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PARADIGM SHIFT IN TEACHING AND LEARNING: BOTSWANALISATION OF THE LEARNING ARCHITECTURE BASED ON COLLABORATIVE CONSTRUCTIVISM

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ABSTRACT

The study seeks to explore and enhance the Learning Architecture based on Collaborative Constructivism (LACC). It has been noted in this research that with the dynamism of learning environments, the learning styles seems to follow the dynamic trends that affect learners' learning styles. In the research, we divided the work into two stages; the first stage seeks to explore the learning styles of student studying IT at Botho College in Francistown and analyze if they really follow the Kolb's experiential learning theory. The second stage was to conceptualize the LACC which has been used at NIIT programs since inception in 1997 and enhance it so that it fully benefits Batswana learners. In carrying out the first stage, we applied Kolb's Learning Styles Inventory (LSI) test to 168 learners. The learners' tested are both the new entrants and the second years. From the data analysis, the data proposed a new structure for the LACC, which is based on the identification of the learners learning behavior. Hence being the "Botswanalization" of the LACC.

KEYWORDS

assessment, LACC, Kolb's learning cycle, curriculum.

INTRODUCTION

Teaching and learning in tertiary education have never been static ever since the introduction of the first classrooms. With the introduction of technology, teaching and learning are no longer confined to the classroom. Many people are experimenting with online education (Speece, 2012). This evolution suggests changes in learning styles too. It is not difficult to suspect that a student that has been groomed to be entertained by modern technology such as television, computers and the latest versions of this technology acquires a modified learning style. This suspected dynamic change in learning styles has motivated this study.

Power (2010b) indicated that the incorporation of employability into the higher learning curriculum is now another dimension that needs to be considered. There is an emphasis on the alignment between the curriculum and the teaching methods to support employability in the current higher education policy/environment, especially in computing courses. Yorke (2006a) stresses the importance of creating the right learning environment. There is a pertinent question that needs to be asked about how learners learn. A lot of researchers have theorised about how the learning happens. Kolb in McLeod (2010) introduced his 4 stage model in which model he claims that in claims that there is no learner that has a combination of "watch and do"; "think and feel". This argument is countered by Dangwal and Mitra (1999); McLeod (2010) who argue that there is need to accommodate the "processing continuum and perception continuum"; suggesting that Kolb's model does not accommodate all learning styles. Dangwal and Mitra (1999) went on to modify Kolb's model with their LACC model, which unfortunately inherited the same defects that they were attacking. Since the LACC model is a derivative of Kolb's model, it carries some of the challenges that are associated with Kolb's model. This has impelled us to investigate further how LACC accommodates the different types of learners and its applicability and suitability in Botswana.

An initial study will begin by seeking for the existence of the students with the argued combination and investigate the category of learning where they belong. There are claims in the local press in Botswana that private teaching institutions are doing little to transform the lives of Batswana learners. Therefore, we want to investigate the teaching methodology that is used by Botho College in view of such perceptions. We also want to find ways that can be used to improve the approach to learning.

The study focuses on collaborative constructivism as a learning style and its use at Botho College. This study is bound to help Botho University tutors in building their capacity to deliver lectures effectively. This paper will contribute to new questions that are raised concerning learning styles. The questions that will be answered will include:

- What are the learning styles of the Batswana learners?
- Does LACC teaching and learning model work in Botswana?
- What are the challenges of the implementation of the LACC model in Botswana?
- Would an active learning environment assist the student in learning under the LACC model?

REVIEW OF LITERATURE

This research seeks to start answering the research questions by introducing some key terms which will guide the understanding of this research. Learning architecture based on collaborative constructivism (LACC) is a derivative of the Kolb's experiential learning style. The original Kolb's (1984) theory acknowledges that there are four learning stages. The scores in Kolb's Learning style can be interpreted by considering 4 learning stages such:

1. Concrete Experience (CE) – use feelings

2. Reflective Observation (RO) learn by watching
3. Abstract Conceptualization (AC) – Learn by thinking
4. Active Experimentation (AE) – learn by doing

These stages results in 4 learning styles which is seen as the four combinations of learning styles:

