# Rural secondary school teachers' perceptions of the implementation of Biology revised curriculum (2015-2022) in Onathinge circuit, Oshikoto region, Namibia

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***Abstract***
*This descriptive study was aimed at investigating rural secondary school teachers' perceptions of the implementation of Biology revised curriculum (2015–2022) in Onathinge circuit, Oshikoto region, Namibia. The study adopted a qualitative approach in which three secondary schools, three principals and six Grade 8–12 Biology teachers were purposively sampled in Onathinge circuit to participate in the study. Results indicated that inadequate training and support, lack of instructional materials and overcrowded classrooms were some of the challenges Biology teachers experienced in the implementation of the revised Biology curriculum. The study recommended that teachers needed support and monitoring if they were to implement the revised Biology curriculum effectively. In addition, adequate training and resources needed to be availed and verified for effectiveness before implementation takes place before implementation takes place.*

**Keywords:** *revised Biology curriculum; challenges; rural secondary schools; curriculum implementation; content knowledge*

## Introduction

In Namibia, a second revised primary and secondary school curriculum was introduced in 2015. As a major subject in science studies, Biology has been included as an important subject in the basic education curriculum to be studied in secondary school learners. However, like many other sciences curricular, Biology curriculum implementation is compounded by a number of impeding factors which curriculum implementers or educators should take note of. Since, it is one of the poorly performed subjects in Oshikoto region which registered below 60% pass rates in both junior and ordinary level public examinations for the years 2016 - 2018. In most cases, the practical paper is not well performed compared to papers 1 and 2. Teachers are qualified or trained to teach Biology at the higher level but the results are not reflecting it since the 2017 to 2018 national Higher Level results for the region fell below 50% pass rate. Higher Level Biology Paper 3 requires a high demand of critical thinking, but the learners end up showing poor interpretation of instructions as commented in the Biology Paper 3 Examiners' Reports 2016 - 2018. In this study, the researcher focused on the implementation of the new Biology curriculum in rural secondary schools in Oshikoto region in Namibia from 2015 to 2022.

## Background to study

According to Fullan (2001), implementing an innovation is an overwhelming undertaking because it involves changes in multiple dimensions including materials, teaching approaches and beliefs. Among these, changes in beliefs are most important and also most difficult to achieve. Further, Fullan (2001) pointed out that "changes in beliefs and understanding are the foundation of achieving lasting reform" (p. 45). Without the changes in beliefs, changes in practice may be cosmetic and superficial, and thus reform may be fragile and transient (Cuba, 1990). The importance of changes in beliefs of implementers has also been recognized by many other researchers (Ding, 2006; Spillane, Reiser, & Reimer, 2002; Xu, 2003).

In recognising the importance that Biology as a subject plays in fulfilling Vision 2030, from 2012 the Ministry of Education made Biology an important subject to be studied at secondary school level (Grade 8-12) for the development of science and technology (Ministry of Education, 2010). The Ministry of Education believes that Biology would assist students to pursue human development studies like forensic sciences, medical sciences, and also have a more understanding of the living organisms / species in their natural environment. However, it seems that most schools have challenges in implementing the

subject. Ministry of Education, Arts and Culture (2018) stated that enrolment for fields of science in local universities were very low compared to other fields because high school graduates failed to meet the requirements.

Ponte (1994) in her study of curriculum reform of the Education system in Portugal reported that teachers believed that the new curriculum would bring significant improvements for sciences learning, but during the implementation of the new curriculum, the same teachers felt overwhelmed with work and were not well prepared to successfully implement the reforms. In a related case on implementation of a new curriculum in Nigeria, Bandele & Faremi (2012) reported that teachers and instructors reported some of the challenges they faced. These included unstable government policy, lack of standardized workshop practical work, lack of in-service training for teachers, out-dated equipment and lack of related modern instructional material. To further elucidate on challenges that teachers face on implementation of mandatory curricula, Sidiropoulous (2008) also reports in her study that teachers in South Africa experienced the following challenges: lack of textbooks, big class sizes, inadequate resources, and unmotivated learners that do not do well in Mathematics when it is mandatory.

