Towards Effective Teaching of Culturally Diverse Health Science Classes in Universities: Application of Culturally Responsive Pedagogies

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Research Article

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Abstract

Background

The level of cultural heterogeneity in today's Health Science Education (HSE) university classrooms has become very high hence the need to effectively manage diversity to ensure effective teaching and learning through the use of culturally responsive pedagogies (CRPs). The study therefore investigated how CRPs are applied in HSE classes in universities in Zimbabwe as well as how significantly CRPs influence effective teaching of culturally diverse classes.

Methods

The study employed a quantitative approach that used a self-constructed structured questionnaire for data collection. A sample of 63 HSE lecturers was selected from five universities using a stratified random sampling strategy. Confirmatory Factor Analysis (CFA) was used for data purification. Data was analyzed using descriptive statistics, Spearman's rank correlation, multiple regression analysis, and correlation analysis.

Results

Results showed that verbal and non-verbal communication, classroom management, cultural knowledge of HSE students, and student-teacher interaction significantly influenced how HSE lecturers applied CRPs in universities. The results further found that the application of CRPs in university classrooms had a significantly influence on the teaching of culturally diverse HSE students in universities.

Conclusions

It was concluded that the use of CRPs is critical for effective teaching of culturally diverse university HSE classroom as it ensures effective participation by all students as well as interaction between students and lecturers as well as between culturally diverse students themselves for effective learning.

Background

The purpose of the study was to establish how CRPs are applied in universities in Zimbabwe for effective teaching of culturally diverse HSE classes. The level of cultural heterogeneity in today's university health science classrooms has become very high hence the need to manage diversity to ensure effective teaching and learning has become a must. Various studies show that university classrooms of today are characterized by a diverse range of HSE students in terms of their cultural backgrounds [1]. Separate studies by [2] and [1] found that discriminatory teaching practices in university classrooms continue resulting in negative learning experiences for many of the HSE students who are referred to as *others* and are always *othered* during their classroom interactions. CRPs can therefore be used to navigate the challenge of managing diversity in these classrooms. The need therefore, for university HSE lecturers to be multi-culturally aware of cultural differences among their HSE students becomes very important for effective teaching [3, 4, 5]. This means that there is a need for HSE lecturers to have a certain level of multi-cultural competence for them to be able to deal with issues of cultural diversity in their classrooms through the use of CRPs. The study was guided by the following research questions:

- What factors influence the implementation of CRPs in culturally diverse HSE classes in universities?
- What challenges do university HSE lecturers face in the application of CRPs to ensure effective teaching and learning of culturally diverse HSE classes in universities?
- How significantly does the application of CRPs contribute to diversity effective teaching of culturally diverse HSE classes in universities?
- What challenges do HSE lecturers face in their application of CRPs in the teaching of culturally diverse HSE classes in universities?

Culture and Culturally responsive pedagogies

Culture has an influence on student learning and social adjustment and is defined by [6: 2] as “the shared learned meanings and behaviours derived from living within a particular life activity” which according to [4] and [7], encompasses various aspects that include customs and values, traditions, communication, attitudes, beliefs, learning styles, rituals, behaviours as well as language. According to [8], a number of resource pedagogies that arose through the 1970s up to the 1990s aimed at finding the intersection between pedagogy, culture and language included the CRPs. CRPs have been consistently associated with various positive student academic outcomes such as improved academic performance, improved attendance, development of positive attitudes and a sense of self-awareness [9, 10, 11]. Responsive, according to [7], means to react quickly and positively, to respond with interest and enthusiasm, hence connotes receptiveness and eagerness. CRPs also known as culturally appropriate pedagogies (CAPs) therefore refer to a pedagogies that enable HSE lecturers in universities to “quickly and positively respond with interest and enthusiasm to the diverse cultures of HSE students” [7: 5). CRPs by definition are teaching approaches that use cultural characteristics, experiences and perspectives of culturally diverse HSE students as catalysts for effective teaching [12, 13, 14, 4, 36, 8].

