

CHAPTER 5

SUMMARY, DISCUSSIONS, CONCLUSIONS AND SUGGESTIONS

5.0 Introduction

The terminating chapter of the study encompasses the summary, findings, conclusions, and suggestions. It plays a crucial role in providing readers with a roadmap to navigate the final segment of the study. This section is the culmination of the entire thesis, synthesizing the critical aspects explored in the preceding chapters. The primary objective is to summarise the main findings, draw meaningful conclusions, and provide recommendations or suggestions for future research. The chapter concisely outlines the study's purpose, reminding readers of the research questions or hypotheses and highlighting the study's significance in contributing to the existing body of knowledge. Additionally, it sets the stage for a comprehensive exploration of the research outcomes, interpretations, and potential implications, preparing the reader for the critical synthesis and reflection that follows in subsequent sections.

5.1 Summary

The researcher embarked on the study to determine how Mathematics teachers are trained in the Mathematics Teacher Education (MTE) departments of Ghana's Teacher Education Universities (TEUs). Mathematics education is integral to the education system of every nation. Experts see mathematics as crucial to developing learners' academic growth, so its quality cannot be overlooked. Mathematics education cannot be of quality without quality Mathematics teachers, and quality Mathematics teachers can only be chinned out through quality MTE. These known observations have motivated the researcher to take up this study to investigate the various activities undertaken to train the Mathematics teachers who teach at the school level of Ghana's education. The above motivation revealed questions to the researcher, which could help the study. The research questions are:

1. What is the current status of Mathematics Education Programs at Teacher Education Universities in Ghana?

2. What is the future direction of Mathematics Education Programs of Teacher Education Universities in Ghana?
3. How relevant are the curriculums of Mathematics Education Programs of TEUs to classroom practice?
4. How does curriculum transaction take place in Mathematics Education Programs of Teacher Education Universities in Ghana?
5. How do evaluation processes take place in Mathematics Education Programs of Teacher Education Universities in Ghana?
6. What are the perceptions of the pre-service teachers and teacher educators concerning the learning culture, evaluation procedure, and resources of the Mathematics Education Programs of Teacher Education Universities in Ghana?
7. What challenges do Mathematics teacher educators encounter in the training process?

The framing of the research questions led to the formulating of the study's research objectives. The study's main objective was to assess the integrated MEPs by public TEUs meant to produce Mathematics teachers for Ghana's school system. This involved investigating the curriculum for training, the learning culture of the MEPs, the evaluation processes and the challenges of the MEPs. The formulated objectives of the study were:

1. To study the Mathematics Education Programs in the Teacher Education Universities of Ghana with respect to their purpose, present status, and future direction.
2. To study the Mathematics Education Programs in the Teacher Education Universities of Ghana with respect to:
 - Academic standards
 - Curriculum design, development and implementation
 - Evaluation procedures
 - Resources at the TEUs – Human and Material
 - Academic Leadership practices
3. To study the learning culture in the Mathematics Education Programmes of Ghana's Teacher

Education Universities.

4. To identify the challenges encountered in training pre-service Mathematics teachers in Teacher Education Universities.
5. To seek recommendations to improve the training process of the Mathematics Education Programmes in the Teacher Education Universities of Ghana.

The study was conducted considering different samples for different data collection techniques. Data was collected from different samples and sources to triangulate the outcome of the data analyses. The study's population included Mathematics teacher educators and pre-service Mathematics teachers. Random sampling was utilized to select teacher educators and pre-service teachers to answer a questionnaire, random sampling was used to select pre-service teachers for semi-structured interviews, and purposive sampling was employed to select teacher educators for semi-structured interviews. A total of 329 pre-service teachers and 28 teacher educators were selected to answer a questionnaire; nine (9) pre-service teachers and three (3) teacher educators were selected for semi-structured interviews.

