

## **Attrition of Pre-service student science teachers under the Virtual, Open and Distance Learning (VODL) mode at Bindura University of Science Education (BUSE) in Zimbabwe**

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### **ABSTRACT**

*Student science teacher attrition under VODL has been a critical concern in the field of education for many years. Student teacher attrition is another term used for student teacher turnover, which are changes in student teachers' status from Semester to Semester. Student Teacher turnover may include Student teachers leaving the course, or Student teachers leaving the university. This study sought to find out the major reasons for student teachers' attrition under the VODL mode of delivery at BUSE through a survey gathering the perspectives of the students who have dropped out of this mode of teaching and learning. The collected data is analysed through the IBM SPSS v. 19. Situational factors are indicated in this study as the major reasons for student attrition under VODL. There is no correlation between the cited reasons for attrition to gender, age or program of study. It is recommended that any intervention mechanisms should put lecturers in the forefront as they are perceived by the former students as the most significant others.*

### **KEYWORDS**

*Attrition, Science Teacher Education, Open and Distance Education, Pre-service Teachers*

### **RÉSUMÉ**

*L'attrition des enseignants de sciences étudiant de VODL a été une préoccupation majeure dans le domaine de l'éducation depuis des années nombreuses. L'attrition des étudiants est un autre terme utilisée pour la rotation des enseignants des élèves, qui sont des changements dans le statut des enseignants aux étudiants d'un trimestre. Le chiffre d'affaires de l'enseignant de l'élève peut comprendre les futurs enseignants qui quittent les cours, ou des enseignants des étudiants qui quittent l'université. Cette étude visait à savoir les raisons principales de l'attrition des enseignants aux étudiants sous le mode de livraison VODL à BUSE à travers une enquête regroupant les points de vue des étudiants qui ont abandonné ce mode d'enseignement et d'apprentissage. Les recueillies données sont analysées par le IBM SPSS v. 19. Les facteurs situationnels sont indiqués dans cette étude que les raisons principales de l'attrition des étudiants de VODL. Il n'y a aucune corrélation entre les raisons invoquées pour l'attrition sexe, âge ou programme d'études. Il est recommandé que les*

*mécanismes d'intervention doivent mettre conférienciers à la pointe tels qu'ils sont perçus par les anciens élèves comme les autres plus importants.*

## **MOTS-CLÉS**

*Attrition, la formation des enseignants des sciences, de l'éducation ouverte et à distance, les enseignants futurs.*

## **INTRODUCTION**

Education is essential to many development initiatives (Thakrar, Zinn & Wolfenden, 2009), in particular economic development and growth (Basaza, Milmen & Wright, 2010). However, across the African continent quality education has been greatly hampered by critical shortages of qualified teachers due to HIV/AIDS attrition and out of service teacher migration (UNESCO, 2008).

To address the critical shortage of teachers, teacher education institutions have come up with different strategies including the employ of the not so traditional Virtual, Open and Distance Education mode of lesson delivery. However, despite the advantages of this mode of student learning the dropout rates in distance education courses have been noted to be unusually higher as compared to those for comparable on-campus courses (Keegan, 1990; Morgan & Tam, 1999). Attrition rates under distance education have been reported in ranges of 30-50% (Parker, 1995; Hill & Raven, 2000; Frankola, 2001). Students' attrition "is generally characterized as the departure from or delay in successful completion of program requirements" (Ascend Learning, LLC, 2012, p. 2). Tinto (1975, p. 94) clarifies the complex interrelated factors that leads to students' attrition defining it as "a longitudinal process of interactions between the individual and the academic and social systems of the college during which a person's experiences in those systems...continually modify his goals and institutional commitments in ways which lead to persistence and/or to varying forms of dropout".

Morgan and Tam (1999) identifies three types of research approaches to examine attrition;

- predict dropout by looking at student characteristics such as age, gender, employment status, and previous education (Parker, 1999; Xenos, Pierrakeas & Pintelas, 2002);
- examine the features and format of the courses which possibly affect student dropouts (Garland, 1993; Frankola, 2001);
- gather students' perspectives (Parker, 1999 ; Xenos, Pierrakeas & Pintelas, 2002).