Research model and hypotheses formulation

The study is informed by the symbolic interactionist theory which was developed by [16] further improved by [. Interactionism also called the symbolic interactionist theory or perspective is predicated on the idea that in a social context, individuals create meanings and then act in some way based on these subjective meanings [18]. Verbal communication in which words are the predominant symbols is key to subjective meaning making (subjective interpretation) evident in social interactions in social contexts which lead to different emotions (positive and negative) in people. These emotions lead to different ways of behaving and acting that have an influence, in the context of university classrooms, on continued participation in learning by HSE students [19]. Subjective interpretations from a social context such as a classroom can contribute to positive emotions such as pleasure and excitement which facilitate learning or to negative emotions such as worry, nervousness, and shame among others, which disrupt learning [20 - 24]. In a nutshell, the symbolic interactionist theory argues that people behave and act the way they do because of the meanings they attach to communicative stimuli from a social context such as a classroom.

In the context of the current study, Figure 1 shows that the symbolic interaction theory helps to inform HSE lecturers in university classrooms about how certain behaviours, actions, assumptions and expectations they and their HSE students make, affect how learning progresses in culturally diverse HSE classrooms, especially with regards to the quality of teacher-student interaction as well as student-student interaction. University HSE lecturers should therefore always provide opportunities for HSE students to interact among themselves as well as with the HSE lecturers. A study by [25] found that opportunities for discussions through the use of flexible groupings provide HSE students with a chance for them to mix, mingle and interact between themselves as well as with the teachers thus ensuring that HSE students of diverse cultures learn from each other during lessons.

Factors influencing application of CRP

In their separate studies, [26], [27] and [28] found that the symbolic interaction theory helps HSE lecturers in university classrooms to be able to modify teaching to meet the learning needs of culturally diverse HSE students through the use of differentiated instruction thus successfully manage diversity in classrooms. For HSE lecturers to be able to do this, they must possess multi-culturally competency. In two other separate studies by [29] and [30], results showed that social context symbols that HSE lecturers use in classrooms that include gestures, words, labels, streaming, grouping and paying more attention to certain groups of HSE students, can create either positive or negative emotions that affect learning in classrooms because of the types of emotions they create in HSE students.

A study by [19] found that different forms of communication produce emotions that result in different ways of behaving and acting that have an influence, in the context of classrooms, on continued participation in learning by HSE students. The words, gestures and labels teachers and HSE students use on some HSE students, the attention they give to other HSE students and classroom management strategies the HSE lecturers reflective the level of multi-cultural competency they possess [7] and this has an effect on teaching and learning (see Figure 1). In their studies, [32] and [25] found that classroom management activities such as building a caring and supportive classroom learning environment, setting a positive tone for all HSE students as well as setting clear expectations to encourage all HSE students from diverse cultural backgrounds to aim high lead to effective diversity

management. Such contextual symbols are interpreted differently (subjectively) by the diverse HSE students in the classrooms in a way that either facilitate or affect effective teacher-student and student-student interaction in the classroom thus affect learning and effective management of diversity in university classrooms in the end.

H_1: *There is a significant statistical relationship between the application of CRP in HSE university classrooms and verbal and non-verbal communication.*

H_2: *There is a significant statistical relationship between the application of CRPs in HSE university classrooms and cultural knowledge of HSE students by HSE lecturers.*

H_3: *There is a significant statistical relationship between the application of CRPs in HSE university classrooms and student-teacher-interaction.*

H_4: *There is a significant statistical relationship between the application of CRPs in HSE university classrooms and classroom management.*

Culturally responsive pedagogies and effective teaching of culturally diverse HSE students

Various studies have shown that for HSE lecturers to be able to effectively manage diversity for effective teaching, they should employ CRPs. Such pedagogies ensure that teaching is more personally appealing, meaningful and effective to HSE students, as academic knowledge and skills development in HSE students is situated within their lived experiences and frames of reference [12, 33 – 35]. Furthermore, a study by [4] found that use of CRPs requires adequate knowledge by HSE lecturers of cultural knowledge (cultural backgrounds) of all their HSE students as a base or starting point, and should include the development of curricula that have cultural diversity elements in their content. Separate studies by [15], [37] and [38] found that effective management of diversity that leads to effective teaching requires teachers to make pedagogic decisions and implement teaching approaches that promote academic and social development of HSE students, encourage teacher-student interaction, build teamwork aimed at diverse HSE students, and reduce competition.

