CULTURALLY RESPONSIVE TEACHING (CRT) AND CULTURALLY DIVERSIFIED CURRICULUM: A PREDICTIVE MODEL FOR IMPROVING ACHIEVEMENTS IN STEM EDUCATION

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Abstract
Students' achievement in STEM education is crucial to developing a scientific and technological society. However, inequalities in achievement is a challenge that must be overcome to attain learning goals. This study examined the predictive role of culturally responsive teaching (CRT) and culturally diversified curriculum (CDC) using the voice of STEM teachers. Beaming our lens on the importance of CRT, we investigated the direct and mediated effects of knowledge and instructional practice (KIP), and achievement inequalities (AI) using the views of STEM teachers in Nigeria. The responses of 343 participants were used to test seven hypotheses for acceptance or otherwise using Smart PLS-4. We found out that culturally responsive teaching has a direct impact on culturally diversified curriculum. However, culturally responsive teaching did not significantly impact differentiated instruction (DI), and knowledge and instructional practice (KIP). Also, the mediating effect of knowledge and instructional practice is not significant. The study concludes that the nuances of CRT and CDC differ in predicting students' achievement in STEM.

Keywords: culturally diversified curriculum, culturally responsive teaching, differentiated instruction, science education, STEM

Introduction

All over the world, it is a fact that Science, Technology, Engineering and Mathematics (STEM) play an important role in a nation's scientific and technological development. An array of studies on STEM continues to emphasize this crucial role, whether to a developed, developing or underdeveloped nation (Birch, 2017; Borner et al., 2018; Kayan-Fadlelmula et al., 2022; Holmlund et al., 2018; Lee et al., 2019; Van Laar et al., 2017). For example, its capacity to solve real-world problems in the field of health, energy, and environment (Martin-Paez et al., 2019; Struyf et al., 2019), and the preparation of youth for gainful employment in the global market (Deming & Noray, 2020; McGunagle & Zizka, 2020; Miller-Idriss & Hanauer 2011) are some of the reasons why STEM education is highly valued. Literature has established the importance of STEM education, however, the potential of studying STEM can be enhanced. STEM education as a crucial field of endeavour is still being confronted with some challenges. Among these challenges are the abstract nature of concepts, gender gap, and the lack of innovative teaching methods (Qureshi & Qureshi, 2021). In the investigation done in China, a lack of understanding of the interdisciplinary nature of STEM-based curricula, content and standards in other subjects, lack of adequate time and insufficient teaching methods and resources were identified (Dong et al, 2020). Similarly, Dave (2024) identified lack of instructional support, resistance to change and limited access to training resources as some of the factors impeding the meaningful study of STEM. Within the African context, the importance of STEM education has also been stressed (Badmus & Omosewo, 2020; Ezeanya-Esiobu & Ezeanya-Esiobu, 2019; Mkhize, 2023; Morton et al., 2019; Torto et al., 2022). Chisom et al. (2024) opined in their study that STEM occupies a crucial area of focus because it can bring about economic success and also address socio-economic issues. STEM education is confronted with similar challenges as identified in some

developed nations. Some of these challenges include shortage of qualified teachers, overcrowded classes, inadequate content and pedagogical skills, gender disparity, socio-economic disparities and lack of innovative teaching methods (Barakabitze et al., 2019; Chisom et al., 2024; Mutsvangwa & Zezekwa, 2021).

A review of literature confirms that the lack of innovative teaching methods seems common across different nations. Previous studies have highlighted the prominent height innovative teaching method for instruction in STEM education occupies (Bada & Jita, 2023; Bada & Akinbobola, 2022) however, students' achievement is still yarning for improvement. Previous studies (see Dave, 2024; Tang et al., 2023) have identified the use of differentiated instruction and the adoption of a culturally relevant pedagogy as a possible remedy to the relatively poor achievement of students in STEM. Cultural diversity is common to many African nations hence, the integration of culturally relevant or responsive pedagogy might assist in overcoming this challenge. This study focuses on culturally responsive teaching, culturally diversified curriculum and its nuances, as predictors of improving students' achievement in STEM. The rest of the article is presented in the following headings: culturally responsive teaching, culturally responsive teaching and diversified curriculum, culturally responsive teaching and differentiated instruction, research hypothesis, methodology, results and conclusion.

