



EFFECTS OF TEACHERS' EPISTEMOLOGICAL, HEALTH VIEW AND PEDAGOGICAL BELIEFS ON THE DIDACTIC STRATEGY TO TEACH ADOLESCENT REPRODUCTIVE HEALTH: A CAMEROONIAN PERSPECTIVE

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Abstract: Despite the recommended didactic strategy to teach Adolescent Reproductive Health in Cameroon using Competency Based Approach with entry through problem situations, a lot of resistance is still observed within biology teachers in this multicultural and linguistic country. This cross sectional study uses Structural Equation Modelling (SEM) techniques to investigate factor that might facilitate or inhibit the effective implementation of this reforms using a purposeful and convenient sample comprised of 373 In-service Biology secondary school teachers.

The validity and reliability of our research instrument was investigated and confirmed using Exploratory and Confirmatory Factor Analysis. Thereafter, a hypothesised SEM model was conceptualised and tested. The model provided a reasonable good overall fit. Teachers' belief in authority and knowledge as unchanging has a strong positive direct effect on their Biomedical Health view and on the use of traditional teaching method but a negative direct effect on using contemporary didactic strategy. Contrarily, Teachers who criticize authority and belief in knowledge as tentative equally developed Biopsychosocial Health view which correlates strongly with Constructivist teaching method that positively influences the use of these didactic strategies. This can serve as a candidate theory for further investigation. It could have implication in the development of psychosocial competences in learners and in the training of ARH educators.

Key words: Adolescent Reproductive Health; Didactic strategies; Structural Equation Modelling; Epistemology; and Health View.

1. Introduction and Research Question

Teaching Controversial Socio Scientific Issues linked to adolescent reproductive health such as HIV/AIDS prevention, abortion, sexual orientation, sex abuses, contraceptive use, and paedophilia have given rise to differing opinion and solutions from the different stakeholders of education in Cameroon, especially given its socio-cultural, geographical, ethnic and linguistic diversity with English and French as official languages and two educational subsystems inherited from her colonial masters (Britain and France). The two educational subsystems are different in structure, content and certification. However, the Education Forum of 1995 came out with Law No.98/004/ of 14th April 1998 to lay down guidelines for education in Cameroon, which state in Section 4 that: *"the general goal of education is to train children for their intellectual, physical, civic and moral development and their smooth integration into society bearing in mind the prevailing economic, socio-cultural, political and moral factors"*. In line with this educational goal, the teaching of Biology and SVT in secondary schools in Cameroon has as main objective; *"to develop a scientific spirit in learners, help them acquire not only theoretical knowledge, but aptitude and responsible attitude towards health, reproduction, environment and life"*, as stated in Ministerial Decision No.114/B1/1464/MINEDUC/SG/IGP/ESG of 18 March 2002.

The 2012 Biology syllabus according to the Competency Based Approach divides Biology into three main modules: The Living World; Health Education; and Environmental Education. Given that the

teachers are from diversified pedagogic, religious and socio-cultural background and also that the teaching of Adolescent Reproductive Health (ARH) will require the mobilization of interdisciplinary, scientific and ethical reasoning, and a specific didactic situation and strategies (Simonneaux L., 2000), this research intend to find out if the didactic strategy the teachers use are influenced by their epistemological beliefs, health views and pedagogic content knowledge. Studies by Lee, J., Zhang, Z., Song, H., & Huang, X. (2013), revealed that teachers' epistemological beliefs can directly or indirectly through its effect on their conceptions of ARH and its teaching and learning, impact teachers' instructional practices in general. No such specific study has been carried out in the domain of Adolescent Reproductive Health (ARH) in general and in the Cameroonian context in particular. Studies by Nchia et al., (2015a) revealed Teachers conception on Sex Education in Cameroon was influenced only by subsystem of education and subject taught and not by gender, age, qualification or religious affiliation. However, it could not explain why the variation within teachers of the same discipline. This study intends to address this gap by exploring how Teachers' Epistemological Beliefs, ARH View, Conception of Teaching and Learning will influence their used of known Contemporary Didactic Practices and eventually influence the Development of Cognitive and Psychosocial Competences in students.

A Conceptual Model developed by us is shown in Figure 1 below.

