



Comparative Analysis of In-service and Pre-service Teachers' Critical Thinking Skills; A Thematic Approach Based on the California Critical Thinking Disposition Inventory

Molefhe Mogapi^{1*} and Waitshoga Tefo Smitta Moalosi¹

¹*Department of Educational Foundations, University of Botswana, Gaborone, Botswana.*

Authors' contributions

This work was carried out in collaboration between both authors. Author MM designed the study and wrote the first draft of the manuscript. Authors MM and WTSM constructed the qualitative data collection instrument and participated in the data collection exercise. Authors MM managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: This paper compares the critical thinking abilities and dispositions of pre-service and in-service teachers to delineate factors that account for their difference. The tertiary pre-service programme is a major source of teachers for the schools in Botswana and as such there is a need for a deliberate alignment of teacher development programme objectives and classroom practice in the field. One area of concern is the difference in the critical thinking skills between tertiary students and practicing teachers. The apparent difference in the conceptualization of critical thinking as a construct between pre-service and in-service teachers is an indication of a possible misfit between conditions within schools and what pre-service teachers expect to find in the classroom when they start teaching. This has implications for in-service and pre-service teacher development, subject-matter organization and general classroom processes.

Methodology: A qualitative multiple case study approach was used to collect and analyze textual

*Corresponding author: E-mail: Molefhe.mogapi@mopipi.ub.bw;

data from pre-service and in-serve teachers in Botswana. Participants from the two subgroups responded to a critical thinking instrument designed to capture their opinion regarding different aspects of the critical thinking construct. The data was analyzed using thematic mapping based on the subcategories of the California Critical Thinking Disposition Inventory

Results: The results showed that pre-service teachers were mostly preoccupied with the analyticity aspect of critical thinking while their in-service counterparts exhibited a much broader understanding of the construct. However, the two groups expressed similar ideas in matters relating to factors that impede successful development of critical thinking skills and dispositions.

Keywords: Critical thinking; curriculum blue print; delphi report; the California critical thinking disposition inventory.

1. INTRODUCTION

1.1 The Problem

Critical thinking has emerged as one of the key educational outcomes of many educational systems around the world [1]. The current prominence of critical thinking stems from the belief that educational experiences should not only be confined to helping learners develop traditional skills such as language proficiency, numeracy and civic responsibility. Rather, the learning and teaching environment should be organized and structured in such a way that it provides an environment where learners acquire essential abilities and habits of the mind that makes them to be critical thinkers [2]. In Botswana, the Curriculum Blue Print for the basic education curriculum adapted in 1996 stipulates twelve objectives that should be achieved through implementation of the Ten Year Basic Education programme. One of the objectives (i.e., Objective Number 3) categorically states that upon completion of the Ten Year Basic Education Programme, learners should have “developed critical thinking, problem solving ability, individual initiative, interpersonal and inquiry skills” [3].

Enhancement of critical thinking skills is also emphasized at tertiary level of education. For example, the University of Botswana has listed graduates attributes to be achieved by all students at the end of their academic programmes. The University Learning and Teaching Policy published in 2008 mentions critical thinking and problem solving as some of the important attributes to be acquired by students. Therefore, teachers are expected to develop critical thinking at both the pre-service and in-serve levels. Views or beliefs of in-service and pre-serve teachers will be compared to identify underlying similarities or differences; the

results will then be discussed in relation to the California Critical Thinking Disposition Inventory subscales.

1.1.1 Critical thinking

Recent developments in the international scene have added momentum toward incorporation of critical thinking in the curriculum. Firstly, the globalization trend has resulted in the almost disappearance of national borders as nation states became more integrated in the world economy. As the world shrinks, goods and services produced in one part of the world are easily available in other parts of the world; therefore, countries have to compete at the global level. Globalization has implications not only at the nation state level but also at the individual or personal level. Individuals as global citizens have to be competent at the global level because employers are free to source skills from around the world. Employers in the 21st century need people who possess requisite skill in a given area but also the person must possess critical thinking attributes that will allow him or her to identify and solve problems, analyze and evaluate situations and make quality decisions that make sure that the enterprise remains to be competitive in the global market. Education and training have to respond to this global trend by providing quality education and producing graduates that have skills that are needed in the globalized arena [4].