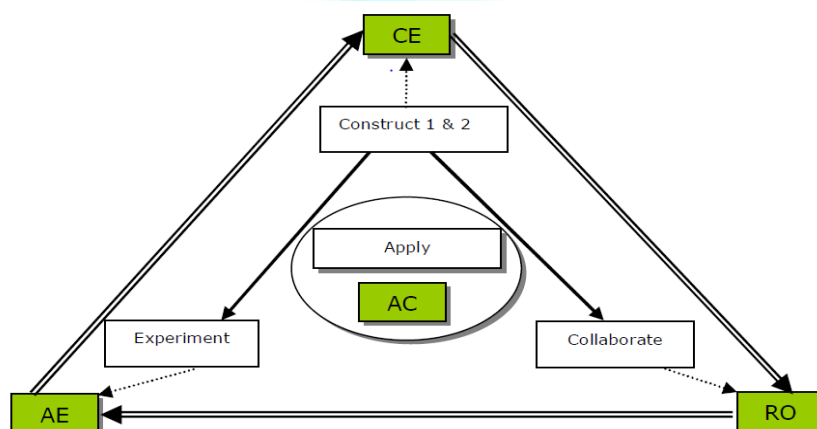
- a) Diverger (feel and watch)
- b) Accomodator (feel and do)
- c) Assimilator (think and watch)
- d) Converger (think and do)

LACC is an extension of Kolb's model but classifies teaching-learning interactions into 3 broad categories:

- Interactions, where the teacher or external resource creates the learning experience
- Interactions, where the teacher or external resource creates or constructs the learning, in collaboration with learners
- Situations, where the learners create their own learning experiences.

LACC is therefore a teaching method which exposes the student to 4 activities/stages and the theory behind being that this is the best practice in enhancing the depth of learning. The first stage introduces the learner to new concepts by way of exposing the student to theory. The second component makes it possible for a learner to have a contextual familiarity of the subject through collaborative learning. The third gives the learner exposure whilst the fourth provides an environment of the learners to develop conceptual clarity. These stages can be seen as the base of a triangle as illustrated in fig 1 below:

FIG 1: LACC MODEL



The LACC methodology derives its essence from four components: the construct, collaborate, experiment and apply. A trained person is brought into the classroom to bring his experiences of the subject. It is assumed that the trainer has had the right exposure and his concrete experience can be shared by the students. The construct creates a foundation which allows the student to move to the next Kolb's state. The stage is delivered in two sessions. The learner is now expected to go through a reflective session which is usually captured in case study, scenarios/problem statement and best practices. This is the stage at which students collaborate and the teacher's role is to merely give directions and allow the students to freely collaborate. This stage of LACC coincides with the Kolb's Reflective observation. The third component of the LACC model takes the student through experimentation where the students experiment with their newly discovered abilities. Apply stage, which coincides with Kolb's abstract conceptualization, sees the learner putting the learnt information into practice. The learner, "learns, refers, compares, thinks and applies their entire knowledge spectrum and creates solutions for a real life case study".

EXAMPLES WHERE LACC IS USED

LACC is currently unique to the NIIT brand and Botho College has adopted this methodology. Botho College uses NIIT resources. At Botho College, the curriculum which is in use was designed in such a way that the instructor is given clear guidelines on the tasks to be done throughout the entire LACC stages (components). Learners are given concrete experience by an expert instructor through two constructs (Lessons). At this stage, power point teaching aid is prevalent bringing an improvement to the traditional teaching methods. Unfortunately, the use of such presentation can sometimes create a boring environment and the students are de-motivated to learn especially given the time constraints because there is usually too much information to be handled.

It can be seen that LACC takes aboard the need to have an expert instructor and the collaboration element. This makes a model a strong model. But a lot of the questions arise which we need to address in this research. After whatever teaching has taken place and assessments have been conducted, we are not sure whether the assessment results that have been forthcoming are a result of this approach or there are unknown variables at play. We may have to conduct a follow up test to investigate the variables that affect our results.