This study is heavily inclined towards gathering students' perspectives and correlating these with student characteristics (Parker, 1999; Xenos, Pierrakeas & Pintelas, 2002).

## **Study Context**

At the dawn of this new millennium Zimbabwe experienced the highest science teacher exodus due mainly to economic hardships the country has been experiencing. The Progressive Teachers' Union of Zimbabwe (PTUZ) estimated that 15,200 teachers had left their jobs for neighbouring countries in the period January to October 2007 (IRIN, 2007). The teacher turnover rate increased tremendously up to the year 2009 creating a huge demand to supply deficit which could not be satisfied through conventional teacher training means. At the same time enrolments into teacher training were dwindling, exacerbating the already strained education system. The science teacher deficit was even worse as these teachers were also in higher demand in neighbouring countries. Some districts in the country like Mbire and Muzarabani districts of Mashonaland Central were reported to have over 50% of the science

teachers either unqualified or requiring up-grading of their qualifications (Interview with Mashonaland Central Provincial Education Director, 28 April, 2010).

This dire situation resulted in Bindura University of Science Education (BUSE) launching an intervention project named Virtual and Open Distance Learning (VODL) in August of year 2010 to satisfy the training needs of unqualified relief science teachers and in pursuance of the university mandate of science teacher education and also addressing the Millennium Development Goal number 2, which is Universal Education for All (BUSE, n.d.). The project was started initially at four centres with residential sessions in August 2010 and later on opening one centre in Mutare, one in Matebeland South and another one in Matebeleland North provinces of Zimbabwe.

The first cohort of the VODL mode was 987 diploma in science education students and 382 undergraduate in science education degree students, giving a total of 1 369 students. Of this number by end of year 2012 only about 800 students were actively pursuing their studies. The initial implementation of the VODL mode of delivery has been mainly oriented towards block-release whereby a semester is made up of two residential periods (four weeks each) falling in April, August or December and the period in between the two. The students were subjected to face-to-face instruction during these residential periods. The virtual and distance learning being more pronounced during the 'in-between residential periods' of the semester.

At the 'centres' a centre coordinator administered the centre on behalf of the VODL directorate. The study program, that is, the courses, course content and duration of the study program in calendar years is the same (three years) as for fulltime students.

Undergraduate degree program students are educated to become secondary school teachers teaching up to Advanced Level (Pre-university) of the following subjects; Agriculture, Biology, Chemistry, Mathematics, Physics or Computer science. Diploma in science education students study in three clusters, i.e., Biology, Agriculture & Geography, Biology, Chemistry & Physics or Mathematics, Physics & Computer Science. Each diploma student teacher will then ultimately choose one science discipline among the three to specialise in. These prospective teachers are expected to teach at Secondary Junior and Ordinary (General certificate) levels.

### **Statement of the problem**

A substantial amount of research has been done in other countries on causes of attrition of students under distance education mode of learning and it seems as though each distance education situation is peculiar. The data gathered from a particular distance education mode unravels reasons for attrition in a particular instance, and possible efforts might be put into effect to retain student teachers under that mode. This study seeks to find out the reasons which former science education student teachers attribute to their dropping out of VODL mode at Bindura University of Science Education. The major question guiding this study is: What are the major reasons for student teachers attrition under VODL mode of teaching and learning?

## **METHODOLOGY**

### **Survey**

Forty four (44) science student teachers who had dropped out of VODL mode of delivery participated in the survey. The questionnaire was directly administered. The selection of the participants was based mainly on their willingness to be part of the study and having dropped

out of the VODL mode of delivery. All the participants were resident in Mashonaland Central province of Zimbabwe.

**Research Instrument**

The survey questionnaire consisted of fifteen items of which two questions were free response, two Likert-type questions, five multiple-choice questions and the rest requiring short answers.

