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Teachers' conceptual understanding of inquiry-based approach (IBA) at secondary schools in Tanzania

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ABSTRACT

The purpose of this qualitative study was to explore conceptual understanding of geography teachers of Inquiry-Based Approach (IBA) for teaching Geography subject. The researcher adopted the case study research design, and the study was conducted on eleven geography teachers from four Secondary schools at Morogoro Municipality, Tanzania. The findings indicate a mixed conceptual understanding of the interviewed geography teachers on the meaning of IBA although some of them seems to experience the use IBA features in their teaching. A lesson can be drawn from this study to inform the area of teaching and teachers development in Tanzania. The study recommended that to make the most use of inquiry-based approach of teaching and learning especially in geography subject, teachers must be updated now and then on how to effectively use it in the classroom.

1. Introduction

In recent years there has been a new call worldwide to improve teaching and learning process. The call geared to produce students with appropriate skills relevant with the needs and demands of 21st century [1]. Memorization of facts and information is considered less important because everyday facts keep on changing and information is accessible at the fingertips of students. Skills that enhance students' ability to think critically, examine problems, and gather information, collaboration, communication, curiosity, creativity, and innovation are highly emphasized [2].Teachers' role in this process are facilitators[3]. Teachers choice of relevant approach can promote students understanding of the subject. Since they are being reflective practitioners, can express their views towards their experienced instruction [4]. Inquiry based approach(IBA) of teaching and learning as a pedagogy emerged from constructivism theory that, individuals are able to learn by investigating scenarios and problems, and through social experiences[5]. With the constructivism thoughts ,teachers encouraged their students to conduct investigations that would satisfy their curiosity, help them broaden their knowledge base and develop their skills and mental frames [6]. Inquiring is the state of mind which may be satisfied by numerous learning experiences. It may, for example, be satisfied by exposition from a teacher, or alternatively it may have satisfied by any of the range of learning experiences commonly called discovery learning or problem solving, or creative activity, or laboratory practical [7]. IBA implementation can also be informed by Stripling Model of Inquiry(SMI).The model was initially proposed by Stripling (2008) and consists of six process or stages such as connect to previous knowledge &experience, wonder(question), investigate, construct, express and reflect. This stages can shape the teaching process who choose to adopt IBA in their teaching instructions[8].

The Spirit of Inquiry is alive in any student who makes a remark about wanting to find out. Geography inquiry in this case empowers students to question why the world is the way it is and how people relate to their physical environment. This is because inquiry involves finding an answer to a question or a solution to a problem. Teaching and learning Geography through inquiry does not mean just giving or finding out answers to questions [9], [10]. In order to develop geographical understanding it is important for students to make sense of the information they encounter by making connections of all types, between their existing understanding and new knowledge and between different pieces of information [3]. Making sense is the most important aspect of learning in any discipline. It involves being able to reason and to develop and evaluate arguments. It requires teachers to teach students how to respond to questions geographically, plan an inquiry in terms of gathering information through fieldwork, analyses and interprets information, and arrive at conclusion based on what they have learnt. Teachers are to guide students to do practical activities (map work, exploratory), to create interactive classroom environment where students demonstrate investigative tasks together. These activities aims to help a student to get geographical skills , concepts and perspectives such as using maps to identify spatial relationship of phenomena, use geographical variables to analyze local and global issues [11].

The use of inquiry tool has been popularly used especially in science subjects and observed to improve students' understanding of subjects compared to the traditional methods [12], [13]. However, less study has been done to investigate how this tool is being experienced by teachers in social sciences subjects including geography[14], [15]. There was a need now to research deeply on how this approach is applied in geography subject given the fact that this subject is known to promote curiosity to students [16]. The purpose of this qualitative study was to explore the conceptual understanding of IBA as perceived by Geography teachers in Morogoro, Tanzania. The research question that was used to arrive to the purpose and to guide the data collection process and analysis was how do geography teachers in Morogoro conceptualize IBA?

2. Method

An exploratory case study is conducted when the situation in which the intervention is carried out does not have a visible set of outcomes. This study applied an explorative case study qualitative design to investigate the perceived conceptual understanding of geography teachers on IB, its use for teaching at secondary schools in Morogoro, Tanzania. This design was chosen by the researcher because it is suitable to fully explore the underlying themes that have been generated because of an in-depth interview with the informants followed by classroom observations. Another conviction that this design can give is the possibility of reaching at saturation state of extracting information from the informants [17]. The research flowchart can be seen in Fig 1.

