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Examining Teacher Pedagogic Practices in Competency-Based Approach Curriculum as a Contributor to Transformational Teaching in Cameroon

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Abstract

Transformational teaching helps educators adequately address the diverse needs of learners and prepare them to solve relevant problems of today and the future. But new pedagogies do not often build on what they have been doing as they link existing practices to new ways of teaching, making the transition smooth. Despite efforts to build teachers' capacities for novel practices, their adoption still encounters resistance. This study examines classroom practices of teachers knowledgeable in the competency-based curriculum adopted in secondary schools in Cameroon. It aims to determine the extent to which these practices can contribute to transformative teaching, enabling teachers to make a smooth transition from current practices to those that are transformative. Data collected through a survey administered to 1500 secondary teachers in Cameroon was analyzed to identify transformative practices. Linear regressions of teacher practice variables were carried out to analyze patterns in their responses. The study reveals that the existing competency-based approach can achieve significant transformational teaching goals. The study has identified additional practices that scale up current CBA practices to transformational teaching, allowing innovative practices to build on existing ones and thereby removing barriers usually encountered when change is introduced into a method. Furthermore, the findings will inform practitioners in designing and implementing effective transformational pedagogical strategies.

Keywords: *Competence-Based Approach, Transformational teaching, Teacher practices, Add-ons*

Introduction

The call for innovative approaches in teaching has heightened recurrent reflections on the nature of classroom practices and the learner outcome that the teacher should aim to achieve at the end of a course (Allchin et al., 2014; Alonso-García et al., 2019). These debates on teacher pedagogic practices are fuelled by the emergence of several learning principles and methods impacting practices (Caena & Redecker, 2019; Slavich & Zimbardo, 2012) and the global changes and challenges that humankind is experiencing (Lehtonen et al., 2019; Nguyen & Baker, 2023; Rieckmann, 2018; Žalėnienė & Pereira, 2021).

On the one hand, shifts in teaching practices are evident from the traditional lecture-based approach, whereby the teacher assumes the role of master on stage and dictates information to students, to one in which the teacher is a facilitator in the process of co-constructing knowledge with the students (Balliu, 2017; McCabe & O'Connor, 2014). Also, emphasis has shifted from students expected to memorise a given body of content and reproduce it for grades to the demonstration of required competence alongside dispositions indicative of mastery of skills and knowledge (Harris & Clayton, 2019; Winget & Persky, 2022).

On the other hand, the global economy and job market continue to evolve rapidly, requiring that teachers equip students with competences and dispositions that prepare them to address the problems of today and remain relevant in the future (Caena & Redecker, 2019; Teo, 2019). Moreover, the presence of ubiquitous, rapidly changing technology in the classroom has influenced educational reforms and consequent changes in teacher pedagogical practices. Today's technologies have heightened the complexity of teacher classroom practices (Ashar et al., 2020; Dimitriadou & Lanitis, 2023; Hanson & Beem, 2024). For example, Artificial Intelligence (AI) can provide instant responses to

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complex classroom tasks, which can undermine the critical reflection desired of students in the instructional process.

Furthermore, disparities in education are reported worldwide (Langthaler & Malik, 2023; Matasci, 2020; Musau, 2018). These inequalities include gender (Psaki et al., 2018), provision of special education (Ales, 2024), and the urban divide (Li, 2022). Practitioners and education agencies are calling for education to be transformed to adequately address the diverse needs of learners, such as learning disabilities, issues of inequality, social anxiety, and different learning paces (Datnow et al., 2022; Shaeffer, 2019; Tikly et al., 2018). Hence, inclusive, innovative teaching practices are needed.

These changing demands on education systems have led to policy and curriculum adjustments, and communities are increasingly adopting various pedagogical approaches and models to address these concerns. For example, the Competency-Based Approach (CBA) curriculum was introduced in secondary schools in Cameroon in 2014 (Wiysahnyuy, 2021) in response to concerns that students were not obtaining the competencies they would need in life beyond school (Nkwetisama, 2012, Wiysahnyuy, 2021).

Importantly, educators and education agencies are praising transformational teaching and advocating its adoption by education systems, as it embodies emerging notions of the teacher as a social mediator, a facilitator of learning, and a reflective practitioner (Hardy, 2009; Selepe & Moll, 2016; UNESCO, 2022). Pounder (2014) and Tahir (2018) assert that a transformative teaching approach is associated with effective teaching; hence, effective classroom teaching can be achieved within the principles of the transformational classroom progression. According to Bang et al. (2023), teachers should be transformative agents in the teacher education-competency-based pedagogic reform pathways. And to achieve this, teachers will need to experience a smooth transition from their current teaching practices to transformational ones. This study has identified additional teacher classroom practices that should be adopted by teachers to fully engage in transformational teaching, thereby allowing innovative practices to build on existing ones and removing barriers usually encountered when change is introduced into a method.

Drawing on characterizations of teaching practice articulated by Orlich et al. (2010), this study describes teaching practice as the actions a teacher takes to develop the lesson in the classroom, appropriately and in ways that achieve the desired learning goals. The teacher in practice demonstrates valid behavior in teaching based on theories. These instructional practices of teachers are central to student learning outcome (Thibaut et al., 2018). It is imperative that we discuss two of these approaches impacting teacher pedagogic practices: competency-based and transformational teaching approaches.

Competency-Based Approach

A competency-based approach is a school-based practice of teaching and learning in which students progress through the instructional system by demonstrating their competence as they prove that they have mastered the knowledge and skills or competencies required for a particular course (Gervais, 2016; Siddaiah-Subramanya et al., 2017). Education systems adopt competency-based curricula in response to concerns that students were not acquiring the competencies they would need in life after school and that their success in the real world could be evaluated based on the competencies they demonstrate (Hess et al., 2020; Le et al., 2014).

The competency-based approach to learning is informed principally by constructivist and socio-constructivist learning theories (Makulova et al., 2015; Morcke et al., 2013). According to constructivist theory, learners learn best when they construct their own world, or at least interpret it based on their experiences (Bada & Olusegun, 2015). Thus, knowledge is built through experience, and learners are encouraged to discover it on their own. Socio-constructivists view learning as social in nature, and, as a result, instructional exercises are more effective when they integrate social interaction (Toma et al., 2024).