Culturally responsive teaching

Culturally responsive teaching leverages on cultural knowledge for instruction during the teaching-learning process. Gay (2018) opines that culturally responsive teaching uses cultural knowledge, previous experiences and the diverse cultural background of learners for instruction. Several concepts have been used to refer to methods that adopt cultural knowledge in its integration. Some of these include culturally relevant pedagogy (Chen, 2023; Kowaluk, 2016; Ladson-Billings, 2014), culturally responsive teaching (Gay, 2018; Krasnoff, 2016; Muniz, 2019), and culturally responsive pedagogy (Chitpin & Karoui, 2021; Samuels, 2018; Vakil et al., 2021). Previous studies on the use of culturally responsive teaching have shown that it has assisted in improving students' achievement in the developed nations (see Abacioglu et al., 2020; Grant & Asimeng-Boahene, 2006; Hernandez, 2022; Rychly & Graves, 2012).

Abacioglu et al, (2020) investigated teachers CRT practices and their perspectives on multicultural attitudes, and found out that teachers' background has nothing to do with their years of teaching, ethic background, gender, cultural sensitivity and multicultural attitudes among others. This suggest that CRT if well practiced, might bridge the differences across cultural lineages. This finding is related to the result from Osterman and Kottkamp (2004) that culturally responsive teaching brings about better understanding when built on the previous experiences of the learners. Literature also shows that teachers who adopt culturally responsive teaching achieved meaningful learning outcomes when compared to those who used non-culturally responsive methods (Baker, 2019; Gunn & King, 2015; Ladson-Billings, 2013). Previous studies reporting the success of CRT has been investigated in the developed nations. There are few or no studies of its impact on achievement in Nigeria, especially among STEM teachers in the southwestern part of the nation. This study intends to fill this geographical gap, by investigating CRT and the nuances related to a culturally diversified curriculum.

Culturally Responsive Teaching and Diversified curriculum

Curriculum is the heart of teaching-learning because it stipulates the content to be learnt, how it should be learnt, the resources and materials needed to learn, method(s) of instruction to adopt, learners' and teachers' activities, goals and objectives of teaching, and the method of assessment to mention a few. As important

as it is, curriculum has been referred to be ubiquitous because it appears to be found in different fields, with different meaning such that it is often taken for granted (Steniford & Koutsouris, 2022). As a result, attempts to have a consensus definition of curriculum have proved abortive over the years (Scott, 2001; Young, 2014). However, among the popular definitions was given by Wheeler. He defined curriculum as the planned experiences offered to the learners under the guidance of the school (Wheeler, 1967). This definition extols the crucial role learners' experience plays to achieve meaningful learning. Over the years, there have been calls that the curriculum practiced in most African nations are influenced by the experiences from the west (Ezeanya-Esiobu, 2019). Hence, the call for adopting indigenous knowledge would benefit teachers and learners (Omilani & Bada, 2024).

A diversified or decolonized curriculum seeks to actively combine diverse experiences, views and perspectives into the learning process. Attempts have been made by researchers to decolonise the curriculum (Arday et al., 2021; Harvey & Russell-Mundine, 2019). This effort has also led to the introduction of approaches such as culturally responsive, culturally relevant or sustainable pedagogies, which leverage the prior knowledge or experiences of the learners, for meaningful learning (Ladson-Billings, 1995; 2013; 2014; Paris, 2012). Therefore, studies on culturally responsive pedagogy and decolonising the curriculum have found a positive relationship between the two concepts (Harvey & Russell-Mundine, 2019; Ladson-Billings, 1995; 2013; 2014; Paris, 2012). However, other studies did not report any relationship between culturally responsive pedagogy and decolonizing the curriculum (see Schucan Bird & Pitman, 2020; Walton, 2018). This shows that the concepts of culturally responsive teaching and diversified curriculum might be better explained using nuances that are yet to be investigated. This study intends to investigate these nuances and how it relates to one another.