1.1.2 Critical thinking as a construct

The definitions of critical thinking provided by researchers and theorists have created a controversy in matters relating to the conception and measurement of the construct [4]. In 1988, The American Philosophical Association (APA) put together a panel of experts from diverse fields such as Philosophy, Education, Social

Sciences and Physical Sciences. The panellists were required to make a systematic inquiry into the critical thinking concepts as well as develop modalities of how the critical thinking construct could be assessed. This process culminated in the publication of the Delphi Report in 1990. According to these experts, critical thinking can be defined as "...purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" [5]. Cognisant of the dual nature of the concept, the Delphi Report also offers a comprehensive definition of a critical thinker. The report provides that:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit [5].

The above definition basically enumerates characteristics exhibited by people with well-developed critical thinking dispositions. According to Facione, Sánchez, Facione and Gainen [6], there is a set of identifiable "characterological attributes thought to be associated with developing success at critical thinking" (p. 1). Factor analyses of the characterological attributes extracted seven theoretically meaningful dimensions. The dimensions were subsequently named as truth-seeking, open-mindedness, analyticity, systematicity, confidence, inquisitiveness, and cognitive maturity. The dimensions have been used by researchers and measurement experts to develop instruments or scales that can be used to assess critical thinking abilities and dispositions.

Fortunately, most researchers in the area of critical thinking seem to agree that critical thinking skills and dispositions are teachable. According to Halpern [7] "There are numerous, qualitatively different types of evidence showing that students can become better thinkers as a result of appropriate instruction" (p. 451). The grey area in the teachability of critical thinking is that experts differ as to how critical thinking skills

should actually be taught in the classroom. A dichotomy has emerged with one group of experts favouring the 'domain specific approach' while other experts champion the 'generic' approach. Experts who favour the domain specific approach (i.e., Bailin [8]; Case [9]; Ennis [10]; McPeck [11]; Pinthers & Soden [12]; Silva [13]) argue that critical thinking skills are subject matter dependent and as such the skills are not transferable across different subjects. They argue that critical thinking is a lens that instructors can use to teach the content in the syllabus (Case [9]). During teaching, emphasis is put on the subject matter with no reference to general critical thinking skills. On the other hand, the generic approach proponents (e.g., Halpern [14]; Lipman [15]; Van Gelder [16]) want to see a "direct and explicit instruction in critical thinking skills as a separate course, where critical thinking skills and abilities are emphasized outside the context of specific subject matter" [17]. However, researcher seem to show that neither of the two approaches has superiority over the other. This essentially means that a mixed approach where the two are used interchangeably, taking into account the prevailing instructional environments, is the way forward. The bottom line is that teachers should be well vested in strategies that can enhance the critical thinking abilities and dispositions of their students. A number of strategies which have been shown to produce significant change in the critical thinking scores of students include collaborative learning, group work, constructivist approach and problem based learning. All these techniques encourage or promote interaction and sharing of ideas amongst the learners with the teacher as a facilitating agent.

1.1.3 Statement of the problem

The apparent difference in the conceptualization of critical thinking as a construct between pre-service and in-service teachers is an indication of a possible misfit between conditions within pre-service classrooms and what pre-service teachers expect to find in the classroom when they start teaching. The apparent misfit between what pre-service teachers learn in tertiary institution and the realities of the job market creates an undesirable situation where new teachers are ill-prepared for the job and have to spend a considerable amount of time trying to adjust to the demands of the new situation. Making sure that pre-service teachers develop critical thinking skills and attributes that are aligned to the classroom environment in schools

would go a long way in making them fully prepared for the world of work. If this situation is not addressed, tertiary institutions will continue to produce graduates that are not well groomed for field.

1.2 Purpose of the Study

The main purpose of the study is to compare the critical thinking skills of pre-service and in-service teachers in Botswana. This will be achieved by comparing the views and opinions of Postgraduate Diploma in Education students and practicing teachers in the South Central region of Botswana. The following research questions will be addressed:

- Is there any difference in the critical thinking views and opinions of pre-service and in-service teachers?
- What are the views of the pre-serve and in-service teachers in terms of factors that impede development of critical thinking skills in the classroom?
- What are the views of the pre-serve and in-service teachers with respect to how critical thinking skills can be enhanced in the classroom?