Teacher Practices in Competency-Based Curriculum

A competency-based curriculum requires fundamental changes in how teachers teach. There is a shift from the traditional style of leading the class and enabling students' learning to student-centred and personalised practices. And the teacher learns how to translate objectives and contents into competences and teach students at varying paces to differing degrees of depth (Balliu, 2017; Bergsmann et al., 2015). Inquiry-based practices engage students in hands-on activities that enable them to discover new concepts and develop new understandings (Lai 2018). According to Farnsworth et al. (2016), competence-based personalised practices require that teachers emphasise students' needs rather than the content to be taught, and, in doing so, the teacher understands which experiences are most supportive of student learning. Thus, it provides personalized attention and feedback on students' attainment.

Also, problem-centered approaches emphasise the introduction of relevant problems at the start of the instructional process, so that the problem provides the context and motivation for learning (Cook et al., 2017; McCaster, 2019). CBA practices employ real-world problems within an engaging and motivating context (Apriliana et al., 2019; Morcke et al., 2013). With regards to assessment, teachers develop formative assessments that accurately measure where students are and how to help them develop (Albanese et al., 2008; Herppich et al., 2018; Le et al., 2014; Marcotte & Gruppen, 2022). Schildkamp (2020) asserts that formative assessments guide and support teaching and learning in the classroom and can enable students to select customized learning opportunities.

Transformational Teaching

Transformational teaching is viewed as a radical shift from traditional teaching (Epp et al., 2021; Mohamed et al., 2021; Omodan & Addam, 2022). Traditional teaching is characterized by teacher-centred practices that render students passive learners (Epp et al., 2021; Mohamed et al., 2021). It is viewed principally as transmitting knowledge, and students are not constrained to associate knowledge with their daily lives as they resolve day-to-day problems (Meguid & Collins, 2017; Orlich et al., 2010). However, founded on the principle that teachers have more to do than enable content mastery through content transmission, skills building, and interpretation, transformational teaching empowers students to examine critically their beliefs, values, and knowledge to develop a reflective knowledge base, an appreciation of multiple perspectives, and a sense of consciousness, curiosity, and action (Omodan & Addam, 2022). And teachers help students build analytical and context-related skills, and they become metacritical participants and goal-setters in the learning process. Transformational education thus focuses on cultivating the whole person of the learner.

Transformative Teacher Practices

These practices are centred on the principles of active and student-centred learning.

They are viewed as a broader approach to classroom instruction encompassing various components of the educational process, such as content, environment, and other factors that affect how students learn and subsequently transform their lives outside the classroom (Quillinan et al., 2019; Rau et al., 2017). The teacher takes on the role of facilitator, coaching and directing students' mastery of subject material and attitude towards learning, while at the same time focusing on practice to guide and assist the student in their pathways as they grow intellectually and socially. Transformative practices allow the teacher to create locally relevant instructional materials that make learning meaningful (McConnell & Giorbio-Booher, 2020).

Transformational teaching goes beyond content delivery. It prepares students to be co-producers of knowledge, become critical and reflective in their thinking, and be goal-oriented and thoughtful (Omodan & Addam, 2022). As builders of these characters in the students, teachers have the mission to be transformational by becoming sensitive, empathetic, and respectful (Jones, 2009). In their transformative role, they establish a shared vision for their subject, enable modelling and mastering experiences for their students, challenge and encourage their students, personalise attention and feedback, create experiential lessons that transcend the boundaries of the classroom, and promote ample opportunities for reflection (Lee & Lee, 2018; Slavich & Zimbardo, 2012; Meyers, 2008).

Research Context

In 2014, Cameroon introduced a competency-based curriculum in secondary schools with the objective of improving the quality of education and making secondary school graduates more employable (Ngwa & Lawyer, 2020; Teijeiro et al., 2013). The curriculum was founded on the belief that there was a missing link between graduates leaving the education system and their ability to meet the demands of the workplace. This missing link was blamed on the education system, which relied on a content-based curriculum that emphasised memorising rather than developing the competencies and skills needed to address community problems (Esongo, 2017). Though competency-based curricula are said to free students from the seat-time limits of traditional courses, allowing them to develop at their own pace while obtaining relevant and demonstrable skills (Rickles et al., 2019), the strategy adopted in Cameroon is best described as blended since it combines seat-time with competency management (Shishigu, 2022).

The principal classroom approach adopted to implement the CBA curriculum is entry-by-life situations (Esongo, 2017; Ngoei, 2024). Teaching with an entry-by-life situation can be regarded as a case of problem-based learning characterized by the presentation of a task or scenario at the beginning of the lesson. The task is authentic and must be either a real event or a fictional one that reflects the lesson concept or competence (McConnell et al., 2019). Students then analyse and resolve the situation with the teacher's help. And when students learn by addressing problems or situations from their own community, they can demonstrate content mastery and develop the needed competence (Ngoei, 2024). CBA practices in schools are explained by present-day learning approaches such as inquiry-based, project-based, and experiential learning, as well as practices including personalised, formative, and summative assessments, and using technology in classroom practices.

Research Issue

New pedagogies do not often build on current methods (Le Fevre, 2014), so teachers can make connections between what currently exists and how to move to a new stage seamlessly. Workshops and seminars are held to promote fresh ideas and methods while emphasizing their value without drawing attention to their relationship to more established methods. Since new pedagogies frequently disrupt the status quo (Le Fevre, 2014), they can also require teachers to learn new skills, gain new knowledge, and secure new or additional resources. As a result, new pedagogical practices occasionally encounter resistance from teachers (Ertmer & Ottenbreit-Leftwich, 2013; Sánchez-Prieto et al., 2019; Ben-David Kolikant, 2019). More often than not, while teachers grapple with current pedagogical practices, a new one is being introduced.

Furthermore, the literature has modelled transformative practices that teachers should adopt to equip students with the skills they need to be productive members of society and recommends that educators find ways to improve their pedagogical strategies (Omodan & Addam, 2022; Slavich & Zimbardo, 2012). But how teachers should engage in a smooth pedagogical transition to transformative teaching, given their knowledge of current practices, has not been examined. We investigated the teaching practices currently employed in secondary schools so that transformational practices can build on them for a seamless transition.