Culturally Responsive Teaching and Differentiated Instruction

There is a rich literature on differentiation in education because of its usefulness in meeting the diverse needs of learners in the classroom. Studies by Schleicher (2016) and Unesco (2017) encourage teachers to adopt differentiated instruction to embrace the diverse nature found in their classroom. The importance of adopting differentiated instruction have been established in literature. Some of these include having adequate respect for students, acknowledging student differences and the zeal to help all students learn irrespective of their background and experiences. Differentiated instruction can make contemporary classes relatively heterogeneous thus improving equity among students (Kyriakides et al., 2018; OECD, 2018; Tomlinson, 2015; Unesco, 2017). Previous studies on differentiated instruction have reported its effectiveness for instruction (see Bal, 2016; Bikic et al., 2016; Little et al., 2014; Smale-Jacobse et al., 2019). However, other studies did not find it effective for instruction (Coubergs et al., 2013). Van Casteren et al. (2019) opined that despite the awareness of the concepts, teachers find its implementation in their classroom difficult. This suggests that more still needs to be ascertain its effectiveness in the classroom. To add an intellectual voice to the current status on differential instruction, we investigates some of it nuances that can assist in understanding the concept better.

Culturally Responsive Teaching, knowledge and instructional practice

Instructional practice forms a crucial aspect of quality instruction because it impacts students achievement in STEM (Larsen & Jang, 2021; Schiefele & Schaffner, 2015; Yu & Singh, 2016). Several studies continue to stress the important role instructional practice plays towards the achievement of classroom goals and objectives (Hann, 2020; Morgan et al., 2015). Hence, some studies have be completed on the factors that contributes to instructional practice. Zakariya and Adegoke (2024) investigated the relationship self-

efficacy, job satisfaction, stress and cooperation have on teachers instructional practices. The researchers found a positive effect of teachers' self-efficacy and cooperation on instructional practice. However, the effect of teachers' satisfaction was not significant. They also reported a negative indirect effect of teachers' stress on instructional practice. This current study seeks to investigate the relationship of some variables yet to be investigated about instructional practice in relation to culturally responsive teaching.

Research Hypotheses

The following hypotheses were formulated and tested in the study.

H_1: Culturally responsive teaching has a significant effect on culturally diversified curriculum.

H_2: Culturally responsive teaching has a significant effect on differentiated instruction.

H_3: Culturally responsive teaching has a significant effect on knowledge and instructional practice.

H_4: Knowledge and Instructional practice have a significant effect on culturally diversified curriculum.

H_5: Knowledge and Instructional practice have a significant effect on differentiated instruction.

H_6: Culturally responsive teaching and culturally diversified curriculum is mediated by Knowledge and instructional practice.

H_7: Culturally responsive teaching and differentiated instruction is mediated by Knowledge and instructional practice.

Methodology

This study focused on secondary school STEM teachers' views concerning CRT and culturally diversified curriculum among secondary school STEM teachers. We investigated CRT's direct and mediated effect on culturally diversified curriculum in Nigerian secondary schools. Using the convenience sampling technique, 343 teachers were sampled and used for data collection and analysis. The instruments used for data collection were the Culturally Responsive Teaching Survey Questionnaire (CRTSQ) and the Culturally Responsive Pedagogy Self-Assessment and Reflective Conversation Questionnaire (CRPSRCQ). The first instrument was adopted from Rhodes's (2016) work on the validation of the culturally responsive teaching survey. The second instrument was adopted from Due East Educational Equity Collaboration resources and printables (DEEEC, 2024). CRTSQ consists of 17 statements built on a 5-point frequency scale of Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). The instrument has been used in different research and was reported to have an acceptable convergent validity (Rhodes, 2016). The reliability of CRTSQ shows a Pearson correlation coefficient of 0.83 after it was administered to 34 science teachers within 6 weeks using the test-retest method. The second instrument CRPSRCO was adapted from Due East Educational Equity Collaboration (DEEEC, 2024) resources and printables. It is composed of four components however, this study was limited to section B (addressing demographic inequalities in achievement) and section D (adapting curriculum to reflect cultural diversity). The indicators for the sections include knowledge and instructional practice (KIP), differentiated instruction (DI), and culturally diversified curriculum (CDC). We asserted the validity of CRPSRCQ by allowing 3 experts in curriculum development from a known university to validate it. The reliability was also achieved after a test-retest with a reliability coefficient of 0.78. We merged the two instruments into one and made a copy to be distributed electronically using the link https://forms.gle/xKTZxoXmimTtCA478 (Table 1). We sent out the link to the different secondary school teachers' platform such as whatsapp and facebook group. We also shared the

link to the email addresses of the teachers that were available. The participants completed the questionnaire by responding whether they Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA) to the statements. We collected data for the study between June and December 2023, and a total of 343 complete responses were received and used for data analyses. The seven hypothesis were tested for acceptance or otherwise using Smart PLS-4.