In their study also, [15:3] found that to be able to effectively manage diversity through the use of CRPs, HSE lecturers need to "possess adequate cultural knowledge, prior experiences, and frames of reference of their diverse HSE students in order to make their learning encounters in classrooms more relevant and effective". In his study also, [25] found that to be able to manage diversity in their classrooms and effectively teach diverse HSE students through the use of CRPs, HSE lecturers should employ approaches that satisfy the learning needs of different HSE students' epistemologies particularly with regards to how HSE students organise their world cognitively through their diverse language and symbols. [7] as well as [39] in their separate studies also found that for HSE lecturers to successfully apply CRPs to manage diversity and effectively teach their diverse HSE students, they need to employ multiple pedagogies in which they seek multiple perspectives from their HSE students, acknowledge all their diverse HSE students' comments, contributions and responses as well as use heterogeneous cooperative groupings to build teamwork among diverse HSE students.

H_5: *There is a significant statistical relationship between application of CRP and effective teaching of culturally diverse HSE students in universities.*

Methodology

Research design

The study employed a quantitative approach located in a descriptive research design. Stratified random sampling approach was used for selecting a sample of 63 HSE lecturers for the study from a population of 75 HSE lecturers from five universities. [40] online sample size table at 95% level of confidence and 5% margin of error was used for determining the sample size. The purpose of stratified random sampling approach was to ensure that each population from the five universities is proportionately represented in the study [41]. There are 22 university in Zimbabwe from which five universities were selected using purposive sampling strategies as they offer HSE programmes. The five universities have been in operation for more than ten years and were

considered possible rich sources of data with regards to the management of diversity in the classrooms. The distribution of the 63 HSE lecturers were as follows: X1=15, X2=14, X3=17, X4=11, X5=6.

Instrumentation

A self-constructed structured questionnaire was used for data collection in the study. The questionnaire consisted of 44 items from five factors as follows: Verbal and non-verbal communication-11items, cultural knowledge-9 items, classroom management-11items, Student-teacher interaction-5 items, and barriers to CRPs application-8 items. The questionnaire was designed using the 5-point Likert scale from Strongly Agree (SA) - 5, Agree (A) - 4, Not Sure (NS) - 3, Disagree (DA) - 2 to Strongly Disagree (SDA) - 1. A criterion mean (CM) of 3 which was the average of the scales was calculated for ease of analysis so that any mean score less than 3 showed disagreement with a given statement while a score from 3 and above showed agreement. 63 questionnaires were hand delivered to participants through the offices of deans of respective universities. 57 questionnaires were returned making a return rate of questionnaires of 90.5 % from the HSE lecturers.

Data analysis

A number of data analysis tools were used in the study. Descriptive statistics was used for summarizing data through tables while Spearman's rank correlation and multiple regression analysis were used to determine the nature of relationships between the dependent and independent variables in the study. Data was first validated using Confirmatory Factor Analysis (CFA). CFA is defined as a multivariate statistical tool that is used for ensuring item quality, reliability, construct validity, convergent validity and discriminant validity [42]. Statistical Package for Social Sciences (SPSS) version 24 was used for both overall data analysis as well as for conducting the CFA on five factors with 44 items. CFA is used to ensure simplified data reduction by identifying a small set of factors that can explain most of the variance observed in much larger manifested data [43].

Results

Biographic data

Results in Table 1 show that more than half (56%) of the HSE lecturers are above 40 years which shows that the institutions are populated by fairly mature HSE lecturers and this is also reflected in the years of experience where around 75% of the HSE lecturers have more than 10 years of experience. There are more male HSE lecturers (61%) than female (39%) in the institutions which shows a problem of gender balance. Most of the HSE lecturers have doctoral degrees (56%) with 38% having doctoral qualifications and 6% having professional qualifications that include Chartered Institute of Management Accountants (CIMA) and Association of Certified Chartered Accountants (ACCA). This shows that universities have moved a step forward in attracting doctoral qualifications holders and having highly qualified HSE lecturers may be very good in the management of diversity and effective teaching at university level.