Aim of Study

The purpose of this study was to identify additional transformative teaching practices by examining competency-based curriculum classroom practices of teachers in secondary schools in Cameroon, with the view that these practices can be adopted by teachers to scale up current CBA practices and fully engage in transformational teaching.

Research Question: *To what extent do competency-based approach classroom practices of teachers contribute to transformational teaching in secondary schools in Cameroon?*

Conceptual Framework

The study uses a conceptual framework to establish the methods used to conduct its investigation. Teacher practices are viewed as overlapping or intersecting within two pedagogical approaches: the competency-based approach and transformational education. According to Grossman et al. (2009), practices naturally overlap in everyday classroom teaching. Edwards-Groves (2018) asserts that this constellation of practices constitutes pedagogy. A set of practices has a "limit" imposed by a fictitious barrier or divide defined by its theoretical underpinnings, methods, instructional strategies, and context. This "imaginary boundary" affects or limits a teacher's teaching practices. The notional boundary or limit of CBA, however, becomes blurred when a teacher, familiar with CBA practices, absorbs "add-ons" or additional practices into current practice, and the teacher experiences transformational teaching within the CBA curriculum. These "add-ons" are transformative practices that are not evident or sufficiently enacted by teachers familiar with the current CBA approach.

Methodology

The study adopted a quantitative research approach to collect and analyse numerical data (Ahmad et al. 2019). It employed both descriptive and correlational analyses (Gunter, 2013). The descriptive analysis examined teacher frequency of use of specific transformational teaching practices. In contrast, the correlational analysis investigated the strength of the relationship between the CBA teacher practices and transformational teaching. Data was collected from participants using a survey questionnaire, and their responses were analyzed and reported. An extensive review of the literature on transformational teaching and the competency-based approach informed the conceptual framework for the research and the development of the research instrument. Items of this instrument were consolidated through expert review and empirical analysis of the questionnaire's reliability and validity.

Participants

Survey participants were teachers at government secondary schools in Cameroon who were trained to teach their respective disciplines. The population comprised 1500 surveys. Participants were sampled from fifty secondary schools. Each school offers 15 subjects, and two teachers were chosen to participate in the study for each subject. Cameroon has ten regions. Purposive sample (Campbell et al., 2020) of five schools were selected per region, three urban and one each from semi-urban and rural zones. Chosen schools had a relatively large number of teachers who had undergone professional development processes on CBA teacher classroom practices and had CBA practices in their classrooms for at least one year of school. These schools were identified through principals' and pedagogic departments' annual reports of activities.

A total of 1030 participants completed the survey, yielding a response rate of 68.6%. This response rate was considered adequate (Kennedy, 2022; Fincham, 2008). The sample consisted of 64.7% males and 35.3% females. The average age of participants was a little above 33 years (M=33.1, SD=0.6). The average teaching experience for participants was above six years (M=6.3, SD=1.2).

Survey Instrument

The 85-item questionnaire was used to document the frequency with which teachers use or put into practice specific classroom practices from the CBA curriculum and from transformational teaching with their students. According to Aragón, Dovidio, and Graham (2017) and Camburn (2010), regular participation in practice has been utilized as evidence of endorsement of that practice.

Preparation of Survey Instrument

A comprehensive literature review on transformational teaching and competency-based pedagogy was conducted to ensure that the extracted items represent a broad spectrum. Face and content validity were carried out for the questionnaire items to ensure that the survey instrument measured what it intended to measure (Boateng et al., 2018).

Transformational Teaching.

The items used for the transformational teaching construct (ttp) were derived from a pre-existing students' questionnaire on teachers' transformational teaching (Beauchamp et al., 2010). The items for this construct were rephrased to encourage teachers to self-report their transformative classroom practices. These items were scrutinized by two independent expert review panels, each consisting of two domain experts and an academic professional, from the stage of item generation through post-pretest evaluation and analysis (Biasutti & Frate, 2017). Extracted items and their measurement scales were submitted to reviewers, along with information that enabled them to provide feedback (Elangovan & Sundaravel, 2021; DeMaio & Landreth, 2004). This construct was operationalized through fifteen items (Beauchamp et al., 2010). The fifteen items (TTP1-TTP15) were phrased to characterize five transformational teaching practices (Slavich & Zimbardo, 2012): establishing a shared vision of the course with students, creating an enabling environment for students to demonstrate their mastery of the course through persistence in finding solutions to problems, encouraging students to think critically as they work on challenging issues, tracking students' progress and giving feedback about their work, creating an environment for reflective thinking and real-life learning experiences. On a four-point Likert-type scale, respondents indicated the frequency with which they engage in transformative practices: 1 = never, 2 = sometimes, 3 = most of the time, 4 = always. (Likert, 1932). (See Appendix A for information on variables measured, definition, and reliability coefficients).

Competency-Based Teacher Practices.

The competency-based teacher practices scale was operationalized using trustworthy pre-existing Competency-Based Education Survey (CBE) instruments (Collaborative, E. P. I., 2021). The original scale is a self-report CBE diagnosis tool that measures different aspects of CBE, including teacher practices. Seven subscales of CBE teacher practices were selected based on their relevance to the context and expert views (DeMaio & Landreth, 2004). These variables are: Teacher classroom practices (TCP), Teacher personalised instruction (TPI), Teacher pacing (TPA), Project-based practices (PBL), Formative assessment practices (FAS), Teacher dispositions (TPA), and Teacher practices with technology (TPT). Some items were contextualized; for example, question 2(a) addresses *entry by life situation*:

"I present at the start of the lesson a life situation on which the lesson is based". 2(b) "I review with students the homework they have done". These items were subjected to expert review at all stages. The instructors self-report the frequency of their practice with these items using a Likert scale from 1 to 4. (See Appendix A for information on variables measured, definition, and reliability coefficients)

Additional information requested was related to gender, age, experience (years of teaching), professional development, and teaching with technology.

Questionnaire Administration

The questionnaire was pre-tested to ensure the applicability, comprehension of the components, and timeliness. The final questionnaire was translated into French and reviewed for content validity. Data were collected from 100 teachers (50 per language), and Cronbach's alpha was used to assess the internal consistency of each survey construct. The post pre-test evaluation and analysis were conducted by expert reviewers and the researcher (Ikart, 2019). The questionnaire was administered in April and May 2023. The survey was distributed in print, and participants were given the French or English version of their choice.