The main objective of the study was to determine how the various aspects of the training of mathematics teachers in Ghana's teacher education universities, such as classroom transactions, leadership activities, evaluation procedures, curriculum design, implementation, and development, are conducted. The tools for collecting data relevant to the study were a 5-point Likert Scale questionnaire for teacher educators and pre-service teachers, observation schedules for classroom interactions, learning culture and resources (Human and Material), and semi-structured interview schedules. The researcher also collected relevant documents, including a departmental handbook, curriculum material, and semester course outlines for analysis. The researcher employed descriptive statistics (Frequencies, percentages and means), inferential statistics (Mann Whitney U test and Kraskal Wallis test), thematic analyses, and content analyses to analyze the data collected for the study.

5.2 Scope and Limitations of the study

The study aimed to gain an in-depth understanding of the processes followed by the TEUs of Ghana to train Mathematics teachers. The quality of activities such as curriculum planning, implementation and development, leadership practices, learning culture and resource availability were among the processes and areas investigated in

the study. The study also explored teacher educators' and pre-service teachers' challenges in the training process. The study serves as a means to better understand academic activities such as classroom transaction processes, assessment procedures, curriculum development processes, learning culture before, during and after class, the status of the MEPs, and future directions, among others.

The study's results will be beneficial in identifying the areas of training of Mathematics teachers in TEUs in Ghana that need improvement. It will expose the shortcomings in areas such as the curriculum for training, evaluation procedures, leadership practices, and learning culture of the TEUs. The study will also reveal the various academic, economic, welfare, and other challenges that teacher educators and pre-service teachers face in the TEUs during the training process. The information from the outcomes of the study will enable the TEUs, policymakers, stakeholders, and the Ministry of Education of Ghana to take the necessary steps needed to ensure that the best training is given to pre-service Mathematics teachers in the TEUs of Ghana through the suggestions that will be outlined in the study.

Though the researcher tried all possible means to ensure that the study would be conducted without many limitations, it is fair to say that every study suffers some limitations. However, the researcher ensured that the limitations did not affect the study's findings. The researcher ensured that the study was almost free of limitations except for those that were difficult to negotiate and commonly occur in social science research.

Among the limitations that the researcher was able to identify during the study include;

1. The researcher selected three (3) TEUs for the study out of eight (8). This was the case because the researcher wanted to use the final-year students as a primary source for data collection, and the remaining TEUs did not have final-year students at the time of the study.
2. The study did not involve private TEUs. Most of the private TEUs did not have final year students as they started the programmes recently, and some of the programmes of the private TEUs were on a distance basis as compared to the regular programmes run by the public TEUs.

3. The sample of teacher educators for answering the questionnaire was limited to 28 teacher educators. However, the population of teacher educators was 35, and it would have been prudent to use as many as possible for the best outcomes; reaching the teacher educators was difficult since most were extremely busy. The majority of them were not on the campuses due to off-campus assignments.
4. The teacher educators selected for the interviews were limited to three (3) teacher educators. It was not easy getting the teacher educators for the interviews. Some were unwilling to participate in the interviews, though they were assured that their identities would be anonymous in the study.
5. Out of the three TEU departments chosen for the study, one refused to release any document containing their curriculum structure to the researcher. One of the departments released the curriculum material, while the other released a handbook containing a detailed programme curriculum for analysis. Due to this, the researcher could only analyze the two curriculum documents provided by the two departments.

Despite these limitations, the researcher strongly believes that the study was conducted with all the care and necessary measures in place to ensure the findings will be beneficial to policymakers, teacher educators, pre-service teachers, the Ministry of Education, the TEUs departments, educationists, supervisors and future investigators to ensure that the best mathematics teachers are produced for the education system of Ghana.

5.3 Discussions

The study investigates the training of mathematics teachers at Ghana's TEUs. In Ghana, teacher education happens at two levels of the education ladder. The CoE train teachers in various disciplines for the education ladder's basic (preschool, primary, and JHS) levels. The Colleges of Education award a degree in primary education of various disciplines.