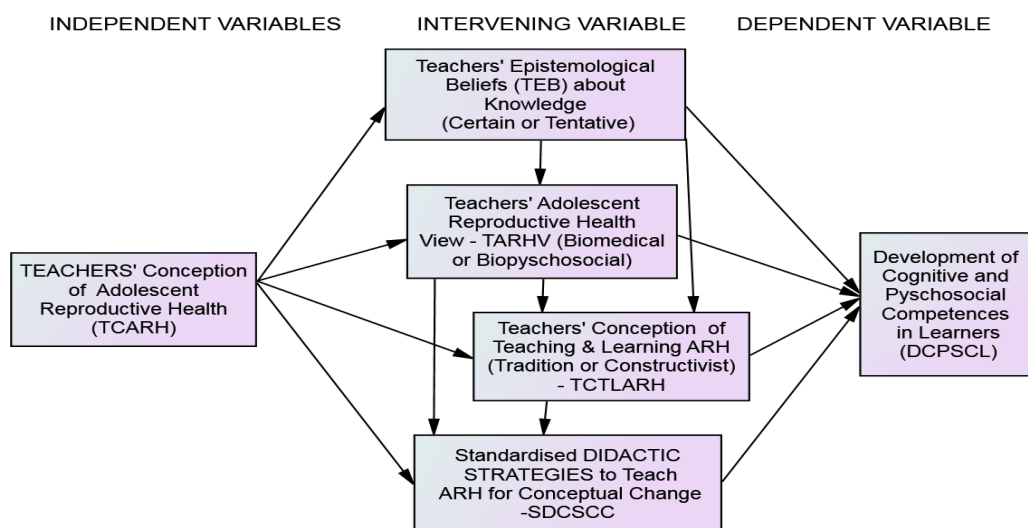


Figure 1. Conceptual framework developed by Nchia (2014) to guide this research work

2. Method

A **cross-sectional study** employing a survey method was carried out for collecting the data. In addition, this research study employed a two-step approach in the **Structural Equation Modeling** (SEM) analysis. In the first step, measurement model evaluation was conducted, in order to examine the dimensionality, validity, and reliability of latent constructs using **Exploratory and Confirmatory Factor Analysis** (EFA & CFA). In the next step, the structural model procedure was employed in order to examine the hypothesized relationships between the latent constructs in the proposed research model.

A **purposeful and convenient sample** comprised of 373 In-service Biology secondary school teachers' of both the English and French subsystems of Education in Cameroon was used. Data was collected during the 2015 Annual Biology Teachers Association Meeting to ensure maximum returns of questionnaires. A portion of the survey questionnaire used is attached on Annex 1.

The independent variable Teachers' conception of Adolescent Reproductive Health (TCARH) was operationalised into four intervening or mediating constructs (TEB, TARHV, TCTLARH and

SDCSCC) that could intervene in the Development of cognitive and psychosocial competences in learners as in figure 1.0.

Structural Equation Modeling (SEM) analysis was employed to investigate how well the hypothesized model (Figure 2) fits the data. Before performing SEM analysis, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used respectively to validate the instruments in the Cameroon context. The entire sample was randomly split into two separate samples. One sample was used in the EFA analysis, and another in the CFA analysis. After the instruments were adequately validated, SEM analysis was conducted to investigate the relationship between these construct. The computer program AMOS 21 was employed for the SEM analysis.

3. Results and discussion

Table 1. EFA to determine dimensions of the constructs.

Construct	No of Dimension	No of items retained after PCA	% variance explained	Cronbach's alpha (α)	Bartlett's test of sphericity			
					KMO	Appro. Chi square	Df	Sig .
Teachers' Adolescent Reproductive Health View (TARHV)	Biopsychosocial	4	21.58	0.712	0.773	201.2	36	.000
	Biomedical	4	20.8					
Teachers' Epistemological Beliefs (TEB)	Knowledge unchanging	10	22.5	0.73	0.757	1245.0	171	.000
	Knowledge tentative	9	17.7					
Teachers' conception of teaching & Learning ARH (TCTLARH)	Traditional	9	24.7	0.76	0.753	346.8	120	.000
	constructivist	7	17.26					
Didactic strategy (SDCSCC)	One	7	39.1	0.75	0.757	357.4	21	.000
Development of competence	One	7	51.1	0.74	0.79	260.7	21	.000

Using the maximum likelihood method of estimation from AMOS 21 (Arbuckle, 2006), Confirmatory Factor Analysis (CFA) was conducted in order to confirm the findings of the EFA. It revealed that the different measurement instruments were valid and reliable to measure the different construct they are intended to. The RMSEA value are below the threshold of 0.08, while the incremental measures of fit (GFI, AGFI, CFI, TLI & NFI) are almost above 0.9 as expected by Byne, (2010); Hair et al., (2006); Tabachnick and Fidell, (2007).