From empirical analysis of the questionnaire's reliability and validity, the adaptation of these items did not impact the reliability of the items for the respondents in this context. The Cronbach's alpha coefficients - a measure of the internal consistency of the instrument, in the range 0.6 and 0.7- imply fair reliability of the instrument, while a coefficient above 0.7 is considered adequate for reliability (Kennedy, 2022). From the results, the Cronbach's α-values of the original scale were generally higher, thus more reliable than the adapted scale. This could be due to factors linked to the context. However, the adapted Cronbach's alpha coefficients ranged from $\alpha = .63$ to $\alpha = .85$, and with these values, the instrument was accepted as reliable for this study (Kennedy, 2022; Taber, 2018).

Results

Frequency Analysis for Items of Transformational Teaching

The percentages of teachers and their reported frequency for each transformational teaching item were computed. (See Appendix B for calculated values) The respondents' overall regularity with the items of transformational practice was reasonable, suggesting that significant transformational teaching practices are commonplace in schools. For example, for transformational teaching items TTP1 - TPP5, TTP9, and TTP10, above 80% of teachers reported "always" or "most of the time", thus teachers regularly implement these transformational teaching classroom practices. Moderate frequency ("sometimes") was reported for the practices of items TTP7 and TTP13. However, items TTP6, TTP8, TTP11, TTP12, and TTP14 showed that overall engagement with these practices was low, suggesting that these transformational teaching practices are not common among teachers.

Regression Analysis

Descriptive Statistics for Research Variables

The mean and standard deviation for variables of CBA teacher practices and transformative teacher practices, at minimum and maximum values of 1.0 and 4, respectively, showed that both CBA teacher practices and transformative teacher practices are relatively high in schools. However, the values for teacher practices with technology (TPT) suggest a relatively moderate level of teaching with technology ($M = 2.45$, $SD = 0.63$).

Correlation Results of Variables

The nature of the relationship among variables was established through a Pairwise correlation analysis. (See Appendix C for Correlation Results of Variables)

Results show that each variable is perfectly collinear with itself. Meanwhile, a weak positive correlation is observed between transformational teaching and all explanatory variables in the model. A strong positive correlation is observed among the other variables. The variance inflation factor of 1.66 falls below the threshold of 2.5, indicating the absence of multicollinearity and thus reliable results.

Regression Results of the contribution of CBA teacher practices to transformative practices.

(See Appendix D for Regression Results of the contribution of CBA practices to transformative practices)

Ordinary List Square Regression was performed to determine the contribution of CBA teacher practices to transformative teaching. CBA practices were significantly related to Transformational teaching. The robust standard errors $X2\ (1) = 30.47$, $Prob > X2 = 0.000$. reflect the absence of heteroskedasticity; hence, the presence of homoskedasticity; hence, the results are reliable.

The coefficient for the constant term ($\beta = 1.10$, $p < .01$) explains variables that affect transformational teaching but are not captured in the model. Variables of CBA teacher practices have positive beta (β) values, indicating a positive relationship between CBA teacher practices and transformational teaching. [Teacher classroom practices ($\beta = .17, p<.01$), Teacher personalised instruction ($\beta = .21, p<.01$), Teacher pacing ($\beta = .1, p<.01$), and Teacher dispositions ($\beta =.19, p<.01$)]. Hence, these practices have a statistically significant effect on transformational teaching. Meanwhile, Project-based practices ($\beta = .04, p = .18$); Formative assessment practices ($\beta = .03, p = .39$), indicating a positive relationship between practices and transformational teaching, but these practices have no statistically significant effect on transformational teaching.

The variable Teacher practices with technology ($\beta = -.006, p =.79$) has a negative coefficient, indicating a negative association with transformational teaching. Teacher practices with technology has no statistically significant effect on transformational teaching.

Furthermore, R2(adj) = 0.302, implying there was a variation of 30.23% in transformational teaching due to variations in CBA teacher practices. For the overall significance of the model, CBA explained a significant amount of variance in transformative teacher practices, $R2 = .31, F(7, 1022) = 64.69, p<.01$. Hence, the results are significant at the 1% level and thus 99% reliable.

Discussion

Transformational teaching is recommended to enable education systems to adequately address learners' diverse needs and prepare them to solve today's problems and remain relevant in the future. With the evidence gathered in the current study, educators can build on current teacher practices to identify linkages between transformative practices and their current practices, enabling them to experience transformational teaching in their classrooms fully.

This study set out to establish the extent to which teacher CBA teacher practices contribute to the uptake of transformational teaching. This study hypothesized that CBA teacher practices would be positively related to transformational teaching. This hypothesis was significantly supported. The results indicate that the existing competency-based approach implemented in secondary schools in Cameroon can achieve significant transformational teaching goals. Four variables (CBA classroom practices, teacher personalised instruction, teacher pacing, and teacher disposition) showed positive correlations with transformational teaching. They were statistically significant, suggesting that these existing practices within the CBA curriculum are transformational. This finding is important because teachers may fail to adopt innovative practices due to an apparent "non-alignment" with their practices (Sánchez-Prieto et al., 2019; Wijngaards-de & Merx, 2018). Teachers may view innovative approaches as requiring them to adopt a completely new set of practices or as non-aligned with their objectives, such as curriculum demands to prepare students for examinations. However, evidence from this study suggests that teachers already possess significant components of the innovative practices. For instance, teachers will understand that students will still have high scores in their examinations when transformative practices are enacted, since their current practices are also transformative.

The Project-based learning practices, Formative assessment practices, and Teacher practices with technology correlated positively with transformational teaching but were not statistically significant. Inspecting the percentages of teachers' frequency with teacher practices on the transformational teaching scale, item TTP11 (providing individualized feedback regarding student resources) showed that relatively fewer teachers were engaging in formative assessment-related personalised practices. Similarly, item TTP12, related to personalized learning, and item TTP14, describing reflective practices, both reported a low frequency of practice. These constitute additional teaching practices for teachers to adopt so that current CBA practices can be transformational. These practices were isolated as "add-ons" to scale up CBA teacher practices to transformational teaching.

