Chapter V

FINDINGS, CONCLUSIONS AND SUGGESTIONS
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FINDINGS

1. TECHNO-PEDAGOGICAL SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

1.1a. 15.5% of the secondary teacher education students have significantly high level of skill in learning.

b. 16% of the secondary teacher education students have significantly high level of skill in preparing lesson plan.

c. 18% of the secondary teacher education students have significantly high level of skill in preparing learning material.

d. 13.9% of the secondary teacher education students have significantly high level of skill in implementing instructional strategy.

e. 16.9% of the secondary teacher education students have significantly high level of skill in communication.

f. 15% of the secondary teacher education students have significantly high level of skill in evaluation.

g. 18.8% of the secondary teacher education students have significantly high level of skill in guidance.
h. 14.7% of the secondary teacher education students have significantly high level of techno-pedagogical skills.

1.2 a. 13.8% of the male 16.6% of the female secondary teacher education students have significantly high level of skill in learning.

b. 20.8% of the male and 16.3% of the female secondary teacher education students have significantly high level of skill in preparing lesson plan.

c. 17.6% of the male and 15% of the female secondary teacher education students have significantly high level of skill in preparing learning material.

d. 15% of the male and 13.3% of the female secondary teacher education students have significantly high level of skill in implementing instructional strategy.

e. 22% of the male and 13.7% of the female secondary teacher education students have significantly high level of skill in communication.

f. 14.8% of the male and 15.2% of the female secondary teacher education students have significantly high level of skill in evaluation.

g. 23.7% of the male and 15.9% of the female secondary teacher education students have significantly high level skill in guidance.

h. 17.8% of the male and 12.9% of the female secondary education students have significantly high level of techno-pedagogical skills.
1.3. There is no significant difference between male and female secondary teacher education students in their skill in learning, implementing instructional strategy and evaluation, but there is significant difference between male and female secondary teacher education students in their skill in preparing lesson plan, preparing learning material, communication, guidance and techno-pedagogical skills.

1.4. There is no significant difference between aided and un-aided college secondary teacher education students in their skill in learning, preparing learning material, communication, evaluation, guidance and techno-pedagogical skills, but there is significant difference between aided and un-aided college secondary teacher education students in their skill in preparing lesson plan and implementing instructional strategy.

1.5. There is no significant difference between graduate and post-graduate secondary teacher education students in their skill in preparing lesson plan, implementing instructional strategy, communication, guidance and techno-pedagogical skills, but there is significant difference between graduate and post-graduate secondary teacher education students in their learning, preparing learning material and evaluation.

1.6. There is no significant difference between secondary teacher education students who have attended computer course and who have not attended computer course in their skill in preparing lesson plan, implementing instructional strategy and communication, but there is significant difference between secondary teacher education students who have
attended computer course and who have not attended computer course in their learning, preparing learning material, evaluation, guidance and techno-pedagogical skills.

1.7 There is no significant difference among English, Mathematics, Natural Science, Physical Science and Social Science optional subject secondary teacher education students in their skill in learning, preparing lesson plan, communication and techno-pedagogical skills, but there is significant difference among English, Mathematics, Natural Science, Physical Science and Social Science optional subject secondary teacher education students in their skill in preparing learning material, implementing instructional strategy, evaluation and guidance.

1.8 There is no significant association between parents’ annual income and skill in preparing lesson plan, preparing learning material, implementing instructional strategy, evaluation, guidance and techno-pedagogical skills of the secondary teacher education students, but there is significant association between parents’ annual income and skill in learning and communication.
2. THINKING SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

2.1 a. 16.3% of the secondary teacher education students have significantly high level of skill in critical thinking.

b. 13.6% of the secondary teacher education students have significantly high level of skill in creative thinking.

c. 14.7% of the secondary teacher education students have significantly high level of skill in logical reasoning.

d. 10.6% of the secondary teacher education students have significantly high level of skill in problem solving.

e. 14.9% of the secondary teacher education students have significantly high level of skill in decision making.

f. 15.1% of the secondary teacher education students have significantly high level of skill in lateral thinking.

g. 15.9% of the secondary teacher education students have significantly high level of thinking skills.