BENEFITS AND LIMITATIONS OF LACC

- LACC accommodates all these types of learners. This makes it a powerful tool which acknowledges the different needs of the learners (categorized by Kolb's).
- The concepts introduced in the construct stage are reinforced in the entire cycle, thereby assisting the students to clearly master the concept. It is essential that the learning environment created assist the students in the two initial sessions of the cycle to be actively involved in the lesson.
- Currently traditional teaching methods embraced with power point presentations are still prevalent as this core stage; this could be one of the challenges of the LACC. Enhancement of the LACC could be done by effectively consider using the principles of active learning (Stern and Huber, n.d.).

ACTIVE LEARNING

One way of improving the LACC model could be to effectively consider using the principles of active learning. Stern and Huber (n.d.) observe that definition of active learning differs with individuals but that one kind of active learning strategy gives individual students more control over the pace, sequence, and monitoring of their own work. Briggs (2005) Claims that an active learning environment improves student grades, comprehension, and satisfaction with the course. Many studies also claim that active learning is indeed a common technique used to improve students' comprehension retention of material. In his study, Briggs (2005) demonstrated how a novel lab experience and other classroom modifications can create an active learning environment and lead to an improvement in student outcomes. A study done by Ratcliffe et al in Briggs (2005) concludes that most Computer science students are active and visual learners. They arrived at this conclusion after administering Felder-Silverman Index of learning styles. The conclusion is relevant in an effective learning environment for any computer science students. Briggs (2005) Conclude that in schools we therefore need an active learning environment. Stern and Huber (n.d.) state that preparation for lifelong learning at work necessitates a kind of initial education that fosters curiosity and the capacity to manage one's own learning agenda.

Employers say they want workers who can take initiative and solve problems, not only in managerial and professional positions, but also in production and clerical jobs.

ACTIVE LEARNING TECHNIQUES

There are a number of active techniques that could be used in the classroom. This includes problem solving, some games, peer review, paired programming, and small group solving etc. Briggs (2005) argues that small breaks in the flow of lectures have effective results on the students. The breaks enable students to share and enable weak students to learn from their colleagues and enable most students to get better engagement with the material. This goes to show that there is need to improve what the learning environment currently on the ground. There is also a need to do a primary study to explore what needs to be done.

LEARNING STYLES

Fry, Ketteridge and Marshall (2003) acknowledge that the use of learning styles presents a lot of problems since there are many models with differing categorization. The practical application of these models is that different individuals have differing preferred learning styles. Studies done by Neumann (2001) suggest that preferences differ with different disciplines. All the scholars involved indicate that most of the claims have not been proved by any academic research. Fry, Ketteridge and Marshall (2003) conclude that "students in particular disciplines may have considerable difficulty in developing, for example, employability skills that relate to a different quadrant (e.g. numeracy by humanities students or team working by mathematicians)". Learning styles assist learners in managing and coping with different learning styles. They are useful in conscientizing students about their own learning needs.

Botho College inherited the system from NIIT due to their close relationship ever since 1997. The NIIT curriculum is designed using the LACC methodology which follows a study conducted by Dangwal and Mitra (1999). Dangwal and Mitra (1999) installed an internet-based PC in some expected place in order to observe how children behave and learn. It was observed that children are capable of teaching each other. The experiment was replicated elsewhere with the same results. These results challenge some aspects of formal education. This project demonstrates that, "even in the absence of any direct input from a teacher, an environment that stimulates curiosity can cause learning through self-instruction and peer-shared knowledge". This became the basis of the LACC model.

Given this important model, we would like to understand how it incorporates some important aspects of learning in as far as a Motswana student is concerned. We attempt to answer the question concerning the learning styles of learners in Botswana.

Speece (2012) argues that "learning styles may differ substantially across cultures". This is an important starting point for the Botswanalisation of the LACC. We need to agree that each culture has its unique needs. Given that one would like to know how universal LACC is? It appears that nobody has taken any serious steps to analyse the Botswana learners learn. This is contrary to the evidence on the ground which appears to suggest that indeed Botswana learners have unique needs which need to be addressed as a matter of urgency. Speece (2012); Wikipedia counters the importance of studying learning styles and appear to suggest that learning styles are only important in as far as building one's competitive advantage and have nothing to do the learning outcomes. This argument fails to explain why people from different cultures learn differently. Dangwal and Mitra (1999) show the importance in that "learning styles could be used to predict what kind of instructional strategies or methods would be most effective for a given individual and learning task". This will be effective if the learning style is matched with the learning environment.