Implementation difficulties of new curricula are recorded extensively in literature. Sidiropolous (2008, p. 46) states that "in developing countries it is often the case that shortage of resources, both material and in terms of human capacity, affect the implementation pathway of curricula as intended". It is possible that Biology teachers in Namibia too may lack motivation, skills and learning equipment to assist Biology learners. From the researcher's experience as a secondary school teacher, she has seen many school teachers struggling to implement the changes in curriculum. Only when teachers' perceptions of the challenges affecting implementation are identified can the Ministry of Education realize success of the Science curriculum innovation. To the best of the researcher's knowledge, no study has specifically been carried out in Namibia related to teachers' perceptions on the implementation of Biology curriculum 2015-2022 in rural secondary schools. Given this background, the researcher has decided to conduct this study to find out the teachers' perceptions of the implementation of Biology curriculum in the rural secondary schools in Onathinge circuit, Oshikoto region in Namibia.

## Research questions

### *Main research question*

The major question to be addressed by the study was, "How is the implementation of the revised Biology curriculum 2015 to 2022 perceived by teachers in rural secondary schools in Onathinge circuit, Oshikoto region?"

### *Sub-questions*

The above question was further sub-divided into the following questions:

1. How is the Biology curriculum implemented in rural secondary schools of Onathinge circuit in Namibia?
2. What are the factors that influence the implementation of Biology curriculum 2015-2022?
3. What challenges are encountered by Biology teachers in the implementation of Biology curriculum 2015-2022?
4. How can the implementation of the Biology curriculum 2015-2022 be improved?

## Theoretical framework

This study was based on the theory of curriculum implementation (Rogan & Grayson, 2003). Regan and Grayson (2003) state that although research has already affirmed the various factors compounding the complexity of curriculum delivery, a focus on the "what" of desired educational change, neglecting the "how", and a lack of clearly thought-out implementation strategies have brought out failures of well-intentioned, well-designed curriculum reform programs, especially in the developing countries. Implementing a curriculum change involves three distinct steps namely: initiation, implementation and reutilization (Waugh & Godfrey, 1995). The authors further state that in most planned changes that occur the focus is almost exclusively placed on formulation of policy (initiation phase) and the implementation phase is hurried in order to get to the reutilization stage. It was therefore this neglect in the implementation stage that led to Rogan and Grayson (2003) coming up with the theory of curriculum implementation. The theory uses three constructs that form the heart of curriculum implementation, namely: profile of implementation, capacity to innovate and

outside support. These three constructs can all be measured by means of indicators and are broad enough to include related factors, or sub-constructs such as the nature of classroom interaction, physical resources and additional opportunities for teacher learning about the subject matter about the overall reform ideas.

## Literature review

### *Curriculum implementation*

Obilo (2010) defines curriculum implementation as the act of translating the curriculum document into action in the classroom by the teacher. He adds that concluding any issue on curriculum implementation without mentioning the teacher will be like one going for a cry and leaving his/her eyes behind. This means that curriculum implementation is the arduous work of the teacher. Ogwu (2012) notes that curriculum implementation refers to what actually happens in practice as compared to what was supposed to happen. This includes the provision of organised assistance to staff in order to ensure that the newly developed curriculum and the instructional strategies are actually delivered at the classroom level. This ropes in the teachers again, meaning to say the absence of the teacher makes curriculum implementation a non-event. In the same vein, Mitchell (2011) views implementation of a curriculum as a specified set of planned and intentional activities designed to integrate evidence-based practices into real-world settings. Mitchell (2011) further claims that approaches, practices and interventions delivered in real-world school and classroom often look different from what was originally intended. A possible reason for such a difference may be that principals and teachers may decide to adopt elements of a programme, but barriers in the school system may prevent them from fully realising their intended results.

Lewy (1990) views curriculum implementation as a process and not an event. He claims that feasibility studies need to be made in the early stages of the curriculum change process by asking whether the new curriculum will offer significant benefits and whether it can be implemented successfully. Ornstein and Hunkins (2009) indicated that educational authorities should consider the critical factor of how different the new curriculum is from the existing curriculum with which teachers are familiar. This is supported by Hasan (2007) who observes that in many cases of unsuccessful curriculum change, the key factor is the level of difficulty they present to teachers. Of the same opinion is Pinar (2005, p. 73) who notes that in some contexts, education systems suffer from "initiative overload", whereby teachers may be weary as a result of constant change and morale maybe low. The current study sought to establish the challenges faced by teachers during curriculum change and identify potential problems in the implementation of the Biology 2015-2022 curriculum in Namibia.