2.2 a. 16.6% of the male and 16.2% of the female secondary teacher education students have significantly high level of skill in critical thinking.

b. 16.6% of the male and 11.7% of the female secondary teacher education students have significantly high level of skill in creative thinking.
c. 16.6% of the male and 13.4% of the female secondary teacher education students have significantly high level of skill in logical reasoning.

d. 11% of the male and 10.3% of the female secondary teacher education students have significantly high level of skill in problem solving.

e. 17.8% of the male and 13.2% of the secondary teacher education students have significantly high level of skill in decision making.

f. 13.8% of the male and 15.9% of the female secondary teacher education students have significantly high level of skill in lateral thinking.

g. 18.3% of the male and 14.4% of the female secondary teacher education students have significantly high level of thinking skills.

2.3. There is no significant difference between male and female secondary teacher education students in their creative thinking, logical reasoning, problem solving, decision making, lateral thinking and thinking skills, but there is significant difference between male and female secondary teacher education students in their critical thinking skills.

2.4. There is no significant difference between aided and un-aided college secondary teacher education students in their critical thinking, creative thinking, logical reasoning, problem solving, decision making, lateral thinking and thinking skills.

2.5. There is no significant difference between graduate and post-graduate secondary teacher education students in their creative thinking, problem solving, decision making and thinking skills, but there is significant
difference between graduate and post-graduate secondary teacher education students in their critical thinking, logical reasoning and lateral thinking.

2.6. There is no significant difference between secondary teacher education students who have attended computer course and who have not attended computer course in their critical thinking, logical reasoning, decision making and lateral thinking, but there is significant difference between secondary teacher education students who have attended computer course and who have not attended computer course in their creative thinking, problem solving and thinking skills.

2.7. There is no significant difference among English, Mathematics, Natural Science, Physical Science and Social Science optional subject secondary teacher education students in their critical thinking, creative thinking, decision making and lateral thinking, but there is significant difference among English, Mathematics, Natural Science, Physical Science and Social Science optional subject secondary teacher education students in their logical reasoning, problem solving and thinking skills.

2.8. There is no significant association between parents’ annual income and creative thinking, logical reasoning, problem solving, decision making, lateral thinking and thinking skills of the secondary teacher education students, but there is no significant association between parents’ annual income and critical thinking of the secondary teacher education students.
3. RELATIONSHIP BETWEEN TECHNO-PEDAGOGICAL SKILLS AND THINKING SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

3.1. There is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the secondary teacher education students.

3.2. There is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the male secondary teacher education students.

3.3. There is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the female secondary teacher education students.

4.1. IDENTIFICATION AND CLUSTERING OF VARIABLES REPRESENTING A SINGLE CONSTRUCT FROM A SET OF VARIABLES

There is significant factor with positive factor loading of the variable, namely skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance and thinking skills. This factor is identified as Pedagogical Excellence.
CONCLUSIONS

1. TECHNO-PEDAGOGICAL SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

   The results reveal that male secondary teacher education students are significantly better than female secondary teacher education students in their skill in preparing lesson plan. This may be due to the fact that male secondary teacher education students take their opportunity for teaching practice as an occasion to express their creative spirits over and above their female counterparts who are more syllabus-bound and convergent thinkers.

   The results reveal that male secondary teacher education students are significantly better than female secondary teacher education students in their skill in preparing learning material. This may be due to the fact that male secondary teacher education students are happy to take a break from their routine college life and revel in their opportunity to be with kids at school and assert their role as teachers at the very outset.

   The results reveal that male secondary teacher education students are significantly better than female secondary teacher education students in their skill in communication. This may be due to the fact that male secondary teacher education students are by their very gender privilege more exposed to technological innovations and are able to communicate the same in their classroom interactions.