1.3 Relevant Literature

Critical thinking, as a construct, has attracted the attention of different researchers and this has resulted in the accumulation of critical thinking literature over time. The purpose of the literature review is to collect empirical evidence relating to the definition and measurement of critical thinking constructs. Bahr [18] conducted a study to compare the critical thinking working definitions of lecturers and students at one Australian university. The research study was meant to shed some light on the idea that academic staff and students have different understandings of the critical thinking concept. The sample consisted of 21 instructors and 26 undergraduate pre-service students; the participants responded to an on-line self-administered questionnaire containing six open-ended items. The data was analyzed using thematic loading to identify themes from textual response provided by lecturers and students. Three themes subsequently emerged. The first theme was named 'State of the mind or disposition' to cover definitions that focused more on enumerating attributes of a critical thinker. The second theme was named 'Techniques and processes' while theme three was named 'Ability

or critique'. The pattern of responses showed that academic staff members' conception of critical thinking were different from that of students; academic staff viewed critical thinking more as a state of the mind (deposition). For example, one academic staff defined critical thinking as, "...willingness to consider interpretations of data or experience that may conflict with one's own preferred world view" [18]. This actually means that open-mindedness and willingness to accommodate other people's viewpoints is an important attribute of a critical thinker. On the other hand, students' definitions tended to be limited to the requirements of their academic work. One student stated that critical thinking is "Possessing the ability to think about a topic just discussed and analyse it and think about how it may affect you..." (p. 7). This particular definition touches on the analytical aspects of critical thinking. Analyticity disposition describes a person's ability to use reason to solve complex problems and reliance of empirical evidence to justify claims or assertions. Though this research study demonstrated to some degree that instructors and students may perceive critical thinking differently, the size of the sample and the general methodology used by the researcher may affect the generalizability of the findings.

1.3.1 Using a standardized instrument to assess critical thinking

The above stated study used a qualitative questionnaire to collect data from participants. However, standardized tests measuring different aspects of the critical thinking construct have been developed. The California Critical Thinking Disposition Inventory (CCTDI, 1992) is one such instrument; the scale had 75 items divided into seven subscales (i.e., Truth-seeking subscale, Open-minded subscale, Analyticity subscale, Systematicity subscale, CT Confidence subscale, Inquisitiveness subscale, and Cognitive Maturity subscale). The test reports eight scores, that is seven score for each subscale and a total score. A total overall score of 30 indicates a weak or less than favourable disposition to the attributes assessed by the scale while a "score of 40 or above demonstrates a positive inclination toward the scale's target disposition" (Facione [6]). Facione [6] used the CCTDI to measure the critical thinking disposition of 587 college first year students. Generally, the research study was able to establish strengths and weaknesses of first year students with respect to their critical thinking dispositions. The researchers noted that:

Given these data, it would be reasonable to describe this group of entering freshmen college students as: (a) Positively disposed toward open-mindedness and inquisitiveness. (b) Their CT-confidence, analyticity, and cognitive maturity varies, but tends in the positive direction. (c) They are not inclined toward focus, diligence, and persistence in inquiry. (d) They oppose seeking knowledge which threatens their preconceptions or interests [6].

The established areas of strength and weaknesses have implications for learning and teaching as well as on assessment procedures. In the case of assessment, instructors can formulate assessment tasks that will challenge a student's pre-existing misconceptions in order to facilitate the development of the truth-seeking disposition. An individual with a high truth seeking score is frequently in search of "the best knowledge in a given context, courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's self-interests or one's preconceived opinions" [6].

Pithers and Soden [19] also used a standardized instrument to conduct a comparative research amongst a sample of vocational education tutors. The instrument used was the Smith Whetton Critical Reasoning Test (CRT). According to Pithers and Soden [19], "little is known about how well vocational tutors themselves can engage in the thinking skills which seem to be valued in the workplace" (p. 24). The expectation is that tutors should have developed competencies in critical thinking for them to be able to impart the skills to students. The sample of the study comprised vocational tutors in Australia (n= 111) and the United Kingdom (n = 145), the two samples had almost similar demographic characteristics (i.e., gender, age education, work experience). Subsequent analysis of variance detected no significant mean difference between the Australian and United Kingdom samples; also there were no differential effects by gender and age. However, the researchers noted that:

The Smith and Whetton finding that people who study mathematics at advanced levels tend to perform better on the CRT Verbal scale than those whose mathematical education is more curtailed is replicated in the merged data: the tutors' means in both countries are significantly lower than those of a group of graduate engineers whose

education would include advanced mathematics [19].