Chan (2010, p. 98) suggests that curricula developers should carry out "laboratory try-outs" whereby, elements of the curriculum may be tested with individuals or small groups. In this case, responses of learners are observed through their diverse characteristics and modifications to the curriculum materials may be suggested. Thus, pilot testing tries to highlight the possible challenges teachers or implementers are likely to experience hence modifications can be made before the actual implementation of a new curriculum. Where pilot testing is absent challenges are likely to be encountered. This study sought to establish whether there was effective pilot testing of new Namibian Biology school curriculum.

### *Curriculum implementers*

Related literature presents the principal and the teacher as the two major players in curriculum implementation. Kobola (2007) claims that it is a must that the principal knows how to manage and lead the process of curriculum implementation. He adds that the principal should ensure that he/she has the necessary policy documents, circulars and guidelines at hand. He/she should study these documents and internalise all the fundamentals of the curriculum changes. Kobola concurs with Briggs and Sommefeldt (2002) who argue that change means that the principal must work through the following phases with his/her staff: diagnosing the problem, planning for change, implementing the change and reviewing developments. Working as a team with the staff would ensure that those who are affected by the implementation of change are involved from the beginning in the planning. Whoever makes the final decision, the staff must feel that they were consulted as a group as well as individuals and that their opinions had some influence on the final decision. The above is supported by Chan (2010) who claims that the principal is responsible for curriculum implementation and for determining the most effective ways of providing organised

assistance and monitoring the level of implementation. Whether school principals in Namibia were providing the needed assistance and monitoring of the implementation of the Biology curriculum 2015-2022 is what the study would like to establish.

While the state often dictates the skills covered by the curriculum, a teacher provides insights into the types of materials, activities and specific skills that need to be included (Wallace & Fleit, 2005). Teachers from different grade levels may collaborate to identify skills students need at each level in curriculum implementation and ensure that the curriculum adequately prepares students to advance to the next grade. Educational policy makers and curriculum planners need to recognise that teachers interpret, filter, modify and implement the curriculum depending on their beliefs and the context in which the curriculum innovation is being implemented (Borg, 2006). This implies that teachers' beliefs and their implementation contexts need consideration by educational policy makers and curriculum planners. Posner (2004) argues that the curriculum in use is related to how teachers interpret and put the official curriculum into operation.

***Implementing new curriculum***

Lambart, Velez, and Elliot (2014) outline what educators need to consider when implementing a new curriculum. Teachers are expected to interpret the curriculum objectives and determine the methods for achieving them. A study carried out by Huntley (2008) on beginning teachers' conception of competence found that they placed importance on their ability to interpret the curriculum document. Another task to be considered by educators is the selection of instructional materials. Huntley (2008) believes that teachers' pedagogical knowledge has also been found to be of help in selecting teaching strategies and learning experiences that engage students in all aspects of classroom tasks. Also, educators are expected to organise classrooms into a second teacher by making sure the classrooms are welcoming and friendly. Igbokwe (2009) states that classroom decisions are greatly determined by the personal beliefs and values of the teacher and his feelings towards the students. In addition, teachers should ensure active participation of students when implementing a new curriculum. To make learning effective, teaching must involve the active and meaningful participation of learners, "provoke and guide their thinking, stimulate their imagination and finally effect transfer of knowledge" (Azikiwe, 1994, p. 182).

***Teachers' perceptions towards curriculum reform***

Research carried out by Nzekwe (2013) revealed that many teachers seem to be confused and lack understanding of what curriculum reform in science subjects is. This concurs with the findings of Wallace and Fleit (2005) who noted that teachers and administrators are faced with the degree to which they choose to accept or reject change. Such perceptions may arise as a result of lack of clarity concerning innovation skills and knowledge, as well as lack of the required instructional materials on the part of the principals and teachers. Lyman (2005) carried out a research in which he concluded that the reality of teachers' resistance to change had led to a huge amount of literature dealing with understanding of the curriculum reform environment and the development of the best strategies to achieve curriculum change. In Namibia, Ottervanger (2016) reported that teachers were still struggling with the sudden change of policies and approaches in the curriculum, and were still facing the challenges.