   The results reveal that male secondary teacher education students are significantly better than female secondary teacher education students in their
skill in guidance. This may be due to the fact that male secondary teacher education students find it easy to interact with students and identify the needy ones and make extra effort to associate with problem children and take it as a challenge over and above their female counter parts.

The results reveal that male secondary teacher education students are significantly better than female secondary teacher education students in their techno-pedagogical skills. This may be due to the fact that male secondary teacher education students are able to creatively execute their teaching skills and manifest confidence in their teaching practice period compared to their female counter parts.

The results reveal that aided college secondary teacher education students are significantly better than un-aided college secondary teacher education students in their skill in preparing lesson plan. This may be due to the fact that aided college is staffed with people of expertise, as the selection process to such institutions vary significantly from that of the un-aided institutions and experience and are well-equipped compared to the un-aided colleges in their infra-structural facilities as well.

The results reveal that aided college secondary teacher education students are significantly better than un-aided college secondary teacher education students in their skill in implementing instructional strategy. This may be due to the fact that these students come through centralised allotment procedure and rank top in the allotment procedure.
The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their skill in learning. This may be due to the fact that post-graduate secondary teacher education students have an edge over the graduate students in their knowledge of content and are naturally more experienced in their skill in learning.

The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their skill in preparing learning material. This may be due to the fact that post-graduate students have better content knowledge which facilitates their preparation of learning materials. Moreover, the teaching practice is a real test of one’s manifold skills coupled with one’s subject knowledge.

The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their skill in evaluation. This may be due to the fact that evaluation which involves experience and mastery of the content is more feasible to post-graduate students.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their skill in learning. This may be due to the fact that those who attended computer course
are a bit more experienced than those who are not exposed to computer training programmes in their skill in learning.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their skill in preparing learning material. This may be due to the fact that most of the students who are computer literates can prepare their learning material in formats that can be interesting through the use of computer effectively.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their skill in evaluation. This may be due to the fact that such students excel in pedagogical skills which make them confident to make evaluations as well.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their skill in guidance. This may be due to the fact that students who have attended computer course have an additional confidence in their learning and teaching which initiates their skill in guidance also.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their techno-pedagogical skills. This may be due to the fact that computer skill and
techno-pedagogical skill have a high positive correlation and the knowledge in one field will certainly of help to the other.

The results reveal that Social Science optional subject secondary teacher education students are significantly better than English, Mathematics, Natural science and Physical Science optional subject secondary teacher education students in their skill in preparing learning material. This may be due to the fact that Social Science optional subject secondary teacher education students have more avenues and openings to link the material they handle with life and day to day experiences of the learners.

The results reveal that Natural Science optional subject secondary teacher education students are significantly better than English, Mathematics, Physical Science and Social Science optional subject secondary teacher education students in their skill in implementing instructional strategy. This may be due to the fact that Natural Science optional subject secondary teacher education students are more acquainted with instructional strategies involving the class as a group. They have opportunities for field work and experiments which makes them unique and different from the rest of the secondary teacher education students.

The results reveal that Mathematics optional subject secondary teacher education students are significantly better than English, Natural Science, Physical Science and Social Science optional subject secondary teacher education students in their skill in evaluation. This may be due to the fact that these students are well-versed in various pre-requisites of evaluation such as
objectivity, validity and reliability from their training in their own discipline which makes them capable of evaluation during their practice-teaching programme.

The results reveal that Natural Science optional subject secondary teacher education students are significantly better than English, Mathematics, Physical Science and Social Science optional subject secondary teacher education students in their skill in guidance. This may be due to the fact that these students have a flair for all that is in nature, especially those that can become a point of reference in the classroom. Thus they make use of their aptitude for naturalistic intelligence in their classroom interaction that demands guidance.