Measurement model analysis

Results in Table 2 showed that the KMO and Bartlett's tests were conducted to demonstrate the suitability of the data structure for factor analysis. The Kaiser-Meyer-Olkin Measure of sampling adequacy was .752 demonstrating that the data satisfied the benchmark of KMO $\geq$ .05 for factor analysis could be conducted (Hair et al, 2017). Results of the Bartlett's test of Sphericity (BS) which were 249.003 and significant ($p = .000$) also satisfied the benchmark of $p < .05$ (Hair et al, 2017) which further confirmed that factor analysis could be performed to validate the data.

Table 3 showed a test of reliability and convergent validity of data items using Confirmatory Factor Analysis (CFA). Internal consistency reliability was tested through the composite reliability of each of the constructs. Results showed that the composite reliability values ranged between .729 and .813 which satisfied the benchmark of $\alpha \geq .7$ for adequate internal consistence reliability of scale items [43 – 44]. Results in Table 3 also confirmed convergent validity through standardized factor loadings, composite reliability and average variance extracted [45]. Standardized factor loadings which ranged between .653 and .847, composite reliability values which ranged between .729 and .813, as well as average variance extracted (AVE) whose variances ranged from .673 and .810 confirmed convergent validity of the scale items.

Table 4 showed a test of discriminant validity of scale items as well as correlation analysis of independent variables. A comparison of the values of the square roots of AVE (bold diagonal values) for each construct and the vertical correlations of the constructs showed that all the diagonal values were greater than the vertical values thus satisfying requirements of discriminant validity [44]. Results in Table 4 further showed that all constructs were positively correlated with each other demonstrating that a change in any of the constructs would positively impacted the others. With regards to the correlation between independent variables, results in Table 4 showed that classroom management and cultural knowledge had the highest correlation ($r=.744$; $p<.01$) showing that as the cultural knowledge of HSE students by HSE lecturers improve, so will also be their ability to apply CRPs when teaching culturally diverse classes. The correlation between cultural knowledge and verbal communication is the second highest ($r=.437$, $p<.01$) showing that cultural knowledge of HSE students by HSE lecturers can lead to improvement on how HSE lecturers verbally interact with their diverse HSE students thus contributing to effective application of CRPs. Barriers to CRPs application had a negative correlation with all the other independent variables showing that these barriers have an overall negative effect on the ability of HSE lecturers to verbally communicate with diverse HSE students ($r=-.213$; $p < .01$), to have adequate cultural knowledge of HSE students ($r=-.271$; $p < .01$), to use effective classroom management strategies on diverse classes ($r=-.319$; $p < .05$), and also to interact effectively with HSE students from diverse cultures ($r=-.271$; $p < .05$).

Challenges to application of CRPs by university HSE lecturers

Results in Table 5 showed that university HSE lecturers faced a number if challenges that affect their application of CRPs for effective teaching of culturally diverse HSE students. The major challenge the HSE lecturers faced was the development and use of multiple assessment tools to meet the needs of culturally diverse HSE students in their classrooms ($M = 4.47$; $SD = .652$). This could be because most of the HSE lecturers never received training on the management of HSE students in culturally diverse classrooms ($M = 4.02$; $SD = .704$). Other challenges HSE lecturers faced that affected their application of CRPs in their classrooms included inability to effectively plan their work in order to adequately cater for the learning needs of culturally diverse HSE students ($M = 4.11$; $SD = .793$), failure to use multiple teaching strategies to cater for the learning needs of culturally diverse HSE students ($M = 3.79$; $SD = .686$), not being able to come up with teaching content that meets the knowledge needs of culturally diverse HSE students ($M = 3.49$; $SD = .542$), as well as having challenges responding appropriately to learning needs of culturally diverse HSE students ($M = 3.02$; $SD = .671$). On a positive note, HSE lecturers however seemed to be prepared to take time to understand the different cultures of HSE students in their classes ($M = 2.11$; $SD = .637$).

Results in Table 6 showed that there was a significant relationship between verbal and non-verbal communication (VNC) and the application of CRPs by university HSE lecturers ($t = 2.492$; $\beta = .027$; $p = .000$; $p < .05$). These results suggested that the way HSE lecturers communicated with their HSE students either verbally or non-verbally, had a significant impact on how they applied CRPs to teach culturally diverse HSE students.