1.3.2 Critical thinking skills of students in South Africa

In South Africa, deliberate efforts were made to incorporate critical thinking into the education and training sector [1]. This resulted in the introduction of Outcome Based Education (OBE) which was implemented via the Curriculum 2005; the idea was to make sure that critical thinking skills are actually taught in the classroom. Successful implementation of OBE would benefit both the public and private sector by producing graduates who were able to "identify and solve problems and make decisions using critical and creative thinking" [1]. At one point, it became necessary to establish the extent to which the objectives of OBE-with particular emphasis on development of critical thinking skills and dispositions- were being realized. Lombard and Grosser [1] used the Watson-Glaser Critical Thinking Appraisal (WGCTA) scale to assesses critical thinking proficiency levels of 117 first year students enrolled for a Bed degree. The students obtained a total raw score of 5255, this converted to a mean T Score of 34.2. This value was compared to pre-existing data from similar studies done in the USA (i.e., American Grade 12 High School Group and the American Pre-Service Student Teachers). The mean for the American High School group was 39.5 while the mean for the American Pre-service Student Teachers was 45.7. These results indicated a less than desirable exhibition of critical thinking skills and dispositions by the South African students. In other words, OBE curriculum objectives were not successfully realized.

The literature sources reviewed have provided empirical evidence that show that pre-service teachers have a rather limited conceptual understanding of the critical thinking construct [18]. More research work is needed in this area so as to generate additional information that will in the end enable researchers and policy makers to with relevant intervention strategies.

2. METHODS

The current study essentially follows the qualitative case study approach to collect and analyse data. Pre-service and in-service textual data is analysed using a thematic approach to develop deeper understanding of their perceptions relating to the critical thinking

construct. The case study design was selected for this study because it will allow the researchers to document perceptions of participants and use the multiple perceptions to develop themes.

2.1 Sampling Procedures

The study used two different target populations, i.e., pre-service and in-service teachers. The in-service sample was obtained from students who registered for a Post Graduate Diploma in Education (PGDE) at the University of Botswana in the 2015 to 2016 academic year. There were about 230 PGDEs and this population was used to sample 40 students to achieve a sample ratio of 17%. The instrument was administered by course lecturers during normal lecture times. The second target population of the study comprised in-service teachers in Botswana. This group of teachers came from four junior secondary schools in the South East region. A total of 20 teachers from the four schools responded to a qualitative questionnaire which sought to document their opinions regarding critical thinking abilities and dispositions. A total sample of 20 teachers was considered adequate as the purpose of the research was not to generalize to the population but capture the perceptions of the teachers so as to develop a deeper understanding of the phenomena. The qualitative instrument was administered in August 2016. The researchers obtained a research permit from the Ministry of Education and Skills Development as well as relevant regional authorities. Specific letters were written to the various school Heads and each participating teacher was given a letter of consent. The data in the South Central schools was collected by trained research assistants over a period of three weeks.

2.2 Instrumentation

The participants responded to a questionnaire that comprised four open ended items that required participants to provide information relating to their conceptual understanding of critical thinking. Thematic analysis was used to extract main themes and the themes were grouped according to the seven dimensions of the CCTDI proposed by Facione et al. [6]. The CCTDI has been validated by numerous researchers and the validation studies have produced impressive reliability and validity results. For example, Yeh [20] reported a content validity index (CVI) of .85 and an alpha coefficient of .70 while İSKİFOĞLU [21] reported

a CVI of .97 with an alpha coefficient that ranged from .85 to .91. However, some studies (e.g., O'Hare [22]) have been able to demonstrate that some sub-scales of the CCTDI have low reliability. While the Self-confidence sub-scale had a reliability index of .78, the Open-mindedness sub-scale was the least consistent with an alpha index of .50 [22]. The low reliability associated with the Open-mindedness items was also reported by Köksal [23]. In general, CCTDI has come through as an instrument with sound psychometric properties [24].