The results reveal that there is significant association between parents’ annual income and skill in learning and communication. This may be due to the fact that those parents who are economically sound can compensate for whatever is lacking in their respective schools a from an early age which makes a qualitative difference between these two sets of people.
2. THINKING SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

The results reveal that female secondary teacher education students are significantly better than male secondary teacher education students in their critical thinking. This may be due to the fact that an ideal critical thinker is habitually inquisitive, well-informed, open minded, flexible, fair-minded in evaluation and such a person steps aside from his/her personal beliefs and prejudices to sort out the facts and discover the truth even at the expense of her/his basic belief system. Female students are able to live out such qualities over and above their male counterparts.

But this study was not at par with the study conducted by Sibichen and Annaraja (2010). The study concluded that there is no significant difference between male and female secondary teacher education students in their critical thinking skills. The study conducted by Fahmi and Hmoud (2010) found out that male students outperformed female students in critical thinking skills.

The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their critical thinking. This may be due to the fact that the post-graduate students are more likely to have greater exposure and experience in their respective fields which gives them an added confidence to think critically and decide on their own.

The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their logical reasoning. This may be due to the fact that their previous training in logical reasoning makes them function superior to their classmates who are graduates.
The results reveal that post-graduate secondary teacher education students are significantly better than graduate secondary teacher education students in their lateral thinking. This may be due to the fact that the post-graduate students are more exposed to step-wise thinking and for thinking outside the box with a goal in mind. The post-graduate students are by experience highly purposeful, systematically organized, controlled and express skills in selective thinking.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their creative thinking. This may be due to the fact that the students who have attended computer course are likely to acquire skills in ideational fluency, originality, flexibility, divergent thinking and improve their ability to see and build novel relationships from the existing phenomena compared to their fellow classmates.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their problem solving. This may be due to the fact that these students are able to prepare, produce and evaluate various tasks better than those who do not have computer education due to their greater exposure and added training in the field of computer.

The results reveal that secondary teacher education students who have attended computer course are significantly better than secondary teacher education students who have not attended computer course in their thinking skills. This may be due to the fact that computer training is also training in one's thinking and reasoning skills.
The results reveal that Mathematics optional subject secondary teacher education students are significantly better than English, Natural science, Physical Science and Social Science optional subject secondary teacher education students in their logical reasoning skill. This may be due to the fact that Mathematics optional subject students get ample of opportunities for deduction and induction through step by step analysis which caters to their reasoning skill.

The results reveal that Mathematics optional subject secondary teacher education students are significantly better than English, Natural science, Physical Science and Social Science optional subject secondary teacher education students in their problem solving skill. This may be due to the fact that the subject Mathematics involves lot of problem solving instances and it makes them qualitatively different from the rest of the students.

The results reveal that Mathematics optional subject secondary teacher education students are significantly better than English, Natural science, Physical Science and Social Science optional subject secondary teacher education students in their thinking skills. This may be due to the fact that Mathematics students have greater exposure and receive lot of training in manifold dimensions of thinking skill as part of their training in Mathematics.

This study support the study conducted by Mahyuddin, Pihie, Elias and Konting (2004). The study concluded that the vocational/technical and science and mathematics teachers were incorporating the thinking skills as compared to language teachers.
3. RELATIONSHIP BETWEEN TECHNO-PEDAGOGICAL SKILLS AND THINKING SKILLS OF THE SECONDARY TEACHER EDUCATION STUDENTS

The results reveal that there is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the secondary teacher education students. This may be due to the fact that these skills have a very high positive correlation and the training and acquisition of one will assist and help for the mastery of another.

This study is in agreement with the study conducted by Duphorhe and Orth (2000). The study found out that computer conferencing designs show higher critical thinking skills. This study also support the study conducted by Thierry (2007). The study concluded that information and communication technologies help student teachers to face pedagogical challenges encountered during their practice teaching. This study also support the study conducted by Ya-Ting and Heng-An (2008). The study concluded that there is a significant positive relationship between critical thinking skills and critical thinking dispositions through different online instructional strategies.