Table 1: *Culturally responsive teaching, self-assessment and reflection Indicators for classroom effectiveness*

S/N		ITEMS
Culturally Responsive Teaching Survey.		
1	CRT1	I include lessons about the acculturation process.
2	CRT2	I examine class materials for culturally appropriate images and themes.
3	CRT3	I ask students to compare their culture with other cultures.
4	CRT4	I make an effort to get to know my students' families and backgrounds
5	CRT5	I learn words in my students' native language.
6	CRT6	I use mixed language and mixed cultural pairings in group work.
7	CRT7	I use peer tutors or student-led discussions.
8	CRT8	I use surveys to find out about my students' classroom preferences.
9	CRT9	I elicit students' experience in pre-reading and pre-listening activities.
10	CRT10	I encourage students to speak their native languages with other students.
11	CRT11	I have students work independently, selecting their own learning activities.
12	CRT12	I spend time outside of class learning about the cultures and languages of my students.
13	CRT13	I include lessons about anti-immigrant discrimination or bias.
14	CRT14	I supplement the curriculum with lessons about international events.
15	CRT15	I ask for student input when planning lessons and activities.
16	CRT16	I encourage students to use cross-cultural comparisons when analyzing material.
17	CRT17	I provide rubrics and progress reports to students.
Culturally Diversified Curriculum		
18	CDC1	I can recognize and articulate cultural biases present in the explicit and implicit curricula.
19	CDC2	I create opportunities for students to bring their life experiences, cultures, and languages into the classroom as a foundation for learning.
20	CDC3	I create opportunities for students to bring their life experiences, cultures, and languages into the classroom as a foundation for learning.
21	CDC4	I present the curriculum so that students understand historical and contemporary events and issues from the perspectives of various racial, ethnic, and cultural groups.
22	CDC5	In my classroom, teaching and learning uses examples and analogies from students' lives and applies content and skills to students' lives.
Differentiated Instruction		
23	DI1	I hold and consistently communicate high expectations for all students.
24	DI2	I demonstrate, through classroom practice, a commitment to teaching all students.
25	DI3	I get to know each individual student in order to determine their skill level and learning needs.
26	DI4	I assess student progress frequently and design instruction accordingly.

27	DI5	I identify and access resources outside the classroom to provide supplemental learning opportunities to meet students' need.
28	DI6	I recognize that students may not have learned grade-level skills as expected so I provide supplemental experiences to accelerate learning.
29	KIP1	I regularly look at student demographic achievement outcomes and discipline referral data to detect inequitable patterns in my classroom.
30	KIP2	I research or design teaching and classroom management strategies that reduce inequitable disparities I notice in achievement and discipline patterns in my classroom.
31	KIP3	I seek out and analyze data on students' prior academic progress to inform and differentiate instruction.
32	KIP4	I team with other teachers to review student work, make collaborative decisions about academic performance expectation.

Results and Discussion

Common method bias

Common method bias was calculated to determine if the model was free from bias. Table 2 shows that all the values are below 3.33, which agrees with the benchmark value for determining if a model is free from bias or not. This aligns with Kock's (2015) assertion that variance inflation factor values less than 3.33 are considered free from bias, while those equal to or higher than 3.33 are not free from common method bias.

Table 2. *Collinearity statistics (VIF) Inner model*

	Culturally Diversified Curriculum	**Culturally Responsive Teaching Survey**	**Differentiated Instruction**	**Knowledge and Instruction Practice**
Culturally Diversified Curriculum				
Culturally Responsive Teaching Survey	1.005		1.005	1.000
Differentiated Instruction				
Knowledge and Instruction Practice	1.005		1.005	

Reliability and validity

The reliability and validity of the indicators are shown in Table 3. A review of Table 3 reveals that most indicators have a factor loading greater than 0.600, except for three indicators (CRTS17, DI5, and DI6). The three indicators were not discarded because they have Cronbach Alpha and Composite Reliability (CR) values above 0.700. This position supports the earlier claim by Hair et al (2019), that Cronbach Alpha and Composite Reliability (CR) values above 0.700 indicate that all the constructs measured are reliable. The Average Variance Extracted (AVE) and Cronbach Alpha (CR) values are also greater than 0.500 and 0.700 respectively, hence, satisfying convergent validity. Table 4 shows the reading of the cross-factor loadings while Table 5 shows the discriminant validity using Fornell & Larker and Hererotrait-Monotrait Method (HTMT) criteria.