It was shown in Table 6 that there was a significant relationship between cultural knowledge (CK) and the application of CRPs by university HSE lecturers ($t = 5.247$; $\beta = .051$; $p = .031$; $p < .05$). These results suggested that having adequate knowledge of the diverse cultures of HSE students in classes had significant implications on how well HSE lecturers applied CRPs for teaching HSE students of diverse cultures.

Results in Table 6 further showed that there was a significant relationship between classroom management (CM) and the application of CRPs by university HSE lecturers ($t = 3.962$; $\beta = .033$; $p = .008$; $p < .05$). These results suggested that for university HSE lecturers to be able to effectively apply CRPs, they needed to be able to use effective classroom management strategies.

It was further shown in Table 6 that there was a significant relationship between student-teacher interaction (SI) and the application of CRPs by university HSE lecturers ($t = 7.229$; $\beta = .032$; $p = .000$; $p < .05$). These results suggested that opportunities that university HSE lecturers created for interacting with HSE students and for HSE students to interact among and between themselves, were critical for the effective application of CRPs by lecturers in universities.

Results in Table 7 also showed that there was a significant relationship between effective teaching of culturally diverse HSE students (EDS) and application of CRPs (CA) in universities ($r_s = .703$; $p = .001$; $p < .01$). These results therefore suggested that the use of CRPs in culturally diverse HSE classrooms led to effective teaching of culturally diverse HSE students in universities.

Discussion

The purpose of the study was to establish factors influencing the implementation of CRPs as well as how significantly the application of CRPs influences effective teaching of HSE students from culturally diverse backgrounds in classrooms. The study also identified factors that acted as barriers to effective implementation of CRPs in universities. The symbolic interactionist theory by [16] and [17] was used to guide the study. The theory highlighted four dimensions namely verbal and non-verbal communication, classroom management, student-teacher interaction and cultural knowledge as being important for the implementation of CRPs.

It emerged in the study that verbal and non-verbal communication has a significant influence on the implementation of CRPs in universities. What people understand or believe they understand from words and symbols that are communicated by the communicator has an influence on how they act or react in a particular situation. A study by [19] found that different forms of communication produce emotions that result in different ways of behaving and acting that have an influence, in the context of classrooms, on continued participation in learning by HSE students. If some HSE students believe that the communication being done by either the teacher or some sections of the HSE students are demeaning to them or have some connotations of segregation, such HSE students may end up not participating in the learning process at all or at worst may end up not coming school. The words and symbols which teachers and HSE students use for communicating therefore have a significant effect on how particularly the marginalized HSE students behave in the classroom. Confirming the above assertion, separate studies by [20] and [21] found that subjective interpretations from a social context such as a classroom can contribute to positive emotions such as pleasure and excitement which facilitate learning or to negative emotions such as worry, nervousness, and shame among others, which disrupt learning. Another study by [7] also found that the words, gestures and labels teachers and HSE students use on some HSE students or the attention teachers give to some HSE students, have a significant influence on the levels of participation in the learning process by the seemingly neglected or marginalized HSE students.

Results of the study also showed that cultural knowledge of HSE students by university HSE lecturers has a significant influence on the application of CRPs in universities. Having a good understanding of the diverse cultures in the classroom helps HSE lecturers to come up with teaching content and activities that cater for the needs of all HSE students. To be able to understand how certain HSE students learn and what they actually consider as learning, HSE lecturers need to have a full understanding of the diverse cultures of these HSE students, that is, HSE lecturers need to demonstrate multicultural competence. With this understanding, HSE lecturers will then be able to make decisions on which teaching methods to use, how to select content to teach and what teaching tools to use. Separate studies by [7] and [27] found that HSE lecturers who possess this adequate cultural knowledge of their HSE students mostly use differentiated instruction to successfully manage cultural diversity in classrooms.