Table 2. CFA for validation (convergent and discriminant) of measurement model revealed by EFA

Latent construct	χ^2	Df	P Values	RMSEA	GFI	AGFI	CFI	TLI	NFI
Teachers' Health View	11.204	8	0.190	0.038	0.987	0.966	0.973	0.950	0.917
Teachers' Epistemological Belief	457.86	151	0.000	0.076	0.852	0.814	0.723	0.686	0.642
Teachers' conception of	115.44	34	0.000	0.064	0.929	0.886	0.855	0.808	0.809

teaching & Learning ARH									
Didactic strategy	13.62	5	0.018	0.050	0.981	0.944	0.953	0.907	0.930
Development of competence	2.51	2	0.285	0.031	0.996	0.978	0.996	0.987	0.980

More specifically, the path coefficient from each latent construct to the observed variable is significant at $p < 0.000$ and the standard regression weight ranges from 0.49 to 0.77 which according to Bollen (1989) supports the validity and reliability of the items.

Teachers' conception of Adolescent Reproductive Health (TCARH) can be explained by seven correlated factors: TBAKU; TCAKT; TBMHV; TBPSHV; TRAD; CONST and SCDS.

The model globally of Figure 2.0 below, reveal that the use of Contemporary Didactic strategy (DSCC) has a strong positive direct effect ($\beta = 0.60$) on the development of psychosocial competences (DCPSC). The use of DSCC is promoted by Constructivist view ($\beta = 0.21$) and inhibited by traditional views ($\beta = -0.06$) of teaching and learning. Teachers' belief in authority and knowledge as unchanging (TBAKU) has a strong positive direct effect on their Biomedical Health view (TBMHV) ($\beta = 0.51$) and on their use of traditional teaching method (TRAD) ($\beta = 0.48$) and a negative direct effect on DSCC ($\beta = -0.08$). TRAD also has a negative direct effect ($\beta = -0.40$) on Cognitive and Psychosocial Competences (DCPSC).

There is **Partial mediation** effect of Teachers' Biomedical Heal View (TBMHV) on the usage of Traditional teaching and learning Approach (TRAD) and biopsychosocial health view (TBPSHV) on the use of constructivist teaching and learning approach to adolescent reproductive health (CONST). These partial mediation effect accounts for 36.0% & 26% of the variance respectively as revealed by the R squared value ($R^2 = 0.36$).