In fact it is ridiculous to suggest that one's learning style has little or no bearing on the learning outcome. Kolb's learning styles model basically works with two major variables, experience (perception) and how one processes this experience. This, by the end of the day determines the level of learning one decides to acquire. How you approach a problem determines the outcome! This can be easily observed in real life situations.

IMPORTANCE OF THE STUDY

There is a lot of debate concerning the learning that takes place in private institutions in Botswana. Some stakeholders believe that there is little learning taking place. This study will help alleviate some of these fears; especially that TEC and BOTA are involved in the quality management of courses and private institutions.

STATEMENT OF THE PROBLEM

There has been an increase in the number of students failing to complete their tertiary education in Botswana despite the opportunity the government avails to the students through sponsored repeats. The preliminary observations have revealed that most of these students who are failing to complete their programmes are not interested in doing so for various reasons which include lack of motivation among other reasons. This is evidenced by a sizeable number of students who opted to drop out from school at diploma level.

Student motivation is one of the key elements with substantial influence on the study approach and eventually the conceptualization and understanding of the subject. Despite the fundamental role played by motivation in learning, teaching and assessment, there is not much evidence on what motivates students at tertiary level in Botswana.

OBJECTIVES

Given that there is not much evidence or literature on student motivation at tertiary institutions in Botswana, the study seeks to fill the gap. The study aims at identifying the factors that influence student motivation at tertiary education using cross sectional data and coming up with suggestions on what can be done by tertiary institutions and policy makers to ensure that the students are adequately motivated to study and learn.

HYPOTHESIS

In an endeavour to understand better the importance of motivation and factors that motivates the students to learn, the study investigates in detail influences attributable to the teacher such design of learning material and the teaching methods applied, the learning environment, the assessment methods and the general institution environment as well as external factors such as socio-economic factors on student motivation, thus the study hypothesis that student motivation is influenced by classroom environment, lecturer's enthusiasm, student's past experiences, nature and quality of feedback, assessment system, lecturer's knowledge of the subject, students' curiosity about the subject. Systems are also considered to be attributing to high failure rates.

SCOPE OF THE STUDY

- This is work in progress, this is an exploratory study.
- Other models have to be used to measure the learning styles of the students apart from Kolb's Learning Style inventory.
- There are a lot of variables that need to be considered to produce conclusive results.
- The study of this nature requires more time than we used.
- More institutions need to be studied if the Botswanalisation of models is to be realised.

RESEARCH METHODOLOGY

RESEARCH DESIGN

The study is a triangulation of both qualitative and quantitative approaches because of the advantages that accrue from such an approach. This approach suits the exploratory study as it can easily enable the researchers not to be bound by any impending rules.

POPULATION OF STUDY

At the time of study, 311 students were enrolled to study computer science at the Francistown branches. The program has three components which include Mathematics for Computing, Introduction to Computers and Communication Study Skills (CSS) for Botho first year. The second year have almost similar subjects but at an advanced level. In CSS students learn language and communication skills. This generally makes our population of study be in a position to interpret the questionnaire.

POPULATION AND SAMPLE SIZE CONSIDERED**TABLE 1**

	BSc Computing Botho 1 st Year	BSc Computing Botho 2 nd Year	NIIT Computing 2 nd Year	Total
BSc Computing Botho 1 st Year	BSc Computing Botho 2 nd Year	NIIT Computing 2 nd Year	Total	261
117	49	95	261	

STUDY SAMPLE

The sample was randomly selected basing on the faculty willing to give spare 5 min for completion of our questioner during their session.

This resulted in a sample of 163 out of 311 Students. Three responses were rejected due to failure to fill in the questionnaire according to the instructions. Participation of these students was voluntary.