***Challenges in teaching Biology***

Related literature reveals a lot of challenges that teachers are likely to face when teaching Biology. Shalala (1990) argues that most Biology teachers scramble to incorporate new topics and illustrations into their courses to keep them current and lively. This is reflected in a study carried out by Raizen (1991) where he revealed that there is rapid generation of new knowledge in the field of Biology. Medium of instruction is also cited as one of the challenges in Biology teaching. Ludi (1980) argues that someone's first language is crucial in setting up the basis for lifelong learning. However, the Namibian Constitution article 3 of 1990 states that English shall be the official language of instruction in all public schools and government offices. The 2015-2022 revised Biology curriculum in Namibia is taught in English.

Like many other African countries, Namibia faces an acute shortage of qualified teachers. Tabaundule (2014) revealed that Namibia had over 24 660 teachers of which 1 208 were without teaching qualifications while 3 000 were under qualified. The

introduction of the new curriculum forced the under-qualified group to increase because teachers teaching the new curriculum had been trained to teach the old curriculum. Overcrowded classrooms are also a cause of concern in many African countries. Uugwanga (1998) observed that large classes impede the quality of teaching in most Namibian schools.

**Research methodology**

A qualitative research paradigm was preferred in this study. Qualitative research uses naturalistic paradigms that help to understand phenomena in context – specific settings such as "real world setting where the researcher does not attempt to manipulate the phenomenon of interest" (Paxton, 2001, p. 27). To develop information that is accurate and interpretable, the researcher adopted a case study. The target population in this study consisted of six Grade 8–12 Biology teachers from three rural schools in Onathinge circuit and three principals from the three schools. The participants were pseudo named T1 up to T6 for teachers and P1 up to P3 for principals for anonymity and confidentiality. The researcher used purposive sampling to select the participants. The researcher administered open–ended questionnaires to collect data from the teachers, and semi–structured interviews were conducted with the principal participants. Permission and consent to participate in the study was sought and ethical principles of confidentiality and anonymity were adhered to (Marshall & Rosman, 2011). The data gathered were analysed by working from the particular to generalised perspectives through segmentation, codes, categories and themes (Creswell, 2014).

**Findings**

Data constructed during in-depth semi-structured interviews and open-ended questionnaires are presented in this section. Analysis of data was done thematically which indicates a shift from reporting facts to making interpretations of people and activities (Creswell, 2008; Chireshe, 2008). The researcher sorted out the data into themes, and as such was able to distinguish what was relevant from what was not.

***Implementation of the Biology curriculum 2015–2022***

Teacher participants were asked to explain how they implemented the new Biology curriculum at senior secondary school level. All teacher participants indicated that they implemented according to syllabus guidelines. T1stated:

*"I draw my aims and objectives from the topics and competences laid out in the syllabus. I then find suitable methods to achieve the objectives and appropriate teaching aids. I always set questions or tasks to assess how far my learners have understood".*

A similar response was presented by T2 with the following additions:

*"I often use group work or presentations made by learners to make my teaching as learner centred as possible. We are no longer allowed to lecture to them except demonstrations where presentations are not clear".*

Responses from teacher participants were mainly based on how they were teaching the new Biology curriculum according to the new approaches they were trained to use. Only T5 said, *"I was not been trained for the new curriculum and I rely on the methods I was using for the old curriculum"*. Principal participants were also asked to explain how their schools were implementing the new Biology curriculum. All principals replied that they were only playing supervisory roles to ensure that learners were taught but the actual implementation was done by the subject teachers. However, P1 intimated:

*"I am not a Biology teacher. During training for new curriculum, we did not look at individual subjects as such. We were trained on how to observe lessons for the new curriculum, how to support teachers in terms resources and to ensure that the new curriculum is successfully implemented".*

***Factors influencing the implementation of the new Biology curriculum***

When asked about factors that influenced the implementation of the Biology curriculum, all teachers were of the view that content knowledge topped the list. T6 stated that teachers who did not do Higher Level at Grade 12 were the most affected since there was very little Ordinary Level content in the new curriculum. T2 said:

*"Most of us will have to go back to school to redo Biology. At high school and at university, I never came across most of the topics I am*

*teaching now. The problem is that I did Ordinary Level at school and not Higher Level. I also trained to teach Grade 4 – 7, but because of shortage of teachers I was asked to teach up to senior secondary".*

Principal participants were also asked to give their own views on factors that influenced the implementation of the new Biology curriculum. The three principal participants cited dedication of teachers as a pre-requisite when implementing a new curriculum. P2 said *"teachers who have their profession at heart did not wait for a curriculum to change, so they upgrade themselves"*. The principal added that good teachers were those who yearned for new knowledge since changes happened on a daily basis. P3 had the following to say:

*"Resources also influenced curriculum implementation in many ways. Denying teachers adequate resources opened loopholes for endless excuses"*.

