



Challenges Faced by Physics Teachers During the Implementation of Competency-Based Curriculum in Rwanda

Peter Gapfizi, Ephrem Shaban Mbarute, Liberatha Masengesho, Prof. Jean Uwamahoro

University of Rwanda College of Education (UR-CE), African Centre of Excellence for Innovative Teaching and Learning Mathematics and Science (ACEITLMS)

Department of Mathematics, Science and Physical Education, University of Rwanda-College of Education
(UR-CE)

Email: petergapfizi13@gmail.com/ mbaruteephremshaban@gmail.com

Abstract: In 2015, Rwanda changed the Education system from a knowledge-based curriculum to a competency-based curriculum. This study aimed to analyze the challenges faced by physics teachers during the implementation of the competence-based curriculum. It was a quantitative research design. Questionnaires were used to collect data. 25 physics teachers have purposefully sampled in the Ngoma district located in the eastern province of Rwanda. Data were analyzed in terms of percentage using SPSS version 20. The findings of this study have shown that physics teachers encountered several challenges. 60% of the participants agreed that the calendar and wide the curriculum are a challenge for them to care about the learners' problems, 56% of the participants did not have official training on CBC, 60% of the participants agreed that the number of the students in a classroom did not allow them to use group discussion in their teaching and learning process, 56% of the participants have said that textbooks and other teaching materials are not enough available for learners to make research on their own. The researcher recommended the Ministry of Education in Rwanda, the Rwanda Education Board (REB), and other educational partners that they must find a solution to reducing the number of students, train newly employed teachers, and look for enough teaching materials for the successful implementation of Competence- Based Curriculum.

Keywords: Challenges, Competence-Based Curriculum, Physics, Curriculum, Teachers, Rwanda

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1.Introduction

Education has been known as the key to any given country's development. The education reforms have brought different changes. In the 21st Century, the number of workers on the market is a crucial problem, but the workforce quality is still a challenge. Selecting information of the greatest calibre and effectively using it in the classroom is now the new challenge. As a result, a curriculum, which is a tool used by educational systems to assist their citizens in acquiring desirable knowledge,

skills, values, and attitudes, must strive to move beyond the rigidity of traditional syllabi or written plans and concentrate on giving students the skills they need to acquire, develop, and apply knowledge, values, and attitudes that should result in the use of skills (Mulenga *et la*, 2019).

Therefore, this led many countries to change their educational curricula. An education curriculum that aimed to identify the unique potential intellectual, emotional, and physical capacity of learners to have a successful life is known as a Competency-based curriculum (Moon, 2007).

The competency-based curriculum was desired to engage the learners in the teaching and learning process to develop creativity and innovation in the students. In the USA, CBC aimed to help learners with low performance and poor teaching methodologies and aimed to train the teachers in a way that assists teachers to help learners to develop competencies (Ruth & Ramadas, 2019).

In Rwanda, CBC was intended with cross-cutting issues such as cultural education, Genocide study, gender balance, peace and values, sexuality, and so on as published by REB in 2015 and cited by Nsengimana (2021). After six years of implementing CBC, it is important to evaluate the situation to know the challenges secondary physics teachers face during the implementation of CBC in the teaching and learning process. This paper aimed at analyzing of challenges faced by physics teachers during the implementation of CBC. It focused on answering the following questions:

- 1) What are the challenges faced by physics teachers during the implementation of CBC?
- 2) What can be the solution to overcome these challenges for CBC to be successfully implemented by physics teachers?

2. Literature Review

Competency-Based Curricula have been commonly implemented in developed countries such as the USA, United Kingdom, France, Germany, and Netherland but also recent years, it has been implemented in developing countries like Tanzania, Rwanda, Mozambique, Zambia and Ethiopia (Mulenga *et al.*, 2019). The increased acknowledgement of the necessity for the development of skills rather than just gaining qualifications has led to a focus on competency-based education. Capabilities are seen as a prerequisite for employability as well as a link between education and the labour market (Wesselink *et al.*, 2007).

Desirable capabilities (knowledge, skills, and attitudes) eventually serve as the foundation for the construction of a competency-based curriculum. Learner-Centre constructivist methods of teaching and learning characterize today's competency-based education programs (Mulenga *et al.*, 2019). Therefore, Constructivism is based on the belief that knowledge and skills are not things that can be transferred from instructor to learner, but rather the result of learners' learning activities, whether done individually or in groups (Wesselink *et al.*, 2007).

Competence-based education is currently criticized for emphasising self-control, problem-solving, project-based learning, portfolio construction, and assessment. Knowledge needs to be prioritized more (Mulder, 2012).

In Tanzania, the study done by Kafyulilo *et al.* (2013) shown when the pre-service teachers were asked to name at least one of the characteristics/features of competency-based teaching approaches. The majority of them were unable to identify the right qualities of competency-based teaching techniques. Instead, they ended up outlining solely the components of competency-based teaching techniques. He concluded that in the questionnaires given to the participants indicated that most of them were aware of competency-based learning. But during the interview, most of them fail even to explain the term competency.