TEUs have colleges/schools/departments that train teachers. The TEUs are mandated to train educational professionals for the education sector of Ghana's education system, for various educational portfolios and as classroom teachers, though some end up in non-educational sectors. Among the programmes run by the TEUs are the MEPs, which train mathematics teachers for the SHS education level,

though some also find themselves at the basic level. The study's objective was to investigate the training process of mathematics teachers at the TEUs regarding purpose, present status and future direction, academic standards, curriculum design, development and implementation, evaluation procedures, resource availability, academic leadership practices, learning culture, and challenges of the training process as well as to seek suggestions for improvement.

It was realised that most teacher educators and pre-service teachers were male. Makarova et al. (2019) found that mathematics has the strongest masculine attribution among the male and female sexes. The authors further indicated that research has shown time and time again that people view mathematics and science as fields dominated by men and that scientists are mostly men.

The study further revealed that most of the grades of the pre-service teachers fell between A1 and C6, which is in agreement with the findings of Osei and Adu-Poku (2020), which stipulates that in core mathematics, nearly all of the pre-service teachers achieved the required minimum general admission grade of C6.

It was also found that the MEPs of the TEUs of Ghana had achieved their mandate of producing mathematics teachers for the pre-tertiary level of Ghana's education. The teacher educators interviewed declared that the MEPs of the TEUs have achieved their mandate of producing mathematics teachers for the pre-service sector of Ghana's education and that the mathematics education programmes are performing well. Ghana has moderately effective teacher education and mathematical physics programmes and significant improvement in primary and secondary education (International Mathematics Union, 2014). The participants expect that the MEP will improve to include current dimensions. Universities must structure programmes in response to the changing educational landscape to meet the demands of the 21st century (Ennin and Pushpanadham, 2023). It was also found that the main challenge of the MEPs of the TEUs is infrastructural deficit. Among African universities' challenges are insufficient mathematical facilities, equipment, and literature (International Mathematical Union, 2014).

The world is now recognised as a global village. Therefore, it is relevant that educational programmes allow learners to access employment and further education globally. The internationalisation of education encompasses disseminating

knowledge, skills, and values with universal relevance to cultivate global citizens (Deshpande, 2023, p. xx). It was revealed through the data analyses that the programmes have international recognition, enabling graduates to gain admission and employment worldwide. Modern education aims to cultivate global citizens equipped with skills and abilities that possess international market value (Deshpande, 2023). The internationalisation of higher education represents the pinnacle of international interactions among institutions, now perceived not as an end in itself but as a mechanism to enhance educational quality (Jibeen and Khan, 2015). The authors further stated that the benefits of internationalising higher education include knowledge translation and acquisition, talent mobilisation to support global research, and enhancing the curriculum with international content.

Academic activities are essential for improving the standards of an educational institution. Educators in educational institutions at all levels promote involvement in activities that significantly enhance knowledge, skills, and capacities (Kapur, 2021). Regularising academic enhancement activities in an educational institution provides learners and teachers with the necessary skills and knowledge to excel. Students' mindsets are encouraged towards task and activity implementation and educational goal attainment when they engage in academic activities (Kapur, 2022). It was revealed that the TEUs MEPs regularly organise academic enhancement programmes for teacher educators and pre-service teachers. This is positive and needs to be encouraged in all educational institutions.

It was also found that the teacher educators are committed to their professional development through the attendance of professional development programmes and the publishing of articles in journals. Through professional development programmes, teachers can acquire the information and abilities necessary to address students' learning (Ghimire, 2020). The teachers' commitment to professional development is essential as this affords them the skills needed to keep up with the fast-changing rate of today's world. Higher education teachers benefit significantly from CPD since it enhances their professional and teaching practices (Banik and Saha, 2023).

The curriculum of the MEPs of the TEUs was found to be crafted in a multidisciplinary form, equipping pre-service teachers with the ability to understand concepts by sourcing their meaning from different disciplines. It is believed that

multidisciplinary learning is a thorough method of tying the subject, concepts, and text together in a single thread to highlight the various areas of knowledge (Kumar and Rani, 2023). The author further reiterated that by altering both the scope and depth of learning, this kind of teacher development could enhance teaching strategies. Multidisciplinary education aims to foster an awareness of the connections between many disciplines and how they can be applied in concert to effectively address challenging problems (Bashir and Wani, 2024). The author further stated that by utilising diverse viewpoints from many fields, students can enhance their comprehension of the subject matter.