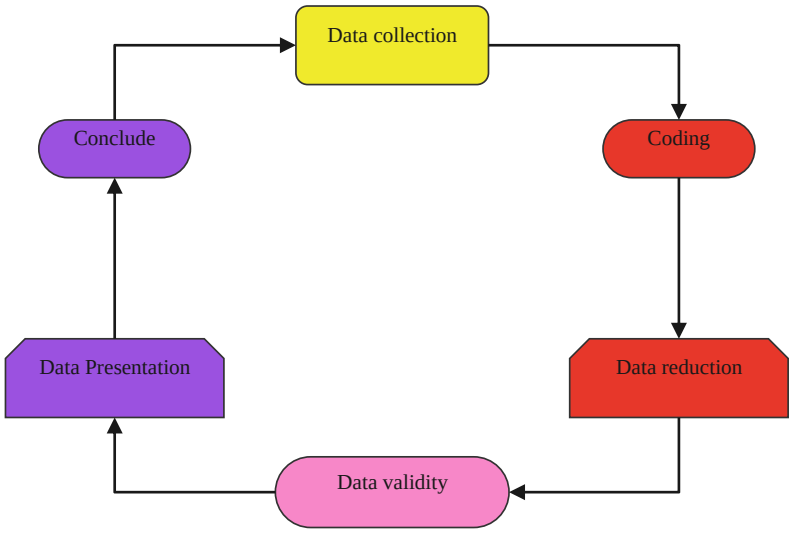

Fig. 1. Research flow chart

The research study was conducted in Morogoro, Tanzania involving eleven selected Secondary School Geography teachers. The informants were selected purposefully based on their specialization as secondary school geography teachers. Therefore, the informants shared their perceived understanding of IBA approach for teaching geography. Data were collected using semi-structured interview and class observation then, thematic analysis was used to analyze the data.

3. Results and Discussion

The study found five key themes that explain ways in which informants conceptualize IBA. The first theme is the "Questions-based teaching" which is based on the responses reflected by majority of the informants except Inf 1,4 and 9.They basically conceptualize IBA as a teaching by use of question(s). The following excerpts presented ideas of questions-based teaching theme from the informants on the meaning of IBA

> *" I always trying to use this method through providing some basic question of the topic, for example for my form 5 students for this time, i m going to start a new topic 'Materials of the Earth' and i have provide them with some questions (Inf 2).*
> *"Is the method which is applied in teaching various subjects whereby a teacher uses the guideline questions"(Inf 3).*
> *"...you have got your topic to present, you have now to make each and every student to participate by answering questions, making discussion, and at the end of the time they come with the answers and as a teacher, at the end you can correct them" (Inf 5).*
> *"...i start asking either oral question or they will be answering, you know that this concept it is somehow clear. The next stage, I won't leave the class until i provide at least am written questions, they will also answer. That will give me the reflection that this lesson has been understood to this extent..." (Inf 6).*
> *"You just create a question then you pose to students and students are the one who are responsible to look for the answers," (Inf 7)*
> *"It is the kind of teaching where you can assign students you can give questions as a guideline to search materials which will assist them to, cover various topics concerning what you want to teach them(,Inf 8)*
> *"Techer give the responsibility to learners trough questions" (Inf 10)*
> *"I can say it's some sort of the method that used in teaching that a teacher gives the responsibility to learners, that through questions learners can go through and ask them to find solution (Inf 11).*

In summary the informants presented a varied view on using questions as a teaching tool while applying the approach. For example, Informant 8 viewed questions to guide students search materials and at the end of all her topics will be covered while Informant 11 viewed questions to get solutions of problems. On the other hand, Informant 2 viewed questions should be given to students in the first place to get them prepared for the coming lesson, and Informant 6 understood questions are given at the end of the lesson. Similarly, the findings from the classroom observation indicated most teachers to have asked students in their lessons using different types of questions. This concept approve the ideas of previous studies that IBA is basically questions driven instruction as asking questions and answering them beyond the existing knowledge students can learn to think for themselves [18]–[20]. However, the concept of using questions in teaching as perceived by the informants in this study seems to disconfirm the role of questions in creating curios minds of students as proposed by[21]. The second theme "Learner -centered" relates to the views presented by informants when they were trying to give the meaning of IBA. Basically, they paid attention to learner's role during a teaching process although to explain the concept, different expressions were used. The following responses from informants reflect the concept.