But this study was not in agreement with the study conducted by Jeong and Kim (2009). The study found out that pre-service teachers were unable to translate pedagogical content knowledge into pedagogically sound technology integrated lessons.
The results reveal that there is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the male secondary teacher education students. This may be due to the fact that co-operation and team work as a single group pays many dividends in the field of teaching and especially at the earlier years or stages of one's teaching career.

The results reveal that there is significant relationship between skill in learning, preparing lesson plan, preparing learning material, implementing instructional strategy, communication, evaluation, guidance, techno-pedagogical skills and thinking skills of the female secondary teacher education students. This may be due to the fact that female students also work as a team like that of the boys or vice versa, and yield good fruits because unity is always strength.

4. IDENTIFICATION AND CLUSTERING OF VARIABLES REPRESENTING A SINGLE CONSTRUCT FROM A SET OF VARIABLES

The Factor Analysis results showed that there existed a single factor as significant. This factor consists of the variables such as skill in learning, preparing lesson plan, preparing learning materials, communication, implementing instructional strategy, guidance, evaluation and thinking skill. This factor is named as Pedagogical Excellence.
RECOMMENDATIONS TO EDUCATIONAL ADMINISTRATORS

1. Teaching strategies should be developed by using different dimensions of techno-pedagogy.

2. Workshops and seminars may be conducted to teachers and parents to help them understand the importance of thinking skills in teaching learning scenario.

3. Sessions for developing thinking skills among students should be conducted.

4. Information and Communication Technology must be incorporated in teaching-learning processes.

5. Problem based teaching method can be adopted.

6. Prospective student teachers should be given ample opportunity to thinking skills by giving individualized puzzle solving sessions and training in logical thinking.

7. Techno-pedagogical skills of the B.Ed. students should be enhanced through computer training programme.

8. Create more opportunities for self-reflective context-based class teaching practice as a means to gain thinking skills.

9. Analysis of the complex task of teaching whereby the demanding task is studied in detail, holistically as well as in separate individual segments for better understanding and application.
10. Assigning pre-service teachers to techno-pedagogical skill incorporated practicum to smaller classes and more capable pupils can help to foster their techno-pedagogical skills.

11. Collaborative teaching and peer support during the initial teaching practice, coupled with appropriate staff and school support can help inexperienced teachers to review and correct inappropriate teaching methods and teaching weaknesses, thus fostering personal teaching effectiveness.
SUGGESTIONS FOR FURTHER RESEARCH

1. Techno-pedagogical skills and thinking skills of college students can be studied.

2. Learning packages and modules to improve thinking skills can be developed.

3. Creative Thinking Skill is an area lacking in students. So learning packages to improve critical thinking skill can be made.

4. Influence of techno-pedagogical skills on teaching competency of teacher trainees can be studied.

5. Component wise influence of thinking skills on teaching competency of the secondary teacher education students can be studied.

6. Computer conference designs can be developed to improve the thinking skills of the teacher trainees.

7. Study can be conducted to find out the level of technology integration in teacher training institutions.

8. Technology usage by teacher educators can be studied.

9. Teacher educators’ use of techno-pedagogical content knowledge for instructional practices.

10. Influence of techno-pedagogical content knowledge on academic achievement of teacher trainees can be studied.

11. Teacher educators use of various thinking skills interventions in classroom.
12. Influence of teacher’s thinking skill interventions in classroom on students’ academic achievement.

13. Teacher educators’ perceptions on technology usage in classrooms can be studied.

14. A study can be conducted to find out the strategies to enhance thinking skills of pre-service teachers.

15. Development of thinking skills enhancement modules for students.

16. Impact of critical thinking skills on technology use of teacher trainees can be studied.

17. Optional subject-wise thinking skill enhancement strategies can be developed for teacher trainees.