2.3 Pre-service Qualitative Data Analysis

2.3.1 Data analysis procedures

The researchers prepared a consent form that was then given to PGDE students for them to indicate as to whether they agree to participate in the study or not. The consent form explained the purpose of the research to students and also gave them the assurance that the data collected will be confidential at all times. The students were also informed that a serial number will be used to identify each questionnaire to uphold the ethical principle of anonymity.

2.3.2 Data analysis

The responses of the 40 pre-service teachers were analyzed using the seven California Critical Thinking Disposition Inventory subscales (CCTDI). Table 1 shows the number of times a theme was mentioned. It is apparent from the table that truth-seeking, analyticity and open-mindedness were mentioned with relatively high frequency. It can be concluded that pre-service teachers are strongly disposed toward truth-seeking, open-mindedness and analyticity in their everyday thinking. This perspective is expected from students as they are mostly preoccupied with tests and assignments. Assignments that students do regularly require them to derive information from different sources (Truth-seeking) as well as the ability to look at the issue at hand from different angles (Open-minded). They must also possess some analytical skills to be able to assess different components of the issue or problem. The pre-service teachers' critical thinking attributes are similar to the views expressed by the Australian university students [18] as the two groups emphasize analyticity.

Inquisitiveness, cognitive maturity, systematicity and Critical Thinking confidence were referred to

less frequently or not mentioned at all. There are at least two reasons for this state of affairs. Firstly, several students stated that courses in their programme of study were presented as separate entities even though the content in the courses were related. Integration of courses would enable students to see problems or issues from different angles in the end realizing the complexity of knowledge and its limitations. Disjointed courses make students to fail to see the larger picture and as a result their cognitive maturity is not cultivated. Secondly, students also stressed the fact that tests and assignments designed by lecturers are not challenging enough. The tasks do not present students with realistic problems that require extensive research and rigorous investigation. Objective items are mostly used in tests and examinations because they are easy to mark and save time. However, students are of the view that such items do not allow them to present their views in a systematic way. Open ended questions on the other hand would allow students to present their ideas and thus develop confidence in their thinking skills. The third point that accounted for low scores in the four subscales related to the duration of the programme of study. The students stated that they have to do a lot of courses within a short period of time; they do not have enough time to do extensive research and reflect on what they are reading. In the end, they receive certificates without having acquired the necessary knowledge and skills outlined in the programme of study. Thus, the apparent weaknesses of the pre-service teachers in the four identifies subscales can be attributed to the structure and delivery of the programme of study.

2.3.3 In-service teachers qualitative responses

A total of 40 in-service teachers from South East region responded to the critical thinking qualitative questionnaire. The responses of the practicing teachers were qualitatively different from that of the in-service participants. The in-service teachers demonstrated clear understanding of the cognitive aspect of critical thinking. For example, one of the teachers stated that critical thinking is:

Self-guided and self-disciplined thinking through which an individual tries to think at highest level and give reasons for the answers. In this situation one's mind is fair

and the thinking level is quality is shown by the answers provided. They usually analyse, assess and evaluate concepts hence have an improved way of thinking. Critical thinking involves empathy and questioning of vital information.

The sentiments express by the above teacher were echoed by another teacher who also stated that "Critical thinking is looking at the issue at hand analysing it, looking at all possible solutions and making informed decisions having researched on it where possible". The textual responses provided by the practicing teachers are reflected in indicated in Table.

Though there are some similarities between the views of pre-service and in-service teachers, practicing teachers identified analyticity as the main attribute of a critical thinker. This was followed by themes on truth seeking and open-mindedness. However, pre-service and in-service teachers' opinions converged when they were required to delineate factors that hinder the development of critical thinking. The practicing teachers mentioned that the syllabus was congested forcing them to spend more time trying to cover the content than helping learners develop critical thinking skills and attributes. This situation is made worse by the fact that each lesson is allocated 40 minutes. The 40 minute time limit was well captured by one teacher when he/ she commented that; "Lesson time in most cases does not allow for giving students enough time to do critical thinking taking into consideration what has to be covered in a lesson" Secondly, the teachers noted that the subject matter in the syllabus was too theoretical, as a result learners do not have the opportunity to do deal with real life problems requiring investigation. Practicing teachers are calling for a curriculum that has more practical content and this should be coupled with the reduction of the teacher-pupil ration in order to make classes more manageable. One teacher stated that "Large class size prevents or limit one to one interaction between student and teacher and also students feel intimidated when expressing themselves in front of their peers or a large audience". According to the practicing teachers, some classes have up to 55 learners and teachers have no adequate resources to adequately cater for the needs of such large group of learners.