Structural model

We tested the hypotheses using Smart PLS-4. Table 6 shows the direct relationships for hypotheses 1, 2, 3, 4, and 5. Table 6 reveals that hypotheses, 1, 4, and 5 were significant, while hypotheses 2 and 3 were not significant. Hypothesis 1, CRTS > CDC (β = 0.160, t = 2.414, p = 0.016); hypothesis 4, KIP > CDC (β = - 0.251, t = 6.031 p = 0.000); hypothesis 5 KIP > DI (β = 0.825, t = 41.683, p = 0.000) are significant. Hypothesis 2, CRTS > DI (β = - 0.160, t = 0.484, p = 0.628); and hypothesis 3, CRTS > IP (β = - 0.029, t = 0.321, p = 0.749) are not significant. Therefore, hypotheses 1, 4, and 5 were accepted while hypotheses 2 and 3 were not accepted.

Table 7 reveals the mediated relationship between the variables. The table reveals that the two hypotheses are not significant. The mediating role of Instructional Practice (IP) was put into perspective. Hypothesis 6, CRTS > IP > CDC (β = 0.007, t = 0.314, p = 0.754); and hypothesis 7, CRTS > IP > DI (β = - 0.024, t = 0.321, p = 0.748), are not significant.

Table 3: *Item loading, reliability, and validity*

ITEMS	LOADINGS	Alpha	CR(rho_a)	CR(rho_c)	AVE	VIF
CRTS1	0.800	0.950	0.958	0.954	0.555	6.990
CRTS2	0.784					4.194
CRTS3	0.854					7.745
CRTS4	0.627					2.461
CRTS5	0.781					3.478
CRTS6	0.736					5.622
CRTS7	0.635					2.857
CRTS8	0.738					4.034
CRTS9	0.809					4.099
CRTS10	0.651					3.123
CRTS11	0.767					4.447
CTRS12	0.828					3.572
CTRS13	0.682					3.510
CRTS14	0.739					3.275
CRTS15	0.751					3.148
CRTS16	0.848					7.259
CRTS17	0.558					4.572
CDC5	1.000					1.000
DI1	0.821	0.793	0.853	0.848	0.500	2.008
DI2	0.817					1.935
DI3	0.792					1.845
DI4	0.827					2.052
DI5	0.459					1.524
DI6	0.373					1.485
KIP1	0.772	0.821	0.829	0.882	0.651	1.667
KIP2	0.839					2.047
KIP3	0.845					2.186
KIP4	0.768					1.733

Table 4: *Collinearity statistics (VIF) Inner model*

ITEMS	Culturally Diversified Curriculum	Culturally Responsive Teaching Survey	Differentiated Instruction	Knowledge and Instructional Practice
CRTS1	0.159	0.800	-0.018	-0.013
CRTS2	0.181	0.784	0.053	0.048
CRTS3	0.122	0.854	0.014	0.003
CRTS4	0.054	0.627	0.039	0.013
CRTS5	0.142	0.781	-0.076	-0.067
CRTS6	0.166	0.736	0.003	0.014
CRTS7	0.066	0.635	-0.052	-0.015
CRTS8	0.035	0.738	-0.003	0.017
CRTS9	0.129	0.809	-0.038	-0.010
CRTS10	0.083	0.651	0.058	0.027
CRTS11	0.132	0.767	-0.087	-0.053
CTRS12	0.130	0.828	-0.032	-0.020
CTRS13	0.055	0.682	-0.048	-0.061
CRTS14	0.152	0.739	-0.059	-0.026
CRTS15	0.086	0.751	-0.094	-0.112
CRTS16	0.103	0.848	-0.040	-0.031
CRTS17	0.005	0.558	0.043	0.077
DI1	-0.200	0.012	0.821	0.661
DI2	-0.281	-0.106	0.817	0.703
DI3	-0.185	-0.063	0.792	0.727
DI4	-0.196	0.071	0.827	0.656
DI5	-0.030	-0.007	0.459	0.278
DI6	0.011	-0.135	0.373	0.234
IP1	-0.181	0.006	0.721	0.839
IP2	-0.309	-0.066	0.721	0.839
IP3	-0.194	-0.071	0.688	0.845
IP4	-0.123	0.051	0.628	0.768

Table 5: *Discriminant validity using the criterion by Fornell & Larcker and Heterotrait-Monotrait Method (HTMT)*