Sifuna and Obonyo's (2019) study looked at the issues preventing the successful implementation of CBC in Kenya. It was determined that the Curriculum was not prepared and implemented methodically. Teachers received truly little training about the curriculum material and instructional strategies. Additionally, it emphasized that parents and other important stakeholders did not participate in the curriculum reform process and that instructional materials were inadequate. The report advised the Ministry of Education to provide a suitable framework for teacher training, educate parents, and offer suitable teaching resources.

However, the research done in Tanzania by Makunja (2016) shows that Tanzania adopted CBC in secondary schools in 2005. Acceptance of the CBC in Tanzania was followed by its implementation. Generally, because many schools and universities offered programs with unclear objectives regarding what the students were being trained to do or be, the competence-based education movement was born out of dissatisfaction with post-secondary education programs (Wesselink *et al.*, 2007).

This study aimed to identify the opportunities and challenges related to the CBC implementation in Rwanda. It is guided by the curriculum implementation theory developed by Gross, Giacquinta and Bernstein (1971). According to this theory, characteristics like teacher awareness and attitudes must be considered for any educational program to be implemented successfully.

The idea also suggested that when teachers are unaware of curriculum changes, the implementation may not be sufficient and effective. Additionally, teachers might adopt favourable views regarding the curriculum and its improvements, which would help with its implementation.

3. Methodology

This study adopted to use a descriptive research design which adopted the quantitative methods to assess the challenges faced by physics teachers during the implementation of the Competency-Based Curriculum in Rwanda. The purposive sampling technique was used to select 25 physics teachers involved in the study. 17 physics teachers were randomly selected from 12 years basic schools (day schools) and the remaining 8 physics

teachers were also randomly selected from boarding schools in the Ngoma district.

The process of choosing cases from a list of all (or most) cases within the sample universe population using a random selection procedure is known as random sampling. Purposive sampling strategies are used to ensure that a specific category of cases within the total population is represented in the study's final sample.

The questionnaires were used to collect the data from the participants. However, since piloting is an important part of the study, The questionnaires were first distributed to other physics teachers to ensure that the addressed questions are reliable and valid and meet the objectives of the study(Rattray & Jones, 2007). One professional physics instructor from the University of Rwanda's College of Education backed up the validity of the tools utilized for the study. An instrument must measure what it was meant to measure to be legitimate.

The data collected were organized in Excel format and imported into statistical packages for social sciences (SPSS 20) for analysis procedure. The data have been analyzed using descriptive statistics, using frequency distribution and percentages where applicable after allocating data throughout the coding process with an identifying number. One of the primary goals of descriptive statistics is to characterize the primary research structures, sometimes using graphical analysis.

Ethical consideration

Ethical issues were taken into consideration since before the data collection process, I got an ethical clearance form

from the University of Rwanda- College of Education and permission to start the process was given by the Mayor of Ngoma district. The participation of the teachers was voluntary because they had been explained the purpose of the study by the researcher and that the data given are for academic purposes only after understanding the purpose of the study, the participants signed the consent form voluntarily.

All participants were promised that there are no hazards connected with this study and that they are free to engage in the research or not as they like at any time without facing any consequences. Data collected were used for research purposes only and not for commercial purposes, identification of participants was not indicated during the data collection process; data collected were secured

4.Results and Discussion

The purpose of this study was to examine the challenges that physics teachers in secondary schools encountered while implementing a competency-based curriculum. The collected data were analyzed using percentages. During data collection, participants were asked to choose between strongly disagree, disagree, agree, Neutral, and strongly agree, and in some questions, they were asked to answer Yes, No, or Maybe.

The coding process was used to make it easier to analyze in SPSS version 20. Strongly disagree=1, Strongly agree=2, Disagree=3, Agree=4, and Neutral=5 However, in some questions where there was no strong agreement, I coded Strongly disagree=1, Disagree=2, agree=3, Neutral=4, and yes=1, No=2, and maybe=3.

Table 1: Level of your education

Education level	Frequency	Percentage
A1 in physics with education	8	32
Bachelor's Degree in physics with education	15	60
Bachelor of physics with no education background	2	8
Total	25	100

Note: A1 = 2 years of university education

Table 1 above shows the total number of physics teachers who participated in this study and it indicates their level of Education background. Total physics teachers who participated were 25, the physics teachers with A₁ in

Physics with Education were 8(32%), the physics teachers with bachelor's degree in physics with Education were 15(60%), and the physics teachers with bachelor's degree in physics without Education were 2 (8%).

