CHAPTER – V
FINDINGS, INTERPRETATIONS,
RECOMMENDATIONS AND SUGGESTIONS

This chapter consists of the sum up parts of the research. It includes the findings that were drawn from the objectives as well as the hypotheses, interpretations, educational implications and suggestions for further studies. The conclusions that emerged out of the study, based on the analysis form the major part of this chapter.

5.1 FINDINGS

5.1.1 Metacognition of Prospective Teachers of Physical Science

1.1 a) 14.4% of prospective teachers of physical science have high level of declarative knowledge.

b) 18.0% of prospective teachers of physical science have high level of procedural knowledge.

c) 15.9% of prospective teachers of physical science have high level of conditional knowledge.

d) 14.7% of prospective teachers of physical science have high level of planning.

e) 17.1% of prospective teachers of physical science have high level of information management.

f) 14.5% of prospective teachers of physical science have high level of monitoring.

g) 20.6% of prospective teachers of physical science have high level of evaluating.

h) 16.4% of prospective teachers of physical science have high level of metacognition.
1.2 There is no significant difference between male and female prospective teachers of physical science in their declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition.

1.3 There is no significant difference between government aided and self-financed college prospective teachers of physical science in their declarative knowledge, procedural knowledge, planning, information management, monitoring, evaluating and metacognition. But, there is significant difference between government aided and self-financed college prospective teachers of physical science in their conditional knowledge.

While comparing the mean scores of government aided (35.20) and self-financed college (34.25) prospective teachers of physical science, government aided prospective teachers of physical science are better in their conditional knowledge.

1.4 There is no significant difference between graduate and post graduate prospective teachers of physical science in their declarative knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition. But, there is significant difference between graduate and post graduate prospective teachers of physical science in their procedural knowledge.

While comparing the mean scores of graduate (36.41) and post graduate (37.30) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their procedural knowledge.

1.5 There is no significant difference between Tamil and English medium prospective teachers of physical science in their procedural knowledge, conditional knowledge, planning, information management, monitoring,
evaluating and metacognition. But there is significant difference between Tamil and English medium prospective teachers of physical science in their declarative knowledge.

While comparing the mean scores of Tamil (38.07) and English (37.53) medium prospective teachers of physical science, Tamil medium prospective teachers of physical science are better in their declarative knowledge.

1.6 There is significant difference between urban and rural area college prospective teachers of physical science in their declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition.

While comparing the mean scores of urban (38.45) and rural (37.49) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their declarative knowledge.

While comparing the mean scores of urban (37.12) and rural (36.20) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their procedural knowledge.

While comparing the mean scores of urban (35.26) and rural (34.00) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their conditional knowledge.

While comparing the mean scores of urban (37.24) and rural (36.18) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their planning.

While comparing the mean scores of urban (36.71) and rural (35.68) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their information management.
While comparing the mean scores of urban (37.67) and rural (36.89) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their monitoring.

While comparing the mean scores of urban (35.52) and rural (34.81) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their evaluating.

While comparing the mean scores of urban (257.98) and rural (251.24) area college prospective teachers of physical science, urban area college prospective teachers of physical science are better in their metacognition.

1.7 There is no significant difference between day scholar and hostel prospective teachers of physical science in their declarative knowledge, conditional knowledge, planning, information management, monitoring, and evaluating. But, there is significant difference between day