	Culturally Diversified Curriculum	**Culturally Responsive Teaching Survey**	**Differentiated Instruction**	**Knowledge and Instruction Practice**
Culturally Diversified Curriculum	**1.000**	0.146	0.241	0.276
Culturally Responsive Teaching Survey	0.167	**0.745**	0.133	0.090
Differentiated Instruction	-0.244	-0.041	**0.707**	0.956
Knowledge and Instruction Practice	-0.256	-0.029	0.825	**0.807**

Note: Diagonal and bold elements are the square of the AVE (average variance extracted)
Below the diagonal elements are the correlations between the constructs (Fornell & Larcker)
Above the diagonal elements are the Heterotrait-Monotrait Method (HTMT

Table 6: *Direct relationships (Hypotheses 1, 2, 3, 4, 5)*

	Beta B values	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P
H_1: Culturally Responsive Teaching Survey -> Culturally Diversified Curriculum	0.160	0.165	0.066	2.414	0.016
H_2: Culturally Responsive Teaching Survey -> Differentiated Instruction	-0.016	-0.018	0.034	0.484	0.628
H_3: Culturally Responsive Teaching Survey -> Knowledge and Instructional Practice	-0.029	-0.037	0.091	0.321	0.749
H_4: Knowledge and Instructional Practice -> Culturally Diversified Curriculum	-0.251	-0.251	0.042	6.031	0.000
H_5: Knowledge and Instructional Practice -> Differentiated Instruction	0.825	0.825	0.020	41.683	0.000

Mediation analysis

Table 7: *Mediating relationship (Hypothesis 6 and 7)*

	Original Sample Values	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P
H_6: Culturally Responsive Teaching Survey -> Knowledge and Instructional Practice -> Culturally Diversified Curriculum	0.007	0.010	0.023	0.314	0.754
H_7: Culturally Responsive Teaching Survey -> Knowledge and Instructional Practice -> Differentiated Instruction	-0.024	-0.030	0.075	0.321	0.748

The study examined the predictive role of culturally responsive teaching (CRT) and culturally diversified curriculum (CDC). We explored the direct effect of CRT with the nuances of CDC through differentiated instruction (DI) and knowledge and instructional practice (KIP) among STEM secondary school teachers in Nigeria. The result from this study reveals that there is positive relationship between culturally responsive teaching and culturally diversified curriculum, supporting previous studies (Kowaluk, 2016; Osterman & Kottkamp, 2004). This finding aligns with previous studies carried out in the USA that teacher ethnic background and years of teaching may not mediate students' achievement during lessons. However, this study reveals that there is no positive relationship culturally responsive teaching and differentiated instruction, and knowledge and instructional practice (Kowaluk, 2016; Osterman & Kottkamp, 2004; Osterman, 2000). We also found out that there was a positive relationship between knowledge and instructional practice and culturally diversified curriculum and differentiated instruction. This finding agrees with Abacioglu, et al. 2020; and Rychly and Graves (2012) Findings from this investigation show that knowledge and instructional practice is positively related to differentiated instruction. This result supports previous studies (Abacioglu, et al. 2020; Grant & Asimeng-Boahene, 2006; Robins et al, 2006; Rychly & Graves, 2012).

Conclusion

This study investigates the predictive model of culturally responsive teaching and culturally diversified curriculum in improving students' achievements in STEM education. The results from this study have provided empirical evidence of some of the nuances of culturally diversified curriculum and how it impacts achievement. Result from the study shows that there is no consensus yet on the status of culturally responsive teaching and its relationship with the identified nuances. This is because the result was significant in some cases and not significant in other scenarios. The result from this study implies that empirical evidence of the effects of culturally diversified curriculum, differentiated instruction, knowledge and instructional practice, has been laid especially as it affects students' achievement in STEM. Therefore, this paper contributes to scholarship in the field of science education of the potentials of culturally responsive teaching methods in improving students' achievement in STEM. This study comes with some

identified limitations. First, this study focussed on the Southwestern part of Nigeria, and not the entire nation. Subsequent research can be extended to other parts of the nation or to the whole nation. Second, the sample size seems relatively small however, future research can have a larger sample. This might bring clearer evidence of the effect of culturally responsive teaching on culturally diversified curriculum. Third, the study focussed on hypothesis testing through survey data. Longitudinal data can be adopted in future research to clearly ascertain the effect of culturally responsive teaching on the identified concepts.

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