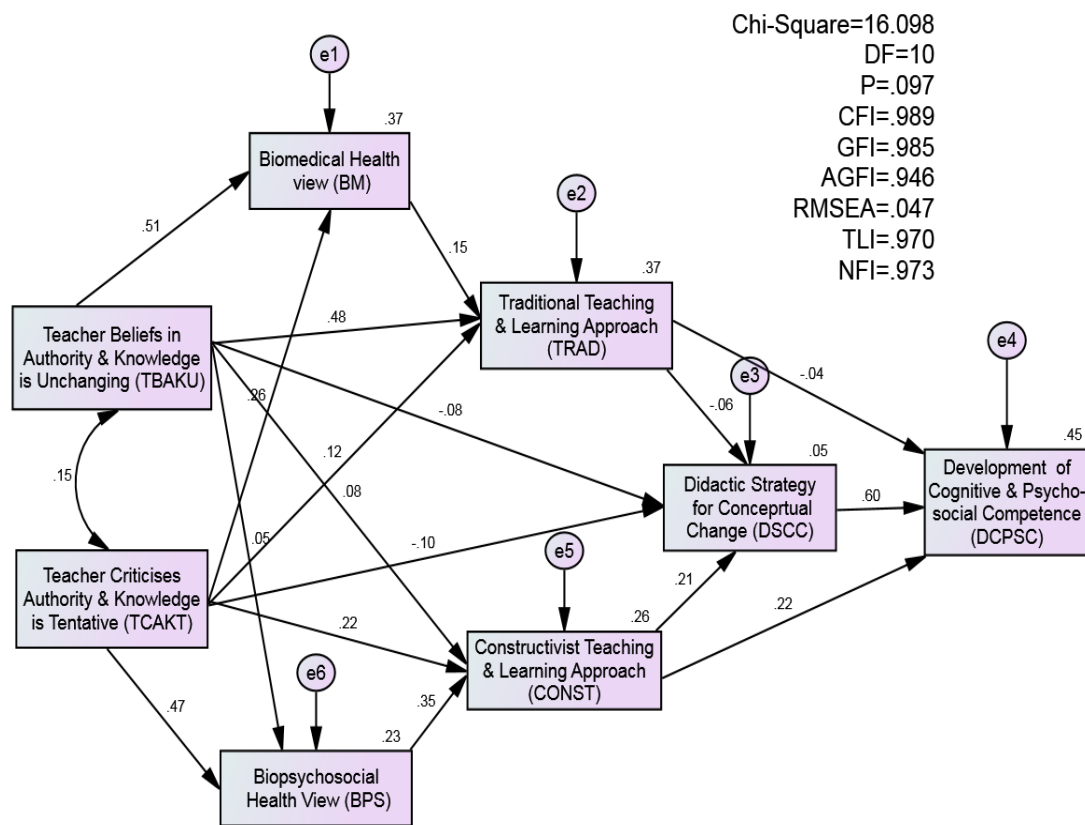


Figure 2. Standardised Path Coefficient and R Square Values for the Hypothesised Structural Model Proposed by Nchia 2016.

All path coefficients were significant, and several overall model-fit indicators show there is a good fit of this hypothesized model. The accepted standard for the above-presented indicators of fit varies from above 0.90 for GFI, AGFI, NFI and TLI indicators to below 0.08 in case of RMSEA. All these procedures indicate a good fit of the model, which is a plausible explanation, even though this does not imply that is the only possible model. Thus the hypothesized SEM model (Figure 2) provides a reasonable good overall fit.

4. Conclusion.

Our model reveals how epistemological view about knowledge and health can act as obstacles to the use of standardized contemporary didactic strategy for conceptual change. Our results attempt to explain teacher's pedagogic practices observed in the field as reported in Nchia (2015b). Teachers' Epistemological Beliefs (TEB) were found to significantly predict their Adolescent Reproductive Health View (TARHV) and their Conceptions of Teaching and Learning of Sex Education (TCTLSE) which will in turn promote or inhibit the use of standardized Didactic contemporary Strategy to bring about Conceptual Change (SDCSCC) and subsequent Development of Cognitive and Psychosocial Competences in learner (DCPSCCL). This could have a theoretical implication in the development of training programs in teacher's education in Cameroon where epistemology is not taught and a practical implication on developing both cognitive and psychosocial competences in learners if the TCAKT → TBPSHV → CONST → DSCC → DCPSC path is reinforced as revealed by our hypothesized model.

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Annex 1: Questionnaire Teachers' Conception of ARH

Directions:

The goal of this questionnaire is to enable us improve upon the teaching and learning of Adolescent Reproductive Health Education. There is no right or wrong answer for the following items. We only want to know what you really believe. For each statement in sections A, B, C and D, indicate the degree to which you agree or disagree with each statement.

SD = Strongly Disagree, D = Disagree, N = No Opinion, A = Agree, SA = Strongly Agree

A. CONCEPTION OF ADOLESCENT REPRODUCTIVE HEALTH

Statements	SD	D	N	A	SA
A1. The state of health is a biological fact and norm					
A2. The state of health is socially constructed resulting from historical, social and cultural influences that have shaped perceptions of health and ill health					
A3. Ill health is caused by biological factors such as viruses, bacteria, genetic characteristic or trauma.					
A4. The root causes for diseases and ill health are to be found in psychosocial factors, such as the way society is organised and structured.					
A5. Knowledge on Sexuality is not exclusive but has a historical, social and cultural context.					
A6. In human reproductive health, medical attention should be centred more diseases, and not on persons and population					
A7. Power should be given to person/ populations for their healthy decision making rather than to health professionals who have the knowledge to heal patients.					
A8. Patients do not need have to have high level of health literacy to be able to make well-informed choices because health officials guide the healing process.					
A9. Emphasis on behaviour change towards healthy lifestyles should be in order to avoid diseases rather than to improve / promote health					

B. EPISTEMOLOGICAL CONCEPTION OF ARH

Statements	SD	D	N	A	SA
B1. One's ability to acquire knowledge, skills and attitudes on ARH is fixed at birth and one can make oneself smarter.					
B2. How much cognitive and psychosocial skill one gets from learning ARH depends mostly on one's effort put in during class activities					
B3. Sometimes I do not believe the scientific facts in textbooks written by authorities.					
B4. Advice from teachers / experts on reproductive health should often be questioned before applying them.					
B5. Some children are born incapable of learning well in certain					