The study also revealed that the MEPs curriculum prioritises content knowledge ahead of the other areas of study. According to Sokoli and Koren (2017), a lack of high-quality university instruction continues to be a conundrum. Further, the authors stated that numerous variables impact the quality of instruction, but the lecturer's qualifications continue to be the primary ones. Teaching mathematics requires not less but rather more diverse knowledge of the subject (Loewenberg Ball et al., 2008).

Evaluation is integral to educational institutions. Evaluation is a means to understand the level of achievement of learners. It is, therefore, relevant that all the processes involved in the evaluation are well-planned and executed. Evaluation involves making value judgements in assessment (Prakash & Dhivyadeepa, 2016). The perception of students about the evaluation process is essential to their trust in the process. Students must have good perceptions of the evaluation processes to breed confidence and trustworthiness in their academic process. The study's findings revealed that the pre-service teachers are satisfied with the outcome of internal examinations but not external examinations. Students' perceptions of assessment substantially impact their learning and studying methods; in turn, students' study approaches influence how they perceive evaluation and assessment (Struyven et al., 2005). Pre-service teachers cited group work, test failure, accommodation, fairness, different assessment chances, and academic enablers as significant sources of concern (Simon et al., 2010).

Supervision of educators should be a priority of educational institutions; educators need to be supervised in all their activities to ensure the prescribed

processes are being deployed. It was revealed that though evaluation and pre-service teacher activities are monitored, teacher educators' supervision is not at the required level. It has been determined that efficient supervision is essential to students' school academic success (Ngole and Mkulu, 2021). The study also revealed that male and female teacher educators have the same perceptions of the academic standards of the TEUs, but Altaf and Saeed (2020) stipulated that teachers of different genders have differing opinions about national professional standards for teachers. The supervision of teacher educators needs enhancement in the MEPs of the TEUs for an improved learning experience.

The learning culture of an institution can potentially direct the actions of students and educators. A resilient learning culture increases employee motivation, satisfaction, and commitment (Halmaghi & Todăriță, 2023). It was revealed that there is a conducive environment for teaching and learning. A conducive classroom environment is a physical space that is safe and stimulating, has excellent architectural facilities, is designed for various teaching and learning programmes, pedagogies, and technologies, follows a carefully designed curriculum, matches with content standards, and uses instructional strategies that suit the needs of teachers and students (Chan-Anteza, 2020).

The Teacher educators were also found to be approachable and encourage collaboration among learners. The teacher educators encouraged the pre-service teacher to engage in group discussion. "Small-group discussion can be an effective vehicle to promote the ability to make sense of others' thoughts and feelings by increasing students' ability to consider multiple perspectives and justify perspectives with advanced reasoning strategies" (Wen, 2021). The competency of educators is essential as it is a factor in the teachers' performance and effectiveness. Teacher competence is seen as vital since it is the primary capital for managing the learning process, in addition to knowing the roles and obligations of a teacher in the classroom, which may be expressed through the teachers' performance (Aindra et al., 2022).

Human resources are very essential to every organisation. The human resources of an organisation control and efficiently utilise the material resources of an organisation to achieve its goals. Organisations that lack the backing of their human resources that are in line with quantity, quality, strategy, and function that is good will

find it challenging to maintain and develop its existence in the future (Chiara et al., 2023). The study's findings revealed that, whilst the pre-service teachers' responses indicated the availability of learning resources, the researcher's observation revealed the lack of some back resources such as lecture hall desks and lecture halls. There is a need to provide enough human resources for these departments as investment in human resources benefits organisations and the nation in general. Human capital is the result of carefully researched investments that generate income (Kryscynski et al., 2021). Organisations profit economically from investing in people (Vale et al., 2022). The human resources of TEI's require material resources to deliver efficiently. The unavailability of material resources can affect the training of learners in an educational institution. Material and human resource constraints in most public and private institutions have resulted in gaps in skill training (Mayombe and Lombard, 2016). The author further argues that the availability of appropriate training materials and skilled trainers with practical expertise and specialised technical abilities creates favourable conditions ("enabling environments") for graduate employment. It was found that the departments lacked material resources. This challenge should be addressed as the availability of resources improves the academic environment. Resources are essential in boosting teaching and learning in schools; in most situations, in developing countries, resource availability has been shown to increase student attendance at public schools (Molaudzi, 2021).