Results further showed that classroom management has a significant influence on the application of CRPs in university classrooms. Classroom management is important in the application of CRPs because it is about the decisions HSE lecturers make and actions they take to create environments that support and facilitate both academic and social-emotional learning. For HSE students of diverse cultural backgrounds to learn effectively, certain conditions that make them feel safe, wanted, cared for and supported have to be in place. Studies by [27] and [28] found that for HSE lecturers to effectively engage culturally diverse HSE students in the learning, they need to establish conditions that elicit the cooperation of their HSE students. Such conditions according to separate studies by [25] and [32] include ensuring that all teaching in the classroom respects and represents multiple cultures, genders, religions and nationalities, is welcoming and focuses more on HSE students' strength rather than weaknesses, provides HSE students with clear criteria and standards for successful task completion, and sets clear rules on how HSE students of diverse cultural backgrounds interact during the learning process.

It further emerged from the study that student-teacher interaction has a significant influence on the application of CRPs by university HSE lecturers. Allowing for opportunities where HSE lecturers interact with their HSE students as well as where HSE students interact between and among themselves is very important in the application of CRPs and in encouraging HSE students to learn from each other as well as appreciate each other's different cultures. Strategies such as class discussions and group discussions are important for providing such interactive opportunities. A study by [25] found that diverse HSE students learn

better in flexible groupings that allow HSE students of diverse cultures to interact with each other and learn to understand and appreciate each other's different cultures.

It also emerged from the study that the application of CRPs in universities has a significant effect on the effective teaching of culturally diverse HSE students. The application of CRPs in teaching ensures that teaching becomes more personalized and contextualized to the needs of diverse HSE students. Separate studies by [12] and [33] found that the application of CRPs in university classrooms ensures that teaching becomes more personally appealing, meaningful and effective to HSE students, as academic knowledge and skills development in HSE students is situated within their lived experiences and frames of reference. This means that for university HSE lecturers to effectively teach culturally diverse HSE students, the starting point is to appeal to each and every student's culture in terms of what each of the HSE students' views as learning and knowledge and how learning can contribute to knowledge and skill acquisition. With this knowledge, university HSE lecturers will be able to come up with learning experiences for HSE students that appeal to each of their cultures leading to all HSE students being motivated more to learn and teaching being more effective.

Results of the study also showed that university HSE lecturers faced a number of challenges that affected their abilities to apply CRPs to effectively teach HSE students of diverse cultures. Among some of the major challenges included that they had not been trained on how to teach HSE students of diverse cultural backgrounds and this as a second challenge, posed problems when they wanted to come up with assessment tools, teaching content and learning activities that satisfied HSE students of diverse cultural backgrounds.

Conclusions

Based on the above results, it was concluded that classroom management, cultural knowledge, student-teacher interaction, and non-verbal communication significantly influence on how CRPs is applied by university HSE lecturers. This means that for university lecturers to be able to apply CRP in their teaching of culturally diverse university students, they need to be able to use effective classroom management strategies as well as ensure that students are directly involved in their learning through interactive opportunities that help to create conducive learning environments for students to learn. It further means that lecturers need to have a good understanding of the different cultures in the classrooms they teach so as to be able to effectively communicate with the students either verbally or non-verbally for effective teaching and learning. It was further concluded that the application of CRPs in university classrooms was a pre-requisite for effective teaching of culturally diverse HSE students in universities. This means that since university classrooms are now populated by diverse range of students in terms of culture, it is important for lecturers to use pedagogies that cater for the learning needs of students from such diverse cultures. Based on the results of the study, it was also concluded that the application of CRPs in universities in Zimbabwe was still work in progress owing to the myriad of challenges HSE lecturers faced that affected the application of CRPs. These challenges ranged from a lack of training in diversity management to failing to create supportive environments for culturally diverse HSE students to learn.

Recommendations

Based on the above results, it is recommend that university HSE lecturers need urgent training on how they can apply CRPs for effective teaching of culturally diverse HSE students especially now that university classes have now become highly multi-cultural. With adequate knowledge and skills of how to use CRPs to manage diversity, HSE lecturers will become more confident, develop positive attitudes towards different cultures and will be able to teach culturally diverse HSE students better.