Table 1. Pre-service sample Critical Thinking Themes

| Truth-seeking | Open-mindedness | Analyticity | Systematicity | CT Confidence | Inquisitiveness | Cognitive-maturity |
|--|---|---|--|---|------------------------|-----------------------------------|
| //////// [10] | //// [5] | ///// [6] | / [1] | / [1] | | / [1] |
| 'Going beyond the surface' | 'Thinking beyond the box' | 'Trying to analyse the situation in front of you' | 'Thinking logically like a high court judge' | 'The ability of an individual to be decisive in thinking' | | 'Developing your own perspective' |
| 'Thinking deeper' | Being a good listeners' | 'Being able to analyse a situation' | | | | |
| 'Holistic thinking meaning not leaving out important details' | 'Letting your mind to think deeply and considering other factors' | 'Asking a co Concept and digesting it' | | | | |
| 'Creating new knowledge' | | 'Critically analyse the situation' | | | | |
| 'To be informed' | | | | | | |
| 10 | 5 | 6 | 1 | 1 | | 1 |

Table 2. In-service teacher's Critical Thinking Themes

| Truth-seeking | Open-mindedness | Analyticity | Systematicity | CT Confidence | Inquisitiveness | Cognitive-maturity |
|---|--|--|---|----------------------|------------------------------------|------------------------------------|
| ///// | //// | //////////////// | / | / | / | / |
| 'Ability to pay attention to very little details' 'Paying more attention to details' | 'Looking into a subject or topic with open mind' 'Looking at all possible solutions an making informed decisions' | 'Thinking and analysing issues' 'Analyse, assess and evaluate' 'Analysing issues / situations' 'Analysing and evaluating of an issue in order to form judgement about it' 'Breaking down and processing of different possibilities in a given situation' | 'Coming up with strategies of solving problems' | | 'Questioning of vital information' | 'Guided self-disciplined thinking' |
| 7 | 4 | 15 | 1 | 1 | 1 | 1 |

3. DISCUSSION

The analysis of the pre-service and in-service data has revealed key differences as well as similarities between the two samples. Firstly, the qualitative data on the conceptualization of critical thinking construct show that teaching experience also has some significant influence on the critical thinking conceptualization. Pre-service teachers mostly understand critical thinking from a dispositional angle; they mostly enumerate attributes of a critical thinker such as the ability to provide detailed answer to a question. In-service teachers were able to demonstrate a strong understanding of the cognitive aspect of the construct and focused more on problem solving and making informed decisions. However, both groups revealed some weakness in the area of standards that must be observed when undertaking a critical thinking process. The students put blame on the structure and course delivery mechanisms in their programme. The students made an observation to the effect that courses are not integrated even though they have overlapping content and this is made worse by assessment instruments that target low order thinking skills. The points put forward by students as an explanation of less than desirable critical thinking abilities and dispositions are in line with the findings of a study conducted by Moeti, Mgawi, & Moalosi [25]. The researchers also sampled 59 pre-service teachers at the University of Botswana and the main data collection instruments for the study were interviews and focus group discussion. Some of the key factors identified as being responsible for inadequate critical thinking attributes of the pre-service teacher were low academic motivation, large classes, teaching methods, and assessment techniques used by lecturers [25].

As for the practicing teachers, lack of clear knowledge on the standards or criteria to be observed can be a consequence of the curriculum content [26]. The curriculum blue print only stipulates that learners should have developed critical thinking skills at the end of the programme. There is no mention of how critical thinking is going to be assessed. The assessment procedures specifically designed to assess critical thinking would enumerate different standards that should be followed when assessing the construct, teachers in schools would be compelled to implement this procedures by designing items that target the desirable critical thinking skills and dispersions

as well as generating marking criteria to operationalize the procedures. Despite difference in the way the two groups conceptualize critical thinking, there is an interesting area of convergence or intersection of viewpoints. Both in-service and pre-service teachers agree that the theoretical nature of the content they are handling is an impediment of development of critical thinking. Secondly, both groups are involved with large classes which also create an environment that is not conducive for cultivation of critical thinking faculties. Also, the pre-service teachers have to finish their programme of study within a short period of time while at the same time they are required to do many subjects. On the other hand, in-service teachers have to teach within a 40 minutes lesson and the curriculum is overloaded with content. In both cases, the environment does not allow the teacher to engage in activities that could help the teacher acquire all of the seven components of an accomplished critical thinker.