Teacher education institutions face several challenges in the training process. Institutions must be able to identify and find solutions to these challenges to train learners effectively. It was realised that teacher educators and pre-service teachers face several challenges; among the challenges are economic (high cost of food, high living expenditure, and expensive accommodation), welfare (lack of administrative support and recognition), academic (unfinished course outlines and regular strike actions) and resource (few lecture halls, lack of computers, poor functioning of counselling centres and lack of enough sporting facilities). This indicates that the teacher education system in Ghana's TEUs faces challenges that need attention. The teacher education system faces numerous challenges and difficulties (Mishra, 2020). The author listed challenges that teacher education institutions face, such as problems of practice teaching, incompetence of students and teachers, problems of practice teaching, lack of proper facilities, and lack of facilities for professional development.

Among the challenges faced by African universities in application of mathematics and mathematics education are:

1. Lack of emphasis by university administrations.
2. Society views mathematics as a difficult subject.
3. There is no support for research in mathematics education.
4. Lack of training in the practical application of mathematical principles.
5. There is a lack of Ph. D.s and professors in universities and countries.
6. Insufficient mathematical facilities, equipment, and literature.
7. Substantial staff teaching workloads.
8. Insufficient collaborations in mathematics.
9. Inadequate remuneration. (International Mathematical Union, 2014)

The relevance of integrating ICT tools in education is evident for all as a response to the ever-changing global landscape towards technology. ICT integration in the classroom can encourage student involvement in the educational process. Students are more likely to actively engage with educational content and achieve better learning results overall when interactive and creative learning approaches are incorporated utilising ICT (Chandra et al., 2024). The participants suggested the emphasis on ICT integration, which shows the participants' realisation of the influence of ICT in daily activities and the need to be equipped with the necessary skills for integration.

The participants further suggested balancing the content and pedagogy of the curriculum of the MEPs and of the TEUs. Pre-service teachers need both content and pedagogy for effective practice after graduation. It is, therefore, essential that they are given enough knowledge of the two for better application. Teachers must have a thorough and flexible understanding of pedagogical and subject matter content knowledge to help students develop useful cognitive maps and relate concepts to everyday life and other disciplines (Mafa-Theledi, 2024). This is necessary if they are to teach students in accordance with today's standards. The MEPs of the TEUs must

ensure that the pre-service teachers have content and pedagogy in the right proportions for better application.

5.4 Conclusions Based on Findings

The conclusions drawn out of the findings realized from the statistical analyses of the qualitative and quantitative data are presented below.

1. The pre-service teachers have information on evaluation procedures at the beginning of the semester through their course outlines. The course outlines give essential information to the pre-service teachers, such as course content, relevant previous knowledge, course objectives, and teaching and learning methods.
2. The HODs are the highest authority in the departments and are in charge of their daily operations. It was found that most teacher educators hold master's degrees, though a good number also hold PhDs.
3. The MEPs equip pre-service teachers with two content areas and emphasize content knowledge to equip them with enough content-wise arsenal for application after graduation, thereby emphasising multidisciplinary learning. The MEPs also prioritize the ICT courses to encourage integration in the classroom after graduation.
4. The male participants (pre-service teachers and teacher educators) outnumber the female participants (pre-service teachers and teachers educators). This is evidence of the dominance of the male gender in Science, Mathematics and Engineering disciplines at the higher level of education. Pre-service teachers want to further their education after graduation, but most want to travel abroad. This is negative for Ghana's education system. The MEPs attract good students as the qualifying grade score of the pre-service teachers is relatively high.
5. There are good practices that help the improvement of the academic standards of the MEPs of the TEUs, including the organization of academic enhancement activities, creation of a conducive learning environment, suitable teaching-learning practices, good leadership practices, unbiased admissions, and strictly supervised evaluation processes. It was also revealed that there is

poor supervision of teacher educators, which is not suitable for the academic standards of the MEPs.