Teachers' overall regularity with the items of formative assessment was low. Teachers reported not regularly providing learners with immediate feedback on assessments, suggesting that formative assessment practices may be inadequate. In secondary schools, feedback on assessments is structured and provided after each six-week study period, and test scores are used for remediation. The results suggest that this model may not enforce regular classroom assessment, especially when a teacher is handling a large class. However, the assumption has been that personalised pacing of activities during remediation would be emphasised by the teacher, leading to improved learning outcomes. Nonetheless, classroom observation will be needed to assess how formative assessment is implemented during lessons.

Recommendation

The study has identified teacher practices that will scale up current CBA teaching to transformational teaching. These additional practices include project-based teacher practices, formative assessment practices, personalised teacher practices, teaching with technology, and reflective practices in teaching. They constitute "add-on" or transformative practices that are not evident or not sufficiently implemented by teachers familiar with the current CBA approach. These practices can be incorporated into the current curriculum to enable teachers to experience transformational teaching in their classrooms. The study also isolated transformational teacher practices within current CBA teacher practices. Valuing teachers' transformational practices will instill confidence in them, making them more receptive to innovative practices and thereby removing the barriers or resistance usually encountered with new practices. The results of this research can inform teachers and practitioners in designing and implementing effective transformational teaching strategies in secondary schools.

Further Research

The study examines teachers' likelihood of adopting new pedagogical practices at the personal level. However, institution-wide factors, such as contextual, external, and resource-related factors, may significantly influence whether the teacher adopts new practices. Further research could examine the influence of these factors on teachers' uptake of transformational teaching.

Both the frequency analysis and the correlational analysis of the item, Teaching practices with technology, reported a very low frequency of teacher engagement with this classroom practice. But when participants were asked whether they had received training on how to use technology in teaching, 97.8% of respondents reported receiving such training (M=.98; SD=0.15).

These results suggest that either teachers are not integrating technology into their practices or that technology is not being used properly. However, given that a dichotomous scale (Yes or NO) was used to verify their competence, this component might have been over-reported due to self-report bias. Future research may focus on observation of teachers' classroom practice with technology.

References

Ahmad, S., Wasim, S., et al. (2019). Qualitative vs. quantitative research-a summarized review. population. *Journal of Evidence Based Medicine & Healthcare, 1*(2), 2828-2832.

Albanese, M. A., Mejicano, G., Mullan, P., Kokotailo, P., & Gruppen, L. (2008). Defining characteristics of educational competencies. *Medical education, 42*(3), 248-255.

Ales, T. (2024). Global disparities in special education: A scoping review on policy impact and educational outcomes. In T. Bastiaens (Ed.), *Proceedings of EdMedia + Innovate Learning* (pp. 548-557). Association for the Advancement of Computing in Education..

Allchin, D., Andersen, H. M., & Nielsen, K. (2014). Complementary approaches to teaching nature of science: Integrating student inquiry, historical cases, and contemporary cases in classroom practice. *Science Education, 98*(3), 461-486. DOI 10.1002/sce.21111

Alonso-García, S., Aznar-Díaz, I., Caceres-Reche, M. P., Trujillo-Torres, J. M., & Romero-Rodriguez, J. M. (2019). Systematic review of good teaching practices with ICT in Spanish Higher Education. *Trends and Challenges for Sustainability. Sustainability, 11*(24), 7150.

Apriliana, L. P., Handayani, I., & Awalludin, S. A. (2019). The effect of a problem centered learning on students' mathematical critical thinking. *Journal of Research and Advances in Mathematics Education, 4*(2), 124-133.

Aragón, O. R., Dovidio, J. F., & Graham, M. J. (2017). Colorblind and multicultural ideologies are associated with faculty adoption of inclusive teaching practices. *Journal of Diversity in Higher Education, 10*(3), 201.

Ashar, M., Rosyid, H., Taufani, A., & Nasir, K. (2020). Ubiquitous learning environment for smart improving disruption activities in classroom on media. *International Journal of Interactive Mobile Technologies (iJIM), 14*(13), pp. 200–212.

Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. https://iosrjournals.org/iosr-jrme/papers/Vol-5%20Issue-6/Version-1/I05616670.pdf(6), 66-70.

Balliu, V. (2017). Modern teaching versus traditional teaching-Albanian teachers between challenges and choices. *European Journal of Multidisciplinary Studies, 2*(4), 20-26.

Bang, N. C., Shafack, R. M., et al. (2024). The 21st century competence-based pedagogy reform and sustainable teacher education through transformative learning model. *General Multidisciplinary Journal of Sustainable Development, 2*(2), 57-68. .

Beauchamp, M. R., Barling, J., et al. (2010). Development and psychometric properties of the transformational teaching questionnaire. *Journal of Health Psychology, 15*(8), 1123-1134.

Bergsmann, E., Schultes, M. T., et al. (2015). Evaluation of competence-based teaching in higher education: From theory to practice. *Evaluation and Program Planning, 52*, 1-9. PMID: 25847854

Biasutti, M., & Frate, S. (2017). A validity and reliability study of the attitudes toward sustainable development scale. *Environmental Education Research, 23*(2), 214-230.

Boateng, G. O., Neilands, T. B., et al. (2018). Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Frontiers in Public Health, 6*, 149.

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). *European journal of Education, 54*(3), 356-369

Camburn, E. M. (2010). Embedded teacher learning opportunities as a site for reflective practice: An exploratory study. *American Journal of Education, 116*(4), 463-489.

Campbell, S., Greenwood, M., et al. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of research in Nursing, 2*5(8), 652-661.

Collaborative, E. P. I. (2021). *Competency-based education survey instrument report*. Education Policy Innovation Collaborative.

Cook, K. E., Han, Y. L., et al.. (2017). Effects of integrating authentic engineering problem centered learning on student problem solving. *International Journal of Engineering Education, 33*(1), 272-282.

Datnow, A., Park, V., et al. (2022). Transforming education for holistic student development: Learning from education system (re) building around the world. Report. The Brookings Institution.

DeMaio, T., & Landreth, A. (2004). Examining expert reviews as a pretest method. In *Conference on Questionnaire Evaluation Standards-QUEST 2003* (Vol. 9, pp. 60-73). DEU.

Dimitriadou, E., & Lanitis, A. (2023). A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms. *Smart Learning Environments, 10*(1), 12.

Edwards-Groves, C. (2018). The practice architectures of pedagogy: Conceptualising the convergences between sociality, dialogue, ontology and temporality in teaching practices. In New Pedagogical Dhallenges in the 21st Century: Contributions of Research in Education, 119-139.