A major limitation within the pre-service programme appears to be lack of activities that facilitate development of cognitive aspects of critical thinking skills. Deliberate efforts should be made to incorporate the cognitive aspect of critical thinking to make sure that pre-service teachers are fully prepared for the field. The in-service also has to be strengthened by stipulating modalities that practicing teachers can use to assess critical thinking abilities of their learners. Currently, practicing teachers are only good at defining critical thinking but lack the technical knowhow necessary for assessing critical thinking within the classroom [27,15].

Generally, the current study has been able to produce empirical evidence that demonstrates that pre-service and in-service teachers have a different conceptualization on the critical thinking construct. This is consistent with findings from a research study done by Bahr [18]. Bahr made an observation to the effect that "...that while academics and students share substantively similar definitions and understandings of critical thinking, there are subtle differences of perspective between them" (p. 13).

4. CONCLUSION

Analysis of data from pre-service and in-service teachers has revealed interesting similarities as well as difference between the two groups. The similarities emerged when the teachers were called upon to state elements that may impede

development of critical thinking. Both groups noted time and congested programmes as some of the contributing factors. Considerable variations between the cohorts were noted in the definition of critical thinking. The pre-serve teachers tend to focus more on expected qualities of a critical thinker while the practicing teachers addressed both the cognitive abilities and dispositions of the construct. It would be interesting to establish whether the observed similarities and differences would be maintained when the two groups respond to a critical thinking scale such as the Watson-Glaser Critical Thinking Appraisal scale (WGCTA). One important policy implication of the study is the need for a review of the pre-serve programme at the University of Botswana with view to making the programme more practical. The practical work (such as teaching practice) would provide students with the opportunity to interact more with practicing teachers and be in a position to put their critical skills to use in the classroom. This will undoubtedly allow them to improve their critical thinking confidence, inquisitiveness, and cognitive maturity. On the other hand, in-service teachers need some guidance relating to how to assess critical thinking skills in the classroom. Two important recommendations have thus emerged from the study. Firstly, the pre-service programme at the University of Botswana has to be reviewed with the aim of making it more practical and attuned to the teaching and learning practice. Secondly, the weaknesses revealed by practicing teachers in matters relating to assessment of critical thinking have to be attended to as quickly as possible. Information sharing platforms such as workshops and conferences will have to be organized for all practicing teachers. The main purpose of such workshops would be to assist teachers acquire assessment techniques that they can later use to assess critical thinking skills of their learners.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Lombard K, Grosser M. Critical thinking: Are the ideals of OBE failing us or are we failing the ideals of OBE? *South African Journal of Education*. 2008;28:561-579.
2. Halpern DF. Assessing the effectiveness of critical-thinking instruction. *Journal of General Education*. 1993;42(4):238-25. Available:<http://projects.ict.usc.edu/itw/vtt/HalpernAmPsy98CritThink.pdf>
3. Government of Botswana, Ministry of Education. Curriculum blue print: Ten year basic education programme. Gaborone: Government Printer; 1995.
4. Liu OL, Frankel L, Roohr KC. Assessing critical thinking in higher education: Current state and directions for next-generation assessment. ETS Research Report Series; 2014. Available:<http://onlinelibrary.wiley.com/doi/10.1002/ets2.12009/epdf>
5. Facione PA. Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. California: California Academic Press; 1990.
6. Facione PA, Sánchez Giancarlo CA, Facione NC, Gainen J. The disposition toward critical thinking. *Journal of General Education*. 1995;44(1):1-25. Available:https://www.insightassessment.com/content/.../file/Disposition_to_CT_1995_JGE.pdf
7. Halpern DF. Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist*. 1998; 53(4):449–455.
8. Bailin S. Critical thinking and science education. *Science & Education*. 2002; 11(4):361–375. Available:<https://link.springer.com/content/pdf/10.1023%2FA%3A1016042608621.pdf>
9. Case R. Moving critical thinking to the main stage. *Education Canada*. 2005; 45(2):45–49.
10. Ennis RH. Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher*. 1989; 8(3):4–10.
11. McPeck JE. Critical thinking and subject specificity: A reply to Ennis. *Educational Researcher*. 1990;19(4):10–12.
12. Pithers RT, Soden R. Critical thinking in education: A review. *Educational Research*. 2000;42(3):237–249. Available:<http://www.tandfonline.com/doi/pdf/10.1080/001318800440579?needAccess=true>
13. Silva E. Measuring skills for the 21st century [Report]. Washington, DC: Education Sector; 2008. Available:http://iwebpx.saschina.org/theronmott/FRC/Articles_files/Measuring_Skills_for_21st_Century.pdf