Abbreviations

ACCA – Association of Certified Chartered Accountants

B.ED – Bachelor of Education

BI – Barriers to the application of culturally responsive pedagogies

CA- Application of culturally responsive pedagogies

CIMA – Chartered Institute of Management Accountants

CK – Cultural knowledge

CM – Classroom management

CRP – Culturally responsive pedagogies

D.Ed – Doctor of Education

Dip Ed – Diploma in Education

EDS – Effective teaching of culturally diverse classes

HSE – Health Science Education

KMO – Kaiser-Meyer-Olkin test

M.ED – Master of Education

MBA – Master of Business Administration

MPhil – Master of Philosophy

MSc – Master of Science

N – Number of participants

PhD – Doctor of Philosophy

SD – Standard deviation

SI – Student-teacher interaction

VNC – Verbal and non-verbal communication

Declarations

Informed consent: Informed consent was obtained from all participants before the commencement of the study.

Ethics approval and consent to participate: The study was given ethical approval and consent by the Bindura University of Science Education ethics committee.

Consent for publication: The manuscript contains any individual person's data in any form

Availability of data and materials: There is no date and material associated with this study to declare

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Authors' information: Norman Rudhumbu is Associate Professor and Executive Dean at Bindura University of Science Education who has published widely in the area of curriculum studies and instruction.

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Tables

Table 1: Biographic characteristics of HS lecturers

Biographic characteristics	Items	%
Age	20 - 30 years	8.4
	31 - 40 years	35.5
	41 - 50 years	39.3
	51+ years	16.8
Gender	Male	60.7
	Female	39.3
Educational level	Master's degree	38.3
	Phd degree	56.1
	Others, specify: ACCA, CIMA	5.6
Years of teaching experience	Less than 5 years	6.5
	5 – 10 years	18.7
	11 – 15 years	41.1
	15+ years	33.7

Table 2: KMO and Bartlett test for independent variables

KMO and Bartlett test		
Kaiser-Meyer-Olkin Measure of	Sampling Adequacy	.752
Bartlett's test of Sphericity:	Approx. Chi-Square	249.003
	df	28
	Sig.	.000

Table 3 Convergent validity and reliability measurement of the model

Construct	Items	Standardized factor loadings	Composite reliability (CR)	Average variance extracted (AVE)
VNC	VNC1	.735	.813	.691
	VNC2	.691		
	VNC4	.722		
	VNC5	.801		
	VNC7	.847		
	VNC9	.851		
	VNC10	.766		
	VNC11	.653		
CK	CK1	.733	.811	.744
	CK4	.826		
	CK5	.721		
	CK6	.754		
	CK7	.815		
	CK8	.694		
CM	CM1	.698	.745	.673
	CM2	.744		
	CM3	.791		
	CM4	.658		
	CM6	.713		
	CM8	.782		
	CM9	.802		
	CM10	.719		
SI	SI3	.747	.729	.810
	SI4	.829		
	SI5	.831		
BCA	BCA1	.805	.817	.833
	BCA2	.743		
	BCA3	.812		
	BCA4	.749		
	BCA5	.667		
	BCA6	.727		
	BCA7	.801		

Table 4: Correlation and Discriminant validity of the measurement model

Constructs	VNC	CK	CM	SI	BCA
VNC	**.831**				
CK	.437**	**.863**			
CM	.371**	.744**	**.820**		
SI	.425**	.388*	.419**	**.900**	
BCA	-.213**	-.271**	-.319*	-.271*	**.913**

Sig: p < .05; **p < .01; Diagonal bold values represent square roots of AVE*

Table 5: Barriers to CRPs application in university classrooms

Item	N	Mean	SD
1. I always have challenges planning to cater adequately for the different learning needs of all my diverse HS students	57	4.11	.793
2. I always have challenges using multiple teaching styles when teaching diverse HS students in my class	57	3.79	.686
3. I always have challenges knowing the diverse cultures in my class in order to use the cultural knowledge to connect what student know to new concepts and content	57	2.11	.637
4. I always have challenges responding to the needs of diverse HS students in my class	57	3.02	.671
5. I always have challenges using multiple, assessment methods for assessing diverse HS students in my class	57	4.47	.652
6. I always have challenges ensuring that the content I teach represents HS students' multiple cultures, genders, religions and nationalities	57	3.49	.542
7. I have not received professional training on the teaching and management of diverse classes	57	4.01	.704