Table 2: Teaching experience

Experience	Frequency	Percentage (%)
1year	1	4
2years	4	16
3years	3	12
4years	4	16
5years	2	8
More than five years	11	44
total	25	100

From table 2, it is shown that one physics teacher has 1 year of teaching, 4 teachers have 2 years of teaching, 3 teachers have 3 years of teaching, 4 teachers have 4 years of teaching, 2 teachers have 5 years of teaching, and 11 teachers have more than 5 years of teaching. This has indicated that most 14 of the participants did not have official training in the competence-based curriculum.

Some teachers have also commented that they did not get in-service training about the competence-based curriculum. The research done by Niyitanga et al (2021), has shown that teachers met with the challenge of using laboratory types of equipment due to a lack of training about the use of laboratory equipment

Table 3: Due to the length of the school calendar and the wide of the physics content, Teachers do not have enough time to discuss with learners to their questions

Statement	Frequency	Percentage (%)
Strongly disagree	3	12
Strongly agree	6	24
Disagree	1	4
Agree	10	40
Neutral	5	20
Total	25	100

From the above table, 3(12%) strongly disagreed, 6(24%) strongly agreed, 1(4%) has disagree, 10(40%) agreed and 5(20%) were Neutral. This indicated that above 60% of the sample have shown that the school calendar and wide curriculum had made them not care about the learners.

Some commended that once you compare the calendar and, the length of each unit and the whole content, there is space to discuss with students about their problems and to find the solution.

Table 4: Competence-based curriculum requires teachers to use group discussion during the teaching process. Due to the number of learners in the your classroom, it is not easy.

Statement	Frequency	Percentage (%)
Strongly Disagree	2	8
Disagree	6	24
Agree	15	60
Neutral	2	8
Total	25	100

From table 4 it was shown that 2 (8%) strongly disagreed, 6(24%) have disagree, 15(60%) have agree, and 2(8%) were Neutral. This means that 60% per cent of the sample claimed that because of the number of students in the classroom, it is not easy to use group discussions in their

teaching and learning process. Some also said that because of the large number of students, classroom management became a big challenge for teachers once they decide to use group discussion.

Table 5: Books and other instructional materials are available for all learners to do research after classroom hours

Statement	Frequency	Percentage (%)
Yes	6	24
No	14	56
Maybe	5	20
Total	25	100

From table 5, 6 teachers equivalent to 24% have said yes, 14 teachers equivalent to 56% have said no and 5 teachers equivalent to 20% have said maybe. A researcher discovered that only 242 of Rwanda's 1502 secondary schools have a laboratory and library with enough books (Ndiokubwayo, 2017).

5. Conclusion and Recommendations

5.1 Conclusion

Based on the research findings, the study concluded that during the implementation of a competence-based curriculum (CBC) in Rwanda, Physics teachers are challenged by the length of the content to be taught and the calendar which makes them not ensure that the students have gained the expected outcome of the curriculum, the larger size of the students in the classroom is still a challenge that teachers found not easy to form groups discussion that achieves the learning outcomes, lack of enough textbooks and other instructional materials that facilitate the learners to engage in active learning. Another challenge is prior knowledge of the students: Most teachers have indicated that they meet with the challenge that students come to class without prior knowledge about some of the physics concepts. This became a big challenge during the implementation of CBC.

5.2 Recommendations

Recommendation to the educational leaders

This study recommends that the Rwanda Education Board, Ministry of Education, and other educational leaders should construct more classrooms and employ more teachers to enhance the standard of students-qualified teacher ratio. This will reduce the concentration of the number of learners in the classroom since from the data analysis, it is seen that there is still a problem of many students per classroom. This may enable teachers and students during active teaching and learning, learners will enjoy group discussion but also easy for teachers to manage the class.

MINEDUC, REB, and other educational partners should fund the teaching and learning materials such as enough textbooks and other laboratory equipment to ensure that the students are enjoying the library and conduct experiments in laboratories to develop their skills, altitude, and values in the field of the science especially physics subject concepts. Doing this may allow teachers to play more effective roles in curriculum development and, eventually, implementation and society will benefit more from a competency-based curriculum.

During this study, the researcher has seen that more than 50% of the participants were having teaching experience

which is less than five years. This indicates that more than 50% of the sample had not attended the official training of competence-based curriculum and therefore, creating a barrier to the effectiveness of the implementation of CBC. The researcher, therefore, recommends the Ministry of Education and Rwanda Education Board (REB) have consistent training.

Recommendation to future researchers

The current study considered the challenges faced by physics teachers that led them not successfully implement the competence-based curriculum. These challenges may lead to the poor implementation of CBC mostly in science subjects, especially physics.

Therefore, we are suggesting that future investigators must continue in the same field to investigate the more challenges that hinder the effectiveness of the implementation of a competence-based curriculum and suggestions on their solutions.

Declaration of Interest

The Authors declare that this research was for academic purposes and there is no financial interest or any other personal profits that have influenced the work of the article.

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