***Challenges encountered by Biology teachers in implementing the new Biology curriculum***

Answering questions on the challenges faced in implementing the new Biology curriculum, the six teacher participants cited inadequate training, shortage of resources, skills, content knowledge and overcrowded classrooms as their common challenges. T5 indicated:

*"Whilst the new curriculum is a good development, it has brought with it challenges of inadequate teaching and learning resources. How can one teach Biology without adequate teaching media such as textbooks and chemicals for experiments?"*

The same sentiments were raised by T1 when he said:

*"The ministry was not supposed to hurry the implementation of this curriculum. There are no resources to accommodate it. How could they change the curriculum before providing resources? Many schools don't have laboratories for practicals in Physics, Chemistry and Biology."*

Whilst the above participants alluded to the shortage of resources, two teacher participants felt that there was no need to introduce the new curriculum without addressing approach issues. T3 said, *"I see no reason to change my way of teaching. I understood the new approaches during training, but they can only work with a fully equipped laboratory."*

T5 stated that she was not trained on the new curriculum and only pinned her hope on regional workshops to understand the new approaches. Similarly, principal participants welcomed the new curriculum as long overdue. When asked about its impact on teaching and learning, they shared the same sentiments with teacher participants. P1 said that *"complaints from teachers and general observations indicate that they were not happy"*. P2 added that *"changes should have waited till educators felt that they were ready for implementation"*. P3 raised a request brought to her by a Grade 8 Biology teacher as:

*"A teacher brought an empty bottle to me and told me that he wanted to test for starch with his Grade 8 learners, but the bottle was empty. He wanted iodine but the school had no money."*

When asked about the training received, the teacher participants unanimously complained about the duration of training. T6 said that *"we only compared the old and the new syllabuses. I thought we were going to get lectures on new topics and one or two demonstration lessons"*. On the other hand, T1 opined that *"I am mostly challenged by the content knowledge and skills required for the new curriculum".* T4 echoed the same sentiment that *"the training I got did not address content knowledge for many Biology topics".*

When asked about the state of laboratories and how they affected teaching and learning, two teacher participants revealed that they did not have laboratories for Biology. The other four indicated that they had laboratories but they were poorly equipped. T5 said, *"I only saw curriculum documents, but the resources were not sent. The school has no money, so I teach what I can".* Similarly P3 had this to say:

*"We do not have a laboratory but a storeroom where we keep a few items for science subjects. We know the challenges faced by the teachers. Sometimes they spend a week complaining about the same challenges but solutions do not come the way they want"*.

Echoing the same sentiments, P2 said *"teachers are actually facing challenges, but teaching has to go on"*. Major challenges as

revealed by the three principals were inadequate resources and overcrowded classrooms. Teacher participants revealed that they were challenged by support and monitoring of the implementation process. T6 indicated that *"I only see management when they want continuous assessment marks, registers and end of term marks, otherwise I do not see them during classroom activities"*. T6 said that *"the management keeps on telling us to be patient on Biology resources and materials, but learners are about to write national examinations"*. T1 added that *"school management seemed to be ignored by the ministry"*. The principal participants however had their reasons for failing to provide adequate support to Biology teachers. P1 and P3 shared the same sentiment, *"I am not Biology teachers and I cannot help with content knowledge"*. Answering a question on resources and infrastructure, all principals indicated that they were pushing the Ministry to act but could not use force.