Elangovan, N., & Sundaravel, E. (2021). Method of preparing a document for survey instrument validation by experts. *MethodsX, 8*, 101326. .

Epp, S., Reekie, M., et al. (2021). Radical transformation: Embracing constructivism and pedagogy for an innovative nursing curriculum. *Journal of Professional Nursing, 37*(5), 804-809.

Ertmer, P. A., & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers & Education, 64*, 175-182.

Esongo, N. M. (2017). Correlation between the availability of resources and efficiency of the school system within the framework of the implementation of competency-based teaching approaches in Cameroon. *Journal of Education and Practice, 8*(2), 82-92.

Farnsworth, V., Kleanthous, I., & Wenger-Trayner, E. (2016). Communities of practice as a social theory of learning: A conversation with Etienne Wenger. *British Journal of Educational Studies, 64*(2), 139-160.

Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the Journal. *American Journal of Pharmaceutical Education, 72*(2).

Gervais, J. (2016). The operational definition of competency-based education. *The Journal of Competency-Based Education, 1*(2), 98-106.

Grossman, P., Hammerness, K., & McDonald, M. (2009). Redefining teaching, re-imagining teacher education. *Teachers and Teaching: Theory and Practice, 15*(2) 273-289.

Gunter, B. (2013). The quantitative research process. In *A Handbook of Media and Communication Research* (pp. 251-278). Routledge.

Hanson, M. A., & Beem, H. (2024). Transitioning Hands-On STEM Teacher Training in Ghana from an In-Person to Online Modality. *Global Journal of Transformative Education, 4*(1), 88-104.

Hardy, S. (2009). Teaching mediation as reflective practice. *Negotiation Journal, 25*(3), 385-400.

Harris, R., & Clayton, B. (2019). The current emphasis on learning outcomes. *International Journal of Training Research, 17*(2), 93-97.

Herppich, S., Praetorius, A. K., et al. (2018). Teachers' assessment competence: Integrating knowledge-, process-, and product-oriented approaches into a competence-oriented conceptual model. *Teaching and Teacher education, 76*, 181-193.

Hess, K., Colby, R., & Joseph, D. (2020). *Deeper competency-based learning: Making equitable, student-centered, sustainable shifts*. Corwin

Ikart, E. M. (2019). Survey questionnaire survey pretesting method: An evaluation of survey questionnaire via expert reviews technique. *Asian Journal of Social Science Studies, 4*(2), 1.

Jones, M. (2009). Transformational learners: Transformational teachers. *Australian Journal of Teacher Education, 34*(2). 2

Kennedy, I. (2022). Sample size determination in test-retest and Cronbach alpha reliability estimates. *British Journal of Contemporary Education, 2*(1), 17-29. DOI: 10.52589/BJCEFY266HK9

Lai, C. S. (2018). Using inquiry-based strategies for enhancing students' STEM education learning. *Journal of Education in Science, Environment and Health, 4*(1), 110-117. DOI:10.21891/jeseh.389740

Langthaler, M., & Malik, J. (2023). Inequalities in education from a global perspective: Theoretical approaches, dimensions and policy discussions (No. 34). ÖFSE Briefing Paper.

Le Fevre, D. M. (2014). Barriers to implementing pedagogical change: The role of teachers' perceptions of risk. *Teaching and Teacher Education, 38*, 56-64.

Le, C., Wolfe, R. E., & Steinberg, A. (2014). The Past and the Promise: Today's Competency Education Movement. Students at the Center: Competency Education Research Series. Jobs for the Future.

Lee, D. H. L., & Lee, W. O. (2018). Transformational change in instruction with professional learning communities? The influence of teacher cultural disposition in high power distance contexts. *Journal of Educational Change, 19*(4), 463-488.

Lehtonen, A., Salonen, A., & Cantell, H., (2019) Climate change education: A new approach for a world of wicked problems. In J. W. Cook (ed.), *Sustainability, Human Well-Being, and the Future of Education*, pp. 339-374

Li, C. (2022). Perpetuating student inequality? The discrepancy and disparity of global citizenship education in Chinese rural & urban schools. *Asia Pacific Education Review, 23*(3), 389-401.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 22*, 140-155.

Makulova, A. T., Alimzhanova, G. M., et al. (2015). Theory and practice of competency-based approach in education. *International Education Studies, 8*(8), 183-192.

Marcotte, K. M., & Gruppen, L. D. (2022). Competency-based education as curriculum and assessment for integrative learning. *Education Sciences, 12*(4), 267.

Matasci, D. (2020). Assessing needs, fostering development: UNESCO, illiteracy and the global politics of education (1945–1960). In *Measuring the Unmeasurable in Education* (pp. 35-53). Routledge.

McCabe, A., & O'Connor, U. (2014). Student-centred learning: the role and responsibility of the lecturer. *Teaching in Higher Education, 19*(4), 350-359.

McCaster, A. L. (2019). Adult education and dialogue: utilizing Project-Based education as a method to provide transformative change in both students and teachers. *Global Journal of Transformative Education, 1*(1), 46-51.

McConnell, T. J., & Giorgio-Booher, B. (2020). Collaborative teams for self-publishing: A model for creating locally-relevant educational books. *Global Journal of Transformative Education, 2*(1), 33-45.

McConnell, T. J., Parker, J. M., & Eberhardt, J. (2019). Problem-Based Learning for tesponsive and transformative teacher professional development. *Global Journal of Transformative Education, 1*(1), 18-25.

Meguid, E. A., & Collins, M. (2017). Students' perceptions of lecturing approaches: Traditional versus interactive teaching. *Advances in Medical Education and Practice, 8*, 229.

Meyers, S. A. (2008). Using transformative pedagogy when teaching online. *College Teaching, 565*(42), 219-224. DOI: 10.3200/CTCH.56.4.219-224

Mohamed Hashim, M. A., Tlemsani, I., & Matthews, R. (2021). Higher education strategy in digital transformation. *Education and Information Technologies*, 27, 3171-3195.

Morcke, A. M., Dornan, T., & Eika, B. (2013). Outcome (competency) based education: an exploration of its origins, theoretical basis, and empirical evidence. *Advances in Health Sciences Education, 18*, 851-863. DOI: 10.1007/s10459-012-9405-9.