> *"...is the teaching approach which makes a learner to be the source of learning process and normally even in our school we apply this learning process coz most of the advanced students they know much (Inf 9).*
> *"... it means students even if they are not taught, we believe they understand something" (Inf 4).*

"…the main purpose of the teacher is just of guiding the students not like doing much work on teaching or giving them, but they are the learners doing and the teacher is like a guide "(Inf 1)

Inf 9 considered learners as the source of the learning process while Inf 10 considered students to have potentials in store to learning anything. With this perception they both understood IBA by considering the position of learners in IBA. However, Inf 1 viewed IBA with respect to the teachers' role, that is to guide students to do their learning tasks. The general understanding of informants for the current study align with previous studies in describing IBA with respect to the degree of learner centeredness in informing their teaching instruction [19], [22], [23]. Ozdemir & Isikrecognized that the constructivism environment favors active learning and so reduces the role of a teacher to becoming a guide and a facilitator while students are given opportunities to investigate and experiment things. One idea presented by one of the informants that support IBA as learners-centered approach, " students can be the source of learning" can extend knowledge in the area because ,with the current advancement in information and technology ,it is not expected teachers to have knowledge of everything. Students are sometimes well informed than teachers and therefore, it is an opportunity for teachers to take that advantage and learn from students. With this idea and the context of teachers and teaching in Tanzania, Mtitu presumed the possibility to invent a productive teacher-student relationship on one condition. The condition urges the existing teachers to consider unlearning the old principle that "teachers are learned individuals and the source of knowledge for students who thirst for it".

The third theme "Researching" represent the meaning given by the informants 1 and 8 by referring to the activities in which students are engaged in learning. For example:

"…i go there with my students then they see what is going on there and then after seeing that they can think more about things like. ok this is soil erosion, how this takes place and what are the effects, so from looking they can …so without even teaching i can come and ask them .ok. what do you think are the effect of soil erosion? So, they may be easy to give out the answers" (Inf 1).

"…the knowledge of searching the information and they will be speculators they are going to speculate why these things are like this one, why this one is like this" (Inf 8)

In the context of applying IBA the informants understood that this approach can mean the use of methods such as observation and searching information to arrive to the answers. This finding aligns with the fundamental inquiry process suggested that.

"Students are given concrete materials and questions. To answer the questions, students work individually or in small groups to explore, observe, and discover answers" p.2.

The theme also confirms a scientific perspective which relates to IBA with the following procedures; Teachers generate situations for students to observe the phenomena, question it, suggest hypothesis for the observations, design and carry out experiments that provide evidence to support or contradict the hypotheses, analyze data and finally draw conclusions from data [26]. From the geographical perspective, this theme extends the idea of exploratory learning methods in geography. By using learning notes and places, students in a geography class make more sense of their knowledge through investigation. Places here represent spaces of exploration or the field so that students can visit and compare abstract ideas with the actual events. Similarly, the concept aligns with Olusegun who considered both teacher and students must not take knowledge as an inert sort of materials to be memorized but as a dynamic, ever- changing view of the world they live in and so they all need to stretch and explore the world from time to time.

The fourth theme "Knowledge sharing and receiving feedback" represent the Informants view on the meaning of IBA with reference to the fundamental processes or component of the approach. Informants 2, 5,6 and 8 understood IBA meaning as a series of processes which goes like, students being assigned questions, then they must engage in a discussion, followed by presentations and getting feedback from teachers. The following excerpts from the Informants, clearly indicated the concept.

"...so, they provide those results to me in terms of presentation or asking individual or group presentation, so for my side i tried to do that way" (Inf 2).
"...another stage i will see how their answers and we can have some sort of remedy, and sometimes before t make the remedy, they used present as per each.at the end of the time we come with the conclusion" (Inf 5).
"...through group discussion, im sure that everybody has participated even those who i did not reach them during the one-on-one discussion" (Inf 6)
"...thereafter if time allows us, they can present it in front of the class. After presenting, if they present it nicely i can add some information concerning what they have presented" (Inf 8)

The learner -centeredness associated with IBA has also been to some extent demonstrated by the observed informants regardless of varied forms in which some of them have shown to demonstrates. This concept confirm previous studies with similar perspective that sharing of information among learners or between learners and the teacher is what makes inquiry lesson meaningful [8]. Meaningful in the sense that, people in a group can identify false ideas which have been conceived by another member. The good way it can be revealed is by sharing those ideas. In the same way, feedback in an inquiry lesson is necessary for learners to get their investigations approved [6]. For example Ormrod postulate the kind of feedback a teacher provides to students about their adhere to what actually they supposed to come up can have a profound effect on helping them to work of controllable and unrollable learning strategies.