**Reliability / Consistency of Research Instrument**

Cronbach’s alpha was used to measure the internal consistency or reliability of the questionnaire. It is the degree to which an instrument will give similar results for the same individuals at different times, an overall index of the repeatability or internal consistency of the scale.

**TABLE 1**  
*Cronbach's alpha of the Questionnaire*

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N° of Items
0.700	0.652	15

The Cronbach’s alpha is 70%, fairly high, implying that our instrument is good. The F-test found that the questionnaire items’ constructs are not the same.

**TABLE 2**  
*The related F-Test or Analysis of Variance table*

		Sum of Squares	df	Mean Square	F	Sig
Between People		33.500	21	1.595		
Within People	Between Items	34.455	7	4.922	7.456	.000
	Residual	97.045	147	.660		
Total		131.500	154	.854		
Total		165.000	175	.943		
Grand Mean = 1.75						

The p-value (0.000) is less than 5% significance level, rejecting the null hypothesis which states that the constructs are the same.

**Participants**

Of the 44 former student teachers who participated in the survey 73% were males while the remaining 27% were females. This distribution generally reflects the science teacher education student population composition which has a bias towards males.

Table 3. shows the distribution of participants across programs. The majority of the participants were enrolled in the Diploma in Science Education program.

**TABLE 3**

*Distribution of research participants across the three science teacher education programs*

Teacher Education Program		Frequency	Percent	Valid Percent	Cumulative Percent
	BSc.Ed.	8	18.2	18.2	18.2
	BSc.Ed. Hons	7	15.9	13.6	31.8
	Diploma in Science Education	29	65.9	65.9	97.7
	Total	44	100.0	100.0	

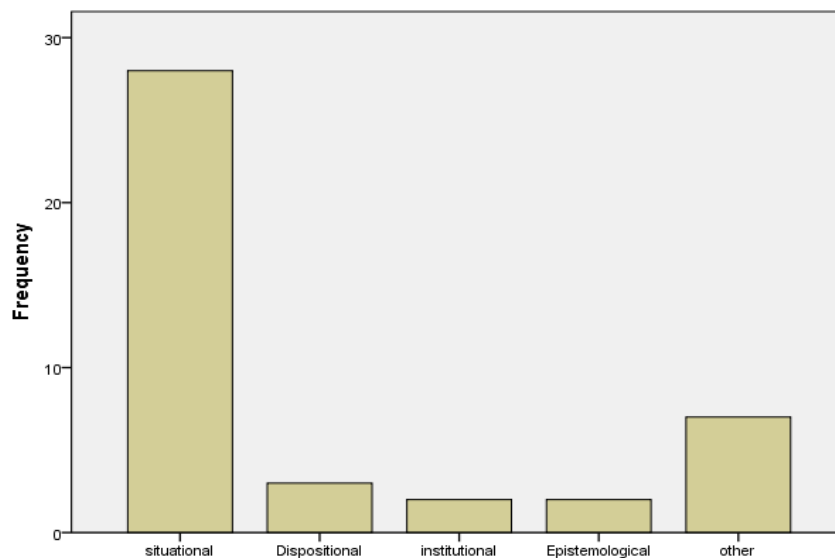
**Data Analysis**

The data collected through the questionnaire items is used to form a descriptive analysis. It also include personal quotes and descriptive evidence. The data is reported in the form of tables, graph, and percentile ratings where there are common trends in responses to a particular question.

**RESEARCH FINDINGS**

Situational factors are cited by the respondents as a major factor attributing to their leaving their studies. Most of the former students cited their inability to secure relief teaching posts which had been enabling them to manage their study costs. One respondent ST9 wrote, “I thought that with my joining VODL my employment as a temporary (‘relief’) teacher was assured and I was going to use my salary to pay for my studies. This was not to be as I failed to renew the teaching contract and I am still try each term to find a temporary teaching post”. This sentiment was echoed by a number of other former students. In other words financial problems was a major influence on the situational attrition factors. Garland (1993) also identified situational factors as challenges arising from a student's own life circumstances, such as changing employment situations or family obligations having a major effect on student attrition. Figure indicates the frequency of the attrition factors as mentioned by the respondents.