6. The curriculums of the MEPs are multidisciplinary, suitably designed, well-structured and updated regularly. The curriculum has the right proportion of content, is well implemented and meets international standards because the graduates gain employment and admissions at the international level.
7. There is satisfaction concerning internal evaluation on the part of the pre-service teachers but dissatisfaction toward external evaluation. The pre-service teachers revealed that teacher educators utilize different evaluation methods to assess the various abilities of the pre-service teachers.
8. Though the pre-service teachers revealed the availability of learning resources from their responses, the researchers' observation revealed the lack of basic resources in the departments. Basic resources such as lecture hall desks and lecture halls were lacking in some of the departments. This is evidence of the programmes' infrastructural challenges.
9. The findings reveal that leaders exhibit commendable characteristics such as leadership knowledge, experience, and the promotion of collaboration, which align with good leadership practices. However, the study also indicates concerns regarding the treatment of members in terms of equality, respect, and dignity, which may contribute to dissatisfaction among staff. Furthermore, a significant proportion of teacher educators expressed dissatisfaction with the processes used to select leaders. These insights underscore the need for leadership strategies that prioritize inclusivity and fairness alongside measures to enhance the transparency and acceptance of leader selection processes.
10. The programmes provide various academic activities to help train and enhance the knowledge of the pre-service teachers and teacher educators to enhance their understanding of current global Mathematics teacher education practices. Though this is the situation, it was also revealed that supervision of teacher-educator activities was poor and needs improvement.
11. Activities on the MEPs campuses show a suitable learning culture at the MEPs. Some of such activities include the recommendation of reference

materials by teacher educators, the encouragement of collaboration, evaluation in different forms, and teacher educators teaching with passion. Pre-service teachers learn more after class, predominantly in groups.

12. The findings revealed challenges pre-service teachers and teacher educators face regarding the MEPs, including resource, welfare, economics, and academic challenges.
13. On human resources, two of the departments indicated having enough teacher educators, whilst one department did not have enough teacher educators. It was the same concerning administrative staff. This shows that the department's human resources are relatively acceptable. There was a massive deficit regarding material and infrastructural resources. The departments lacked basic resources such as lecture halls, lecture hall desks, and computers, and one of the departments did not have a computer laboratory.
14. The suggestions for improvement from the participants revealed the wish for emphasis to be placed on ICT integration. It was suggested that stakeholders provide the necessary material to enhance the utilization of ICT in the teaching and learning processes in the TEUs. There was also the push for a further look at the balance between content and pedagogy to aid pre-service teachers' practical application after graduation.
15. The MEPs train mathematics teachers for the pre-service level of Ghana's education. The programmes have achieved their mandate and are doing well, but there is more room for improvement. The primary challenge of the MEPs of the TEUs is infrastructural deficit.

5.5 Educational Implications of the Study

The following educational implications have been drawn from the study findings.

1. A significant benefit of the study is that it paves the way for comprehensive research at the teacher education and other levels of Ghana's education system, dwelling on the tools and methodologies of the study to gather enough data to aid policy formulation.
2. The results directly show that there is a significant deficit in the infrastructure of the MEPs of the TEUs. The necessary infrastructure must be provided to

develop quality and enough Mathematics teachers for Ghana's education system.