14. Halpern DF. Assessing the effectiveness of critical thinking instruction. *The Journal of General Education*. 2001; 50(4):270–286.
15. Lipman M. Critical thinking—What can it be? *Educational Leadership*. 1988;46(1): 38–43.
Available: http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_198809_lipman.pdf
16. Van Gelder T. Teaching critical thinking: Some lessons from cognitive science. *College Teaching*. 2005;53(1):41–48.
Available: <http://www.tandfonline.com/doi/pdf/10.3200/CTCH.53.1.41-48?needAccess=true>
17. Lai ER. Critical thinking: A literature review; 2011.
Available: http://images.pearsonassessments.com/images/tmrs/CriticalThinkingReview_FINAL.pdf
18. Bahr Nan. Thinking critically about critical thinking in higher education. *International Journal for the Scholarship of Teaching and Learning*. 2010;4(2):1-14.
Available: <http://digitalcommons.georgiasouther.edu/ij-sotl/vol4/iss2/9>
19. Pithers RT, Soden R. (Assessing vocational tutors' thinking skills. *Journal of Vocational Education & Training*. 1999; 51(1):23-37.
DOI: 10.1080/13636829900200076
20. Yeh Mie-Ling. Assessing the reliability and validity of the Chinese version of the California Critical Thinking Disposition Inventory. *International Journal of Nursing Studies*. 2002;39(2):123-132.
Available: [http://www.journalofnursingstudies.com/article/S0020-7489\(01\)00019-0/pdf](http://www.journalofnursingstudies.com/article/S0020-7489(01)00019-0/pdf)
21. İSKİFOĞLU Gökhan. Cross-cultural equivalency of the california critical thinking disposition inventory. *Educational Sciences: Theory and Practice*. 2014; 14(1):150-178.
DOI: 10.12738/estp.2014.1.1840
22. O'Hare L. Measuring critical thinking skills and dispositions in undergraduate students Unpublished doctoral dissertation. Queen's University of Belfast, Belfast; 2004.
Available: https://pure.qub.ac.uk/ws/files/18330848/Liam_O_Hare_PhD_thesis_PURE.pdf
23. Köksal MS. Development of a culture specific critical thinking ability test and using it as a supportive diagnostic test for giftedness. *Acta Didactica Napocensia*. 2016;9(3):55-66.
Available: http://padi.psiedu.ubbcluj.ro/adn/article_9_3_6.pdf
24. Gupta K, Iranfar S, Iranfar K, Mehraban B, Montazeri N. Validity and reliability of critical thinking disposition inventory (CCTDI) in Kermanshah University of Medical Sciences Educational Research in Medical Sciences. 2012;1(1):7-10.
Available: <http://journals.kums.ac.ir/ojs/index.php/EduRMedS/article/view/81/114>
25. Moeti B, Mgawi RK, Moalosi WS. Critical thinking among post-graduate diploma in education students in higher education: Reality of fuss? *Journal of Education and Learning*. 2017;6(2):13-24.
26. Bailin S, Case R., Coombs JR, Daniels LB. Conceptualizing critical thinking. *Journal of Curriculum Studies*. 1999;31(3):285–302.
Available: <http://www.tandfonline.com/doi/pdf/10.1080/002202799183133?needAccess=true>
27. Kuhn G. A developmental model of critical thinking. *Educational Researcher*. 1999; 28(2):16-25+46.
Available: <http://www.pop.educationforthinkng.org/sites/default/files/page-image/1-01DevelopmentalModelCriticalThinking.pdf>

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