DATA COLLECTION PROCESS

During the administering of the questioners, they was always a researcher available to assist students in interpretation of the questioner since the Kolb learning inventory has difficult terms derived from Jung study which appear to be challenging for most learners unless if they have gone through a psychology course, these terms could be hard for Computing students to interpret.

QUESTIONNAIRE

The questionnaire was derived from Kolb's Learning Inventory and it consisted of 12 questions. Each question has got four alternative answers that a student could rank from 1 to 4, where 1 stands for least preferred and 4 being the most preferred answer.

DATA ANALYSIS

Initially we analyzed the data by using the key provided by Kolb and we used 2 best scores for each student to categorise them as divergers, accommodators, assimilators and convergers. When we realized that the analysis was not enough we further subjected the data to one way ANOVA to confirm our results

RESULTS & DISCUSSION

Below are the results of the studies that were conducted:

ANALYSIS OF STUDENTS LEARNING STYLES**TABLE 2**

Learning styles		n	%
N=163	Converger	42	25.77%
	Diverger	5	3.07%
	Assimilator	22	13.50%
	Accommodator	21	12.88%
	Unknown (RO & AE)	63	38.65%
	Unknown (CE & AC)	10	6.13%

The results show that 25.77% of the respondents are convergers, 3% divergers, 13.5% are assimilators, 12.88% are accommodators, and those with strange combinations thus CE & AC and RO & AE constitute of the 6.13% and 38.65 % respectfully. Those with the majority fall of our students fall within this unknown segment.

TABLE 3: NO. OF STUDENTS FITTING IN MORE THAN ONE CATEGORY

	Converger	Diverger	Accommodator	Assimilator	1 and 3	2 and 4
Converger			1			6
Diverger				1		
Accommodator		1		1		1
Assimilator					2	3
1 & 3						
2 & 4						

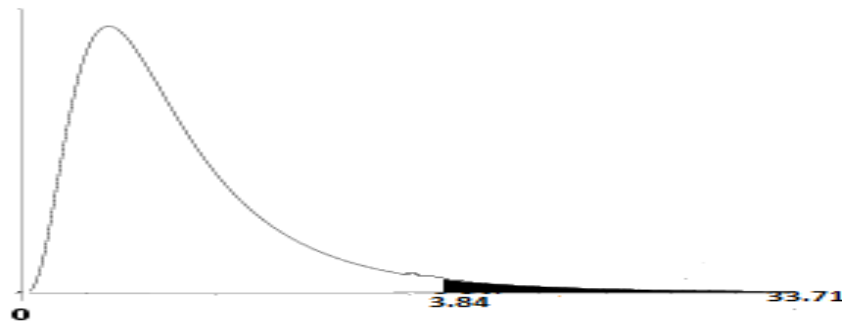
The LSI results outlined that they are some learners who fall within two categories. The data is presented as above. Of essence is that in the unknown category they are up to 12 learners, who fall in another category as the results are equivalent for both categories.

A concern was raised given such a case can these students be comfortable with another learning style or let us say we compared the unknown with other learning styles.

TABLE 4: COMPARISON OF THE LSI SCORES BEFORE CONSIDERING THEIR COMBINATIONS

		DF	SS	MS	F
source	Factor	3	6549.29	64.77	33.71
	Error	448	41971.93	2183.1	
	Total	451	48521.23	2247.87	
Level		N	MEAN	STDEV	
	CE	163	25.48	5.79	
	RO	163	30.61	8.03	
	AC	163	28.87	6.03	
	AE	163	34.27	11.17	