The fifth theme "Cognitive skills development" based on the answer of most informant. This was another way they assign the meaning of IBA regarding the skills students can get. Their views reflected skills that tend to help students to develop their mental abilities such as Questioning and thinking. This understanding has been indicated from the following remarks from the informants.

"...because if you give them questions so they can't just give you answer without thinking of that reasoning, so they will have to reason and think what is going on or what is that" (Inf 1)
"... the students are able to get the...to know various resources in geography in finding the answers they can go in various sources such as internet, how to read various sources". (Inf 3)
"...the students, you have presented the topic and now there is a pace for presentation for each group.as per each group they have got their uniqueness of presenting, so one group can question another group through that sub-division of topic you have given to them" (Inf 5)
"...the knowledge of searching the information and they will be speculators they are going to speculate why these things are like this one, why this one is like this" (Inf 8)

This theme approve the view that has been portrayed by Anderson who perceive inquiry teaching approach as a means to engage students 'mind in doing investigations. The concept also extend knowledge in the field of geography by bringing in the possibility of formalizing spatial thinking in the model of teaching geography using IBA in Tanzania schools. Applis elaborates inquiry in geography enhance learner's geographical thinking or spatial thinking. This is the perspective in Geography used to study the phenomena in relation to the space dimension. An example of spatial thinking task is the analysis of climatic data of a particular place in relation to human activities [34]. Another form of thinking in geography adopt the term Geographical critical thinking which goes beyond just thinking, it involves utilizing reasoning elements such as assumptions and the existing theories to argue for or against something [35].

Overall, the interviewed geography teachers in Morogoro municipal demonstrated varied conceptual meaning of IBA as shown by their points of emphasis on questions, the role of students and teachers, and the nature of activities to be performed by students during the teaching and learning process. However, despite their differences in the way they define IBA, they all presented an idea of teachers using questions as teaching tool. Similar view has been portrayed by previous studies on defining IBA regarded IBA as the combinations of procedures that engage students in

exploring the real-world problems by posing questions in order to seek answers. Similarly, Ramnarain look at IBA as the active involvement of learners, focusing on the why and how and less on the what questions. These definitions suggest that the approach urge teachers to aid learners through questions and investigative tasks to gain a better understanding of the topics. The findings have also come up with the new insight that the implementation of IBA in teaching is subject specific. The nature of teaching subjects and their contents can shape IBA implementation. Different teaching subjects can offer different potentials in enhancing the application of IBA. For example, geography subject has the potentials of offering for the study of nature and its relationship with humans, while pure science subjects like biology can only offer the study of nature. The study findings have proved that the teaching of geography subject favors the application of IBA. For example, the first three stages of Stripling Inquiry Model (SIM) of "connect", "construct" and "express" can be implemented during face-to-face contact hours in class while "wonder", "investigate" and " reflect" can be implemented outdoors through exposure to real life study in forms of Fieldwork or field excursion (Watson, 2008; Brown et al., 2016).This concept can add up in the theoretical underpinning of IBA. On the other hand, the findings about the perceived understanding of the interviewed geography teachers on the meaning of IBA in terms of approach process for implementing in class seems to contradict with the rationale of the inclusion of inquiry from the SMI [37] and as supported by Rodríguez, Pérez, Núñez, Baños, & Carrió (2019) that the significance of questions in IBA is to spark students curiosity in wanting to learn and not for preparing students for the lesson or for assessment purpose as perceived by most of the interviewed informants.

4. Conclusion

The purpose of this qualitative study was to explore the conceptual understanding of IBA as perceived by Geography teachers in Morogoro, Tanzania. The study has shown presence of misconceptions or contradictions among geography teachers' conceptual understanding of IBA. This has been arrived at by looking at lack of common agreements about the process of IBA implementation and the role of question(s) in using the approach. Inquiry approach is more than just asking questions. Teachers must ask open ended questions that get students to develop their own questions and to design investigations that can answer their own questions. The study findings can imply that, the current Teachers' Training for pre- and in-service teachers in Tanzania may not have improving for geography teachers' theoretical understanding of Inquiry-Based Approach. Therefore, it is recommended that, the Government and teachers' trainers should consider addressing the existing misunderstandings, there is an urgent need for teachers training institutions to revise their methods and content courses to integrate IBA. Furthermore, since this is the first qualitative study to investigate geography teachers' understanding and practice of IBA in Tanzania, there is a need for further research involving geography teachers from other regions of the country in order to get general and conclusive findings. Also, further research can investigate the extent of levels of geography students in geography Inquiry skills. Finally, future studies may consider using both qualitative and quantitative approaches to make a comparison of findings

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