**FIGURE**



*Frequency of factors influencing on student attrition*

On being asked on who had the most influence on their studies, the former students appear to attach a lot of respect on lecturers. Forty six percent (46%) indicate that the lecturers were the most influential on their study life. This could be due to the fact that the lecturers had a direct interface most of the time with the students. VODL directorate is indicated as the least influential at 11.4% in the former students' studies. This perceived less influence of the VODL directorate on the students might be due to the fact that the directorate will in most cases be dealing directly with Centre Coordinators and lecturers. Under the "Other" influences student peers featured prominently and these peers are said to be assisting in the writing of assignments and group studies. Whilst there are a lot of other support departments within the university which cater for students' life like for example, the student affairs department, these were not mention. Indications might be that they focus most of the attention and resources on on-campus students giving little attention to those under VODL.

**TABLE 4**  
*Persons most Influential on the students' study life*

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	VODL Directors	5	11.4	11.4	11.4
	Centre Coordinators	10	22.7	22.7	34.1
	Lecturers	20	45.5	43.2	77.3
	Other	9	20.5	20.5	97.7
	Total	44	100.0	100.0	

The former students indicated that they faced some challenges whilst they were at the centres as shown on table 5. Nineteen (43) former students raised the issue of subject matter being too difficult for them to grasp.

**TABLE 5**  
*Challenges when learning under VODL*

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Content related	19	43.2	48.7	48.7
	Pressure	13	29.5	33.3	82.1
	Other	7	15.9	17.9	100.0
	Total	39	88.6	100.0	
<b>Missing</b>	System	5	11.4		
<b>Total</b>		44	100.0		

ST 20 who is still employed as a relief teacher said, "I had to drop because I did commercials at Advanced Level ('Pre-University') and Chemistry was just too difficult for me. If you introduce a commercial teacher education program maybe I might re-join". Mathematics courses were also cited as challenging and some of the former students said they had been out of school for some time and coming back to learn proved to be challenging. About 30% of the participants indicated that there was too much to learn in a short period of time such that 'the pressure was just too much'.

When the former students were requested to rate the level of satisfaction of the other students under VODL towards their study program, a total of 81.4 % indicated somewhat satisfied and very satisfied.

**TABLE 6**  
*Study satisfaction under VODL*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	17	38.6	39.5	39.5
	Somewhat satisfied	18	40.9	41.9	81.4
	Neutral	8	18.2	18.6	100.0
	Total	43	97.7	100.0	
Missing	System	1	2.3		
Total		44	100.0		

This might be a reflection of the case that most dropped out of their study program mainly due to situational problems and might also be a demonstration of their eagerness to further their education. Upon being asked whether they would consider enrolling in another program at university level 90.9 % indicated that they would consider it. This might be a demonstration of the level of motivation some students have albeit the problems they might be facing.

#### **Tests for Significance of Gender Effects on the Derived Variable**

To test for gender effects on the constructs the one way non-parametric ANOVA based on the Kruskal-Wallis tests was used. This method was chosen because the data were clearly not meeting the parametric ANOVA assumption of normality. For the same reason, the Wilcoxon-Mann-Whitney test was used since the data violated the assumption of normality to justify use of the students' T-test. The results of the analysis are presented in Table 7.

**TABLE 7**  
*Kruskal-Wallis tests for Gender effect on constructs*

Construct	Kruskal Wallis Tests	P-Value	Decision
<i>Factors most likely to led to attrition</i>	3.35	0.310	<b>The Null Hypotheses were rejected</b>
<i>Study satisfaction</i>	1.43	0.987	
<i>Most significant other</i>	1.65	0.0539	
<i>View on other students' satisfaction towards their Studies at the same centre.</i>	2.87	0.129	
<i>Considering enrolling in another program at university level</i>	4.91	0.186	
<i>Challenges encountered when learning under VODL mode</i>	1.83	0.605	

Table 7. shows that the p-values were greater than 5%, the adopted significance level. This means that there is no evidence of gender effects on the mean construct values at a 5% level

of significance. As such, the opinions of the respondents on reasons for attrition are not influenced by gender, there is a unanimous agreement across gender.