GRAPH 1: RESULTS SHOWING REJECTION OF F FOR THE OF THE LSI SCORES BEFORE CONSIDERING THEIR COMBINATIONS

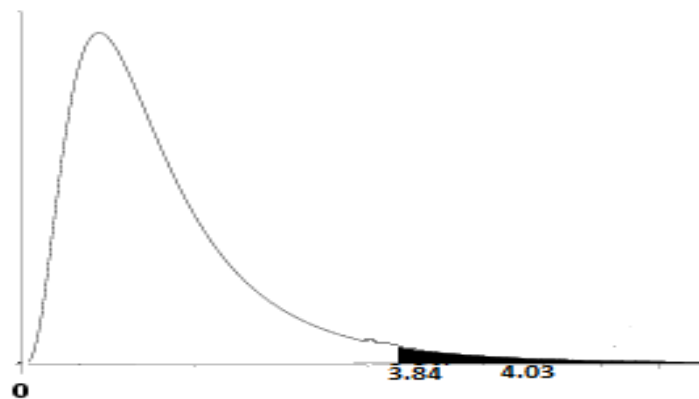


In table V above, we compared the average of the individual categories of the entire sample. Graph 1 depicts that students fail in the area of rejection thus the average is not the same, meaning that students have different learning styles.

TABLE 5: COMPARISON OF THE MEAN SCORES OF CE AND RO OF THOSE LEARNERS WHICH FALL IN THE UNKNOWN

		DF	SS	MS	F
source	Factor	1	3604.66	53.8	4.03
	Error	132	1953.22	14.58	
	Total	133	5557.88	68.38	
Level		N	MEAN	STDEV	
	CE	67	23.48	3.13	
	RO	67	33.85	3.86	

GRAPH 2: RESULTS SHOWING REJECTION OF CE AND RO OF THOSE LEARNERS WHO FALL IN THE UNKNOWN



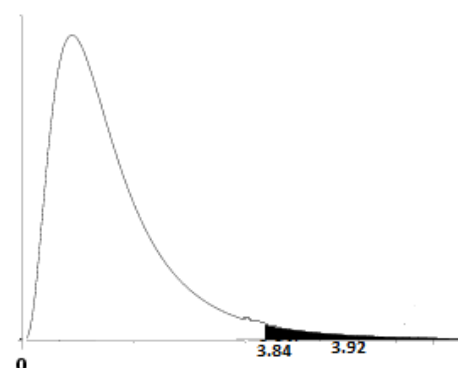
A comparison of the unknown category to the CE and RO was done using the ANOVA. It appears that some students who fall in the unknown CE & RO. So we had to compare the unknown combination thus we have to verify if those students cannot be shifted to a known learning style. We tested the value of CE and we verified if there is a significant difference of their value in RO. This was to verify if there was need for combination of RO & AE to be considered as they do not fall in another category.

The results presented show that the value of F (4.03) falls in the rejection region. We conclude that there is a significant difference in the categories of CE and RO. These learners cannot be categorised as accommodators. The same analysis was done for these unknown learners to verify if they can be categorised as convergers as shown in Table VI below:

TABLE 6: COMPARISON OF THE MEAN SCORES OF AC AND RO OF THOSE LEARNERS WHICH FALL IN THE UNKNOWN

		DF	SS	MS	F
source	Factor	1	1620.57	48.9	3.92
	Error	132	1670.78	12.47	
	Total	133	3291.35	61.37	
Level		N	MEAN	STDEV	
	AC	67	33.85	3.86	
	RO	67	26.9	3.18	

GRAPH 3: RESULTS SHOWING REJECTION OF AC AND RO OF THOSE LEARNERS WHO FALL IN THE UNKNOWN



The value of F value of 3.92 was calculated. This was a comparison of the value of RO and AC of those students who fall in the unknown. The Fig 3 clearly shows that the F value falls in the rejection region. This shows that the students cannot be categorised as convergers.

The learners with the combination CE and AC were not further analysed since the number is insignificant for the current study and that 2 out of 5 fall within another category.

It appears that the learning styles recognised by Kolb have been expanded and two more are been suggested from the results. This suggests that certain specific learning styles can be peculiar to certain environments. This is consistent with Dangwal and Mitra (1999) findings that 'the process of learning is critically important and understanding the way individuals learn is the key to educational improvement'. Learning styles are indeed culture specific. LACC teaching method appears to have very encouraging components which when applied rigorously may result in an improvement in the grades.

