpful	29	22.0%
	extremely helpful		6.8%
Valid		32	100.0%
Missing			
Total		32	100.0%

Table 1.0: Estimated effects of selected predictors

	Coeff.	**SE**	**Wald**	**df**	**P-value**	**95% CI**
Student feeling about dist. Education	-2.151	.394	29.830	1	.000	-2.923, -1.379
Student overall feeling about dist. Education	-.668	.350	3.653	1	.056	-1.354, .017
Having a device for online resource	.286	.501	.326	1	.568	-.696, 1.268
Type of device	-1.280	.959	1.783	1	.182	-3.160, .599
Time spent in the program						
XXX	Ref					
XXX	-.065	.471	.019	1	.889	-.988, .857
XXX	-.315	.514	.377	1	.539	-1.323, .692
Individual participations						
XXX	Ref					
XXX	-2.407	.613	15.397	1	.000	-3.610, -1.205
XXX	-1.728	.406	18.091	1	.000	-2.524, -.932
Feeling of distance education						

XXX	Ref					
XXX	14.560	1.793	65.915	1	.000	11.045, 18.075
XXX	16.286	1.787	83.030	1	.000	12.783, 19.789
School support						
XXX	Ref					
XXX	-1.711	.541	9.991	1	.002	-2.772, -.650
XXX	-1.034	.456	5.138	1	.023	-1.928, -.140
Stressful in covid-19						
XXX	Ref					
XXX	.938	1.475	.404	1	.525	-1.953, 3.828
XXX	-.052	1.528	.001	1	.973	-3.046, 2.942
Managing time with studies						
XXX	Ref					
XXX	-.264	.528	.250	1	.617	-1.298, .771
XXX	-.386	.573	.452	1	.501	-1.509, .738
Managing time with studies	18.366	.876	439.631	1	.000	16.649, 20.083
Student perceptions about Math &Stats.						
XXX	Ref					
XXX	17.463	.786	493.738	1	.000	15.922, 19.003
XXX	16.342	.815	402.223	1	.000	14.745, 17.939
XXX	16.756	0.000	XXXX	1	XXX	16.756, 16.756
How helpful is your math teacher						
XXX	Ref					
XXX	-1.783	.903	3.896	1	.048	-3.553, -.013
XXX	-1.384	.920	2.261	1	.133	-3.187, .420
XXX	-1.814	.927	3.830	1	.050	-3.630, .003
XXX	-1.198	.913	1.721	1	.190	-2.988, .592

Ref: Reference. The reference category of dependent variable

Model Adequacy

The model fitting information (Likelihood Ratio Chi-square test) is 0.00 significant level. P-value =0.00, Pearson and deviance respectively, also indicating significant model fit of data

DISCUSSIONS

The paper has investigated the challenges of students and teachers in the distance education program at the University of Makeni. To explain the motive behind the challenges of students in the distance education program, an ordinal logistic regression model consists of individual student ratings of the overall program quality of the university to be at the 78.8 percentile (i.e. moderately helpful to very helpful). Only 21.2% of students rated the distance education program as not helpful. This shows that majority of the student is satisfied with the university's support of the distance learning program. Among the challenges, most of them are positive about the distance learning program, institutional supports, individual participation in mathematics/statistics sessions as well have a good perception of mathematics and statistics in the program. The fitted ordinal logit model suggests that student ratings of the programs' overall performance decrease when they are less satisfied with the challenges such as the insufficient time of the program, the unavailability and use of online device accessing applications, the covid-19 pandemic, and when their mathematics/ statistics teachers become unhelpful. Among these components, the student feeling about the program, individual participation, and perceptions in mathematics/statistics as well as their personal time management were found to be the most significant

challenges that influence students in the distance education program. Also, learning materials, institutional support, the overall time spent in the program, and help from their mathematics teachers are the request students proffers for improvements. Besides, the best curriculum and latest technology is insignificant to any quality education system without a teacher who feels supported, encouraged and appreciated as in current day Sierra Leone education system.

CONCLUSION

The study suggests that, the University of Sierra Leone and the teacher training institutions, as the country's highest educational institution, requires a 21st-century curriculum structure that will stimulate need-related innovative teaching and learning approaches that will prepare students for life rather than just exams, starting from the education foundation classes. The increasing poverty to parents and teachers need to be reduced, remote areas must have better schools, connected technologies, qualified teachers and a conducive teaching and learning environments, gender inequalities must be eliminated to improve teaching and learning outcomes to teachers and pupils especially those with disabilities and those living in remote areas.

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