Musau, Z. (2018). Africa grapples with huge disparities in education. *Africa Renewal, 31*(3), 10-11. DOI:10.48028/iiprds/ijsreth.v10.i1.09

Ngoei, H. (2024). Western educational concepts in Africa again? Future Skills Concept in Cameroonian higher education. An analysis of opportunities and implementation conditions. *European Journal of Education Studies, 11*(8).

Nguyen, K. N. & Baker, S. (2023). Climate change and UNESCO World Heritage-listed cultural properties: A systematic review, 2008–2021. *Heritage, 6*(3), 2394-2420.

Ngwa, E. S., & Lawyer, B. N. (2020). The competency-based approach in public universities in Anglophone Cameroon: Implications for the Tuning Africa Project. *Asian Journal of Education and Social Studies, 10*(4), 38-59. no. AJESS.60432.

Nkwetisama, C. M. (2012). The Competency Based approach to English language education and the walls between the classroom and the Society in Cameroon: Pulling down the walls. *Theory & Practice in Language Studies (TPLS), 2*(3). doi:10.4304/tpls.2.3.516-523

Omodan, B. I., & Addam, B. (2022). Analysis of transformational teaching as a philosophical foundation for effective classrooms. *Journal of Curriculum Studies Research, 4*(2), 15-29.

Orlich, D. C., Harder, R. J., et al. (2010). *Teaching strategies: A guide to effective instruction*. Wadsworth, Cengage Learning. ISBN-10: 0-547-21293-3

Pounder, J. (2014). Quality teaching through transformational classroom leadership. *Quality Assurance in Education, 22*(3), 273-285.

Psaki, S. R., McCarthy, K. J., & Mensch, B. S. (2018). Measuring gender equality in education: Lessons from trends in 43 countries. *Population & Development Review, 44*(1).

Quillinan, B., MacPhail, A., et al. (2019). Transformative teaching and learning through engaged practice: lecturers' and students' experiences in a university and underserved community partnership in Ireland. *Journal of Transformative Education, 17*(3), 228-250.

Rau, M. A., Kennedy, K., et al. (2017). Unpacking "active learning": A combination of flipped classroom and collaboration support is more effective but collaboration support alone is not. *Journal of Chemical Education, 94*(10), 1406-1414.

Rickles, J., Zeiser, K. L., et al. (2019). Promoting deeper learning in high school: Evidence of opportunities and outcomes. *Educational Evaluation and Policy Analysis, 41*(2), 214-234.

Rieckmann, M. (2018). Learning to transform the world: Key competencies in Education for Sustainable Development. In A. Leicht, J. Heiss and W. J. Byun (eds.), *Issues and Trends in Education for Sustainable Development, 39*, 39-59. ISBN 978-92-3-100244-1

Sánchez-Prieto, J. C., Huang, F., et al. (2019). Exploring the unknown: The effect of resistance to change and attachment on mobile adoption among secondary pre-service teachers. British Journal of Educational Technology, 50(5), 2433-2449.

Schildkamp, K., van der Kleij, F. M., et al. (2020). Formative assessment: A systematic review of critical teacher prerequisites for classroom practice. *International Journal of Educational Research, 103*, 101602.

Selepe, C., & Moll, I. (2016). Are teachers facilitators or are they mediators? Piaget, Vygotsky and the wisdom of the teacher. *The Independent Journal of Teaching and Learning, 11*(1), 6-16. Corpus ID: 56263654

Shaeffer, S. (2019) Inclusive education: a prerequisite for equity and social justice. *Asia Pacific Education Review, 20*, 181–192.

Shishigu, A. (2022). Supplemental blended learning model as an approach towards the enhancement of Competency Based Education: An experience from a pedagogical intervention. *Journal of Educational Technology Systems, 51*(2), 202-214.

Siddaiah-Subramanya, M., Smith, S., & Lonie, J. (2017). Mastery learning: how is it helpful? An analytical review. *Advances in Medical Education and Practice*, 8, 269-275.

Slavich, G. M., & Zimbardo, P. G. (2012). Transformational teaching: Theoretical underpinnings, basic principles, and core methods. *Educational Psychology Review, 24*(4), 569-608.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*, 1273-1296. DOI 10.1007/s11165-016-9602-2

Tahir, K. (2018). Transformational teaching: Pakistani students' perspectives in the English classroom. *International Journal of Teaching and Learning in Higher Education, 30*(1), 61-69.

Teijeiro, M., Rungo, P., & Freire, M. J. (2013). Graduate competencies and employability: The impact of matching firms' needs and personal attainments. *Economics of Education Review, 34*, 286-295.

Teo, P. (2019). Teaching for the 21st century: A case for dialogic pedagogy. *Learning, Culture and Social Interaction, 21*, 170-178.

Thibaut, L., Ceuppens, S., et al. (2018). *Integrated STEM education: A systematic review of instructional practices in secondary education*. European Journal of STEM Education, 3(1), 2.

Tikly, L., Joubert, M., et al. (2018). *Supporting secondary school STEM education for sustainable development in Africa*. University of Bristol.

Toma, R. B., Yánez-Pérez, I., & Meneses-Villagrá, J. Á. (2024). Towards a socio-constructivist didactic model for integrated STEM education. *Interchange, 55*(1), 75-91.

UNESCO (2022) Transforming education: An urgent political imperative for our collective future. *United Nations Transformation Education Summit*, New York.

Vannatta, R. A., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education, 36*(3), 253-271.

West, C., Baker, A., Ehrich, J. F., Woodcock, S., Bokosmaty, S., Howard, S. J., & Eady, M. J. (2020). Teacher Disposition Scale (TDS): Construction and psychometric validation. *Journal of Further and Higher Education, 44*(2), 185-200.

Wijngaards-de Meij, L., & Merx, S. (2018). Improving curriculum alignment and achieving learning goals by making the curriculum visible. *International Journal for Academic Development, 23*(3), 219-231.

Winget, M., & Persky, A. M. (2022). A practical review of mastery learning. *American journal of pharmaceutical education, 86*(10), ajpe8906.