CM = 3.0 *Adapted from Adriane, Dorrington & Latosha (2018)*

Table 6: Multiple regression analysis on independent variables

Model		Unstandardized coefficients		Standardized coefficients	t	Sig	95% confidence interval for B			Collinearity Statistics		
Dependent variable: *Application of CRPs in universities*		B	Std Error	Beta (β)			Lower bound	Upper bound	Zero Order	Part	Tolerance	VIF
1	(Constant)	67.441	3.713		1.301	.000	64.19	71.39				
	SI	.346	.649	.032	7.229	.000	.341	.354	.518	.368	.495	3.01
	CK	.211	.361	.051	5.247	.081	.205	.216	.211	.419	.274	3.47
	CM	.103	.275	.033	3.962	.008	.096	.109	.254	.317	.371	4.52
	VNC	.092	.295	.027	2.492	.000	.089	.106	.117	.351	.481	3.71

a. Dependent variable: Application of CRPs in universities (CA)

b. Independent variables: Verbal and non-verbal communication (VNC), Classroom management (CM), Cultural knowledge (CK), Student-teacher interaction (SI)

Table 7: Spearman's rank correlation test on CA and EDS

			EDS	CA
Spearman's rho	EDS	Correlation coefficient	1.000	.629**
		Sig. (2-tailed)		.000
		N	57	57
	CA	Correlation coefficient	.629**	1.000
		Sig. (2-tailed)	.000	
		N	57	57

**Correlation is significant at the p = .01 (2-tailed)

Figures

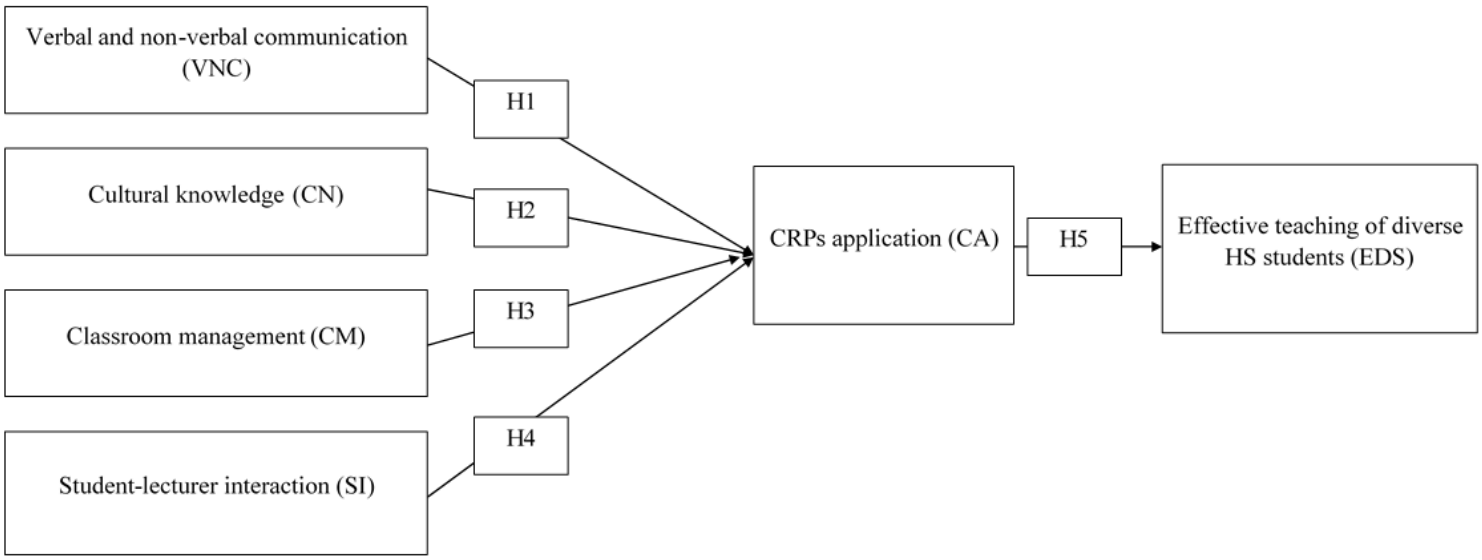

Figure 1

Research model adapted from the symbolic interactionist theory [16 – 17]