subjects like sciences					
B6. Acquisition of assertive skills, decision making, and self esteems to reduce sexual risk takes a lot of efforts and practice.					
B7. Expert knowledge on sexuality are influences by their scientific, socio-cultural, and religious background					
B8. Scientific knowledge on sexuality is certain and does not change					
B9. Once scientists have a result from an experiment on human sexuality, that is the only answer.					
B10. One's innate / inborn ability limits his/her cognitive & psychosocial skills in ARH					
B11. If you read something in a science or Biology textbook on ARH, one can be sure it's true.					
B12. Scientists pretty much know everything about human sexuality; there is not much more to know.					
B13. The ideas about ARH in Biology textbooks sometimes change.					
B14. New discoveries can change what Biologist think is true about ARH.					
B15. Some ideas in ARH today are different than what scientists used to think.					
B16. Everybody has to believe what scientists say about sexuality.					
B17. Students who begin school with "average" cognitive and psychosocial competences remain "average" throughout school.					
B19. Good ideas in ARH can come from anybody, not just from scientists.					
B20. If a person tries too hard to understand a problem, he/she will most likely just end up being confused.					
B21. The only thing that is certain is uncertainty itself.					
B22. You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic.					

C. CONCEPTION OF TEACHING AND LEARNING ARH

Statements	SD	D	N	A	SA
C1. "ARH teaching is the transfer of knowledge from expert or teacher to student and learning is the absorption of this knowledge"					
C2. Good teachers always encourage students to think for answers to daily life sexuality problems themselves.					
C3. "Learning is the creation and acquisition of knowledge by the learner through reasoning, and teaching is a provision and facilitation of the learning process".					
C4. The lecture method for teaching ARH is best because it covers more information / knowledge.					
C5. Teaching is to provide students with accurate scientific and psychosocial knowledge on ARH rather than encourage them to discover it.					
C6. The focus of teaching is to help students construct knowledge from their learning experience instead of knowledge communication.					
C7. Effective teaching of ARH requires giving students the desired information according to the laid down pedagogic objectives in the curriculum.					

C8. Effective teaching of ARH requires let student express themselves so as to identifying student's misconceptions and setting objective –obstacles to overcome them.					
C9. Learning means students are offered opportunities to explore values, attitudes and norms in relation to sexual behaviour, risk taking and decision making.					
C10. Students learn as a result of socio-cognitive conflict generated during group discussion, peer interaction and debates during ARH lessons.					
C11. Teaching ARH is simply telling, presenting or explaining the subject matter by breaking down complex ideas into its constituent parts.					
C12. Learning means remembering what the teacher has taught.					
C13. The best way for students to understand technical terms or concepts in ARH to remember the textbook definition.					
C14. Learning occurs as student consciously and explicitly link their new knowledge on ARH to their prior knowledge and daily experiences.					
C15. I tend to remember things best if I concentrate on the order in which textbook presented them					
C16. While I am studying, I often think of real life situations to which the material I'm learning would be useful					
C17. Learning ARH means getting high scores on examinations.					
C18. Learning science means learning how to apply knowledge and skills I already know to solve unknown problems.					
C19. Learning ARH means changing my way of viewing sexual interaction and related issues.					

D. TEACHERS' CONTEMPORARY DIDACTIC STRATEGY FOR CONCEPTUAL CHANGE

“Which degree of interest will you give as a teacher to the following didactic strategy in teaching ARH

STATEMENT	Low interest	Moderate interest	High interest	Very high interest
D1. Teaching students healthy sex behaviours in a participatory way to enable them find solutions to difficult problems they face by themselves				
D2. Establishment of links between students' daily experiences and science				
D3. Establishment of links between a notion in sexuality and that of another discipline, to the resolution of problems				
D4. Organising group discussion and debates to Improve students' argumentation ability to construct new cognitive & social competences				
D5. Teach how to use interdisciplinary approach to resolve complex life problems on sexuality				
D6. Identify students' ideas that act as obstacles and develop appropriate objective-obstacles to overcome them.				

D7. Construct problem situations around overcoming an objective-obstacle identified as a conceptual difficulty characteristic of students.				
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E. DEVELOPING STUDENTS' COGNITIVE AND PSYCHOSOCIAL COMPETENCES

“Which degree of interest will you give as a teacher to the following approach to develop competences in learners?”

STATEMENT	Low interest	Moderate interest	High interest	Very high interest
E1. Teaching of the idea of not submitting to peer pressure.				
E2. Teaching to learn to accept different opinion of others.				
E3. Teaching the right to self-defence and to defend ones point of view.				
E4. Teaching critical thinking skills to analyse difficult situations./problems				
E5. Listening and respecting the different point of views of others				
E6. Teaching how to make informed decision when faced with a complex problem after scientific, moral, legal, socio-cultural & ethical considerations.				
E7. Teaching how to develop self esteems in learners				

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