Wiysahnyuy, L. F. (2021). The competency based approach in Cameroon public secondary schools: Modes of appropriation and constrains. *International Journal of Humanities Social Sciences and Education, 8*(1), 92-103. DOI:10.20431/2349-0381.0801011

Yifat Ben-David Kolikant (2019) Adapting school to the twenty-first century: Educators' perspectives.*Technology, Pedagogy and Education, 28*(3), 287-299,

Žalėnienė, I., & Pereira, P. (2021). Higher education for sustainability: A global perspective. *Geography and Sustainability, 2*(2), 99-106.

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Appendix A

Table A. Variables measured, definitions, number of items, sources and reliability coefficients

Variable	Definition	Item	Source	α value Original	α value adapted
Teacher transformational teaching (TTP)	degree of teacher use of a variety of strategies, including contemporary ones, to enable students to demonstrate mastery of concepts and transformational ideals/requirements.	1a-5c (12)	Transformational teaching questionnaire (Beauchamp et al., 2010)	.85	.700
Teacher Classroom Practices (TCP)	degree of teacher use of a variety of strategies, including contemporary ones, to enable students to demonstrate mastery of skills, knowledge, and dispositions in solving real-life problems.	2a-j (10)	CBE Survey Instrument: College of Education, (Michigan State University, 2021)	.719	.78
Teacher personalised instruction (TPI)	Frequency of teachers' support to students' unique needs and abilities with tailored learning pathways.	3a-g (7)	CBE Survey Instrument: College of Education, (Michigan State University, 2021)	.836	.680
Teacher Pacing (TPA)	speed at which teacher & students collaboratively go through a lesson or activity to achieve learning goals.	4a-g) (7)	CBE Survey Instrument: College of Education, (Michigan State University, 2021)	.646	.630
Teacher Project-based practices (PBL)	Degree of teacher use of a variety of strategies, including authentic questions and problems within real-world practices, in an active learning process to achieve learning goals.	5a-g (7)	CBE Survey Instrument: College of Education, (Michigan State University, 2021), Pane et al., 2015	.871	.640
Formative Assessment practices (FAS)	Frequency of teacher use of a variety of student assessment practices to get feedback that informs students' progress.	6a-g (7)	CBE Survey Instrument: College of Education, (Michigan State University, 2021)	.783	.644
Teacher dispositions (TDP)	attitudes and modes of conduct demonstrated by the teacher that facilitate student learning and convey a positive image of the teaching profession.	7a-g (7)	West et al. (2020) Teacher Disposition Scale (TDS): construction and psychometric validation. (Teacher Efficacy)	.860	.705
Teacher practices with technology (TPT)	Frequency of teacher use of a variety of technology tools and applications to attain lesson objectives.	8a-k (11)	Faculty Technology Survey (Vannatta & O'Bannon, 2002)	.851	.841

Appendix B

Table B. Frequency analysis of responses for items of the transformational teaching variable.

Variable	Description of Items	Always (%)	Most of the time (%)	Sometimes (%)	Never (%)
TTP1	I present the goal in the first classes of the course to enable students to build a picture of their personal and collective future as they study the course.	70	24	6	0
TTP 2	I create a collaborative learning environment, and students encourage each other to participate in discussions and activities during lessons.	50	35	14	0
TTP 3	Together with the students, we agree on roles and on how to achieve the course objectives, such as attending classes, completing assignments, and encouraging each other.	51	33	14	2
TTP 4	I inspire students to rely on one another to find solutions to problems, complete assignments together, and collaborate to discover knowledge.	52	32	14	2
TTP 5	I encourage students to view challenging situations as opportunities rather than barriers to success.	45	34	19	1
TTP 6	I frame surmountable problems to allow students to practice and demonstrate specific learning skills.	32	34	**28**	**6**
TTP 7	I start my lessons at an acceptable, coherent level of difficulty, then pose questions and present problems that are incrementally more difficult.	34	38	20	**8**
TTP 8	I create study guides, share sample exam questions, modify exam time limits, and use alternative exam formats, such as oral, open-book, and group tests.	29	31	**31**	**9**
TTP 9	I prompt students to be creative, examine their assumptions and beliefs critically, and view problems from multiple perspectives.	38	44	15	3
TTP 10	I assess students' knowledge of a topic and pose questions at a corresponding level of difficulty.	55	32	11	2
TTP 11	I provide students with individualized feedback on their resources and capabilities, and on their progress towards their goals.	29	34	**28**	**9**
TTP 12	Based on each student's current ability level, we create a personalized learning plan together to help attain learning goals, such as a list of exercises that provoke new thinking.	22	31	**34**	**13**
TTP 13	I introduce activities in class that students can implement outside of the classroom.	38	37	21	4
TTP 14	Students are encouraged to examine their approach to solving a problem before they begin, so they can consider alternative strategies for tackling it.	26	32	**33**	**8**
TTP 15	I encourage students to think independently and from different perspectives in activities such as debates.	37	40	18	3

Appendix C

Table C. Correlation results of variables

	TTP	TCP	TPI	TPA	PBL	FAS	TDP	TPT	M	SD
TTP	1								3.33	0.46
TCP	0.45	1							2.82	0.49
TPI	0.46	0.56	1						3.21	0.45
TPA	0.41	0.57	0.55	1					3.00	0.50
PBL	0.35	0.56	0.44	0.50	1				2.72	0.55
FAS	0.35	0.48	0.43	0.49	0.50	1			2.76	0.50
TDP	0.37	0.35	0.36	0.31	0.31	0.41	1		3.46	0.44
TPT	0.24	0.46	0.30	0.40	0.42	0.33	0.20	1	2.45	0.63
Mean VIF: 1.66										

Appendix D

Table D. Regression Results of the contribution of CBA to transformative teaching

	Coefficient	Robust Std. Err.	t-statistics	P>t	[95% Conf. Interval]	
TCP	0.17	.036	4.81	.000	0.10	0.24
TPI	0.21	.038	5.48	.000	0.13	0.28
TPA	0.1	.036	2.6	.009	0.02*	0.17
PBL	0.04	.026	1.34	.181	-0.02	0.09
FAS	0.03	.032	0.86	.392	-0.04	0.09
TDP	0.19	.037	5.06	.000	0.11	0.26
TPT	-0.01	.022	-0.27	.786	-0.05	0.04
Constant	1.09	.123	8.91	.000	0.85	1.33

**Significant at $\alpha = 0.05$.*