***Improving the 2015–2022 Biology implementation***

Ideas were sought from both teacher participants and principal interviewees on how future Biology implementation could be improved. Teacher participants cited teacher training, resources and infrastructure as most critical areas. T2 suggested that *"teachers should be actively involved in the planning and development process of a new curriculum right from the start, so that they can raise their concerns on challenging areas during the process"*. On a different note, T1 said that *"universities should be given chances to retrain or train new teachers before implementation starts so that pioneer students do not suffer"*. T3 made the following contribution, *"planners should first assess if schools are ready to implement the new curriculum to avoid trial and error"*. The participant added that the ministry should test the new curriculum with selected schools first and address challenges before making the implementation compulsory for all schools. Principal participants concurred that challenges they faced needed to be properly documented for consideration when need arose to change the curriculum.

**Conclusion**

The aim of the study was to find out what perceptions Biology teachers had on the implementation of the Biology curriculum (2015–2022) in three rural secondary schools in Onathinge circuit, Oshikoto region in Namibia. One of the findings of the study was that educators were not adequately trained to implement the new curriculum. About training of curriculum implementers, Mulkeem (2010, p. 39) says that "to ensure effective implementation, teachers need to be well trained, highly motivated, dedicated and professionally competent". Judging from the perceptions raised by educators, concerns raised by Mulkeem (2010) were not addressed meaning the implementation of the revised Biology curriculum might not have been successful. The ministry could have waited until educators pronounced their readiness to implement the revised curriculum.

Educators also raised the issue of laboratories that most of the schools did not have. The conclusion reached by this researcher was that Biology practicals could best be carried out in laboratories. Carl (2009) warned that the implemented curriculum may be inhibited by scarcity of resources like infrastructure, physical accommodation and other facilities. The absence of laboratories was an indication that only the educator and the curriculum were expected to change; whereas, all other things remained unchanged. The same was noticed in materials that educators revealed were scarce. During the 2001 curriculum reform in Namibia, Rogan and Grayson (2003) advised that a great deal of time, money and effort might be wasted as good ideas were never translated into classroom reality in Namibia. Even if money was there, the bureaucracy in the procurement of resources and materials for schools seemed to be a thorny issue in Namibia. One can conclude that pioneer students of the revised Biology curriculum might perform poorly while schools waited for the resources and other materials.

In the case of support and monitoring of the revised curriculum, teachers were not happy. They complained of very little help from the school management and advisory officials. Susilana (2013) advised that the school management has to study and identify the best instructional practices and materials to deliver the content. As managers of the curriculum implementation, the management was expected to study the Biology curriculum documents together with the Biology teachers and discuss the best approach and materials needed to make the implementation a success instead of only handing them the documents as and when

they came. One can conclude that if teachers know that their subject implementation is not monitored, they might pretend to implement the subject while very little happens in the classroom.

The conclusion reached by this study was that teachers were implementing the revised Biology curriculum with mixed feelings. These feelings negatively affected their involvement in and commitment to implementing the revised Biology curriculum 2015-2022 in Onathinge circuit. Firstly, Biology teachers were not well provided with instructional materials such as textbooks and laboratory equipment and chemicals. Secondly, teachers lacked opportunities to work through implementation programmes with subject advisors, their principals and peer teachers. Lastly, lack of skills knowledge and content of the new Biology curriculum inhibited their implementation. Based upon these findings, this study makes suggestions for curriculum policy makers as shown below.

**Recommendations**

The main purpose of this study was to explore teachers' perspectives on the implementation of the revised Biology curriculum in Onathinge circuit of Oshikoto region in Namibia. Based on the research findings and data interpretation, a number of recommendations can be made.

To begin with, the research findings showed that Biology teachers were not happy with the support they got from the management teams and resource teachers during implementation of the revised Biology curriculum. In this regard, the researcher recommends that the Ministry of Education should ensure that teachers are supported with a rich and satisfactory teaching environment. This can be achieved by training all stake holders involved on how to provide support and monitoring during curriculum implementation. Any anticipated challenges can be discussed at this stage before implementation in schools. The researcher further recommends that additional funds be made available by the Ministry of Education to cater for training and instructional materials.

The quality and duration of training should be addressed as a matter of urgency. The rushed and inadequate training that teachers had subjected to should be reviewed and replaced with quality continuous training offered by well–trained trainers. Teachers also need to be provided with adequate time to deepen their understanding and develop new school–based approaches to implementation. After intensive training, opportunities should be set for teachers to meet regularly at cluster levels and also at regional levels to discuss problem areas that they experience during implementation.

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