**TABLE 8**  
*Kruskal-Wallis tests for Study Program effects on constructs*

Construct	Kruskal Wallis Tests	P-Value	Decision
<i>Factors most likely to led to attrition</i>	1.67	0.6448	<b>The Null Hypotheses were rejected</b>
<i>Study satisfaction</i>	1.73	0.6306	
<i>Most significant other</i>	3.43	0.3296	
<i>View on other students' satisfaction towards their Studies at the same centre.</i>	2.47	0.4804	
<i>Considering enrolling in another program at university level</i>	3.7	0.2954	
<i>Challenges encountered when learning under VODL mode</i>	2.52	0.4711	

Results presented in Table 8. show that there was no evidence that students' opinions on as evaluated by the constructs depended on the program. All the p-values were greater than 5% which meant there was no statistically significant of study program effect. As such, the opinions of the respondents were the same across all age groups and programs.

**Cross-Tabulations and Chi-Square Analysis**

The Chi-square is useful for analyzing whether a frequency distribution for a categorical or nominal variable is consistent with expectations (a goodness of fit test), or whether two categorical or nominal variables are related or associated with each other (a test for independence). Below are results from the various tests undertaken.

**TABLE 9**  
*Period when student was enrolled Vs Most significant other*

Cross Tabulation

		VODL Directors	Centre Coordinators	Lecturers	Other	
Duration	Les<= 1 year	4	6	12	3	25
	1+ - 2 years	1	3	3	2	9
	> 2 years	0	1	4	4	10
Total		5	10	19	9	44

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.301a	8	.318
Likelihood Ratio	9.836	8	.277
Linear-by-Linear Association	5.846	1	.016
N of Valid Cases	44		



The p-value 0.016 is less than the significance level of 0.05, hence the null hypothesis was rejected. I can therefore be concluded that there was some degree of association on how the students in various parts or levels of study responded to who they think is more influential among the options given. A summary of the chi-square test on the other constructs is presented in the Table 10.

**TABLE 10**  
*A Table of Summary of results*

	<b>Chi-square Value</b>	<b>Asymp. Sig. (2-sided)</b>	<b>Decision</b>
Gender Vs Factors most likely to led to attrition	6.158	0.188	Fail to reject Ho
Gender Vs Study satisfaction	5.788	0.055	Fail to reject Ho
Period when student was enrolled Vs Factors most likely to led to attrition	8.455	0.356	Fail to reject Ho
Period when student was enrolled Vs Alternative Enrolment	2,553	0.635	Fail to reject Ho
Previous teaching qualification Vs Study satisfaction	3.154	0.532	Fail to reject Ho
Previous teaching qualification Vs Most significant other	7.268	0.508	Fail to reject Ho
Study program Vs Study satisfaction	18.194	0.006	Reject Ho
Study program Vs Most significant other	5.992	0.916	Fail to reject Ho

Most of the constructs had significant values above 0.05, failing to reject Ho indicating that there are no significant differences in responds across the demographic aspects. That is gender, duration, and whether the respondent was a certified teacher or not had less influence or had little association with their responses. The null hypothesis was rejected on the “Program”.

## **DISCUSSION OF THE FINDINGS**

The study reported here was not designed to obtain the perspectives of a representative sample of participants who have dropped from the VODL mode but rather to give a glimpse from forty four participants of probable reasons for attrition from this mode of teaching and learning at BUSE. Situation factors have a major impact on student retention under VODL. Lecturers are cited as the most significant others. It is recommended that the university authorities craft student retention schemes which recognise the role of lecturers so as to dissuade student attrition. Although the majority of students indicated that they had a high level of satisfaction with their study program some however said that they faced challenges in relation to the subject matter they were learning because of their prior knowledge. It might be prudent for departments to profile the newly enrolled students and provide some bridging programs for those lacking the requisite prior knowledge. The opinions of the respondents on reasons for attrition are not influenced by gender, age or the program they were enrolled in.

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