3. Committees can be set up to identify the most pressing infrastructural needs of the MEPs of the TEUs.
4. Educational leaders in tertiary institutions should ensure that the course outlines given to learners provide them with all the needed information.
5. Supervision of teachers in tertiary institutions should be enforced.
6. Students should be allowed to appraise teachers' activities in tertiary institutions. This will prompt teacher educators to ensure the best services are rendered to the students.
7. Tertiary education teachers should be encouraged to utilize TLMs and ICT tools in their delivery to enhance content understanding. It also aids prospective teachers in integrating these tools into the classroom.
8. More efforts should be put in place to ensure that the female gender gains interest in science, mathematics, and engineering programmes, especially at the highest level of education.
9. The necessary measures should be implemented to ensure that graduates of the MEPs remain in Ghana to serve the education system.
10. Leadership selection and appointment in educational institutions should be devoid of all forms of interference. All qualified persons should be given equal opportunities to be selected.
11. Measures should be implemented to ease students' and teachers' challenges in tertiary institutions. Providing basic needs such as accommodation and transportation can ease some economic challenges students and teachers face.
12. The MEPs should be expanded to allow more pre-service teachers to be trained.
13. The MEPs should include industrial internships in their curriculum to enhance pre-service teachers' chances of employment in non-education sectors.

14. Collaboration between industries, schools, and universities should be established to improve the curriculum for training suitable graduates for the employment world.
15. There should be exchange programmes with national and international institutions to expose graduates to global needs, requirements and cultural differences.
16. A fair and transparent evaluation committee should be enacted to ensure that the needs and grievances of learners and teachers are addressed fairly and equally.
17. A recognition and reward system should be implemented to encourage hard-working teacher educators and learners to encourage others.
18. The research culture in tertiary institutions should be orchestrated to be creative in enhancing the training of Mathematics teachers.
19. The various TEUs should cooperate to improve each other's curriculum to ensure that the best Mathematics teachers are trained for the education of Ghana.
20. Quality enhancement programmes in the form of workshops and seminars should be regularly organized to keep teacher educators and pre-service teachers informed of the current happenings in Mathematics teacher education.

5.6 Suggestions for further research

Though the researcher has done everything possible to produce a good study, there is always room for improvement. The following suggestions will be appropriate for further research.

- The study did not involve private universities that run MEPs. A study involving the private universities' MEPs would be more generalizable.
- A case study of each of the selected MEP departments can be conducted for an in-depth analysis of the MEPs of each of the TEUs
- A comparative study of the different MEPs of the TEUs can be conducted to provide insight into the differences and similarities of the training process.
- The study utilized a survey predominately to investigate the study's variables. An experimental study can be conducted on the variable of the study.

- Another study can be conducted as a follow-up to find out graduates of the programmes' perceptions of the benefits they have derived from their training.
- The inclusion of a new population, such as employers and parents, may allow further dimensions and insights into the study's findings.
- A longitudinal study involving the study's variables over time may provide a different dimension regarding the study's outcomes.

5.7 Final Remarks

This study was necessitated based on the willingness to investigate the training of mathematics teachers in the Ghana TEUs. The study was based on variables including academic standards, curriculum design, development and implementation, evaluation procedures, resources at the TEUs – human and material, academic leadership practices, learning culture and challenges of the MEPs of the TEUs. The study investigated how these variables are managed in the training of Mathematics teachers. For the MEPs of the TEUs to be able to train the best Mathematics teachers for the pre-tertiary sector of Ghana's education, these variables play an essential role and must be managed very well.

The study addressed a gap in existing knowledge concerning the training of Mathematics teachers in Ghana's TEUs. Qualitative and quantitative methods were utilized in the study to gain an in-depth knowledge of the study variables. Data was collected from different sources to understand the situation on the ground better. Data was collected from pre-service teachers, teacher educators, observations and interviews.

The study contributed uniquely to the field of Mathematics Education, especially TEUs who train Mathematics teachers. It serves as a reference source for policymakers, universities, the Ghana Education Service, and the Ministry of Education in decision-making about Mathematics teachers and their training in Ghana's universities. The findings and conclusions of the study show that though there are various positives in the preparation of Mathematics teachers, such as good leadership practices, good curriculum implementations, suitable curriculum structures, and good learning culture, the primary challenge of the MEPs of the TEUs is infrastructural deficit. Basic infrastructure such as lecture halls, computers, computer labs and lecture hall desks are challenges to the MEPs of the TEUs.