The new categories that we got are the same combinations that most writers believe are unattainable. Taking into consideration the various arguments presented by many other authors that it is impossible to get those kinds of learning style, this presents a new challenge in that majority of the respondents are in the undefined zone. This surely shows a lot of work needs to be done. We cannot just dismiss the results. The results may probably be as a result of lack of understanding of the instrument that was used. The future research, we may have to translate the Kolb's Learning Inventory to investigate whether indeed the learners were saying exactly what they intended to say. It's possible that the challenges came from most of the words that are used in the instrument. The words are based on Jung's psychology research and an ordinary IT student may find it very difficult to decipher a language in psychology.

We feel our findings are substantive, because they challenge the usual findings. Why would we get such a substantive result (38%) and an additional 6% of the students in the sample who belong to the undefined group? The results are so inconsistent that, on its own, suggests that a bigger study be done to explore the learning styles in Botswana as whole.

The findings seem to suggest the LACC methodology is not meeting the expectations of an ordinary student at Botho College. The intentions of meeting multiple learner types might not be easily attained if we take into consideration the various learners type that are not taken into account the Kolb's Learning styles models. (Note: 44% of the respondents have got no known learning styles, yet Kolb's experiential model is premised on the 4 learning styles.)

Our conclusion is that Batswana learners indeed fall under six categories of which those with the combination CE and AC still require further analysis. With this understanding it is required that the LACC should consider these learning styles for it to present a methodology which will suit the Batswana learners

FINDINGS

We carried out a survey within the Botho Students in Francistown applying a questionnaire on the students learning style by Kolb in 1984. Nobody has ever tested the applicability of these models on the Botswana type of learners.

We believe that students are not benefitting much from the constructs that are proposed by the LACC model. This is because traditional learning styles are still being used. It appears that there is nothing wrong with LACC methodology because it is designed to make the students go through the Kolb's learning cycle. The researchers intend to investigate if active learning environment is being used during the construct. Research question: what is the best way of imparting the expert knowledge to the learner? There is challenge, therefore, in the way teachers are dealing with the construct stage. This paper tends to present the methods which can be employed to enhance learner involvement during the construct stage.

On the construct the learning environment must take into account the different learning styles. The problem is LACC seems not to cater for all learning styles in Botswana.

It appears that the learning styles recognised by Kolb have been expanded and two more are been suggested from the results. This suggests that certain specific learning styles can be peculiar to certain environments. This is consistent with Dangwal and Mitra (1999) findings that 'the process of learning is critically important and understanding the way individuals learn is the key to educational improvement'. Learning styles are indeed culture specific. LACC teaching method appears to have very encouraging components which when applied rigorously may result in an improvement in the grades.

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The findings seem to suggest the LACC methodology is not meeting the expectations of an ordinary student at Botho University. The intentions of meeting multiple learner types might not be easily attained if we take into consideration the various learners type that are not taken into account the Kolb's Learning styles models. (Note: 44% of the respondents have got no known learning styles, yet Kolb's experiential model is premised on the 4 learning styles.)

RECOMMENDATIONS/SUGGESTIONS

Suggest further analysis of the learning styles at Botho University. The study is now questioning the validity of the learning components of LACC. This is especial concerned with the construct component. Two construct elements are offered one after the other and are too long to deal with. It is even worse if one also considers the expertise that is required by this model. The definition of the expert required is not so clear. Probably if experience of the lecturer is the most determining factor, it is understandable. How about when we have a new lecturer fresh from university? It would appear that this model will work well if the teachers are taken through appropriate teacher training programs like the Post Graduate Certificate in Higher Education (PGCHE) which Botho University has started offering to its faculties.

CONCLUSIONS

From the research findings, it can be concluded that student motivation to study is influenced many factors which are, life goals, nature and quality of feedback, reasons for choosing a programme of study, the school environment, assessment systems and the student's abilities to master the subject content. This means that the tutor, the student and the tertiary education system has to work together to achieve full the objectives of education which is transformation of an individual, thus employability.

SCOPE FOR FURTHER RESEARCH

The study was not exhaustive though it brought out some of the pertinent issues with regard to student motivation at higher education. There is need to subject the finding to empirical test by trying all the recommendations such as the mode of delivery and tutor training and then measure the level of student motivation. Further research can be done on the process of motivation and the effectiveness of different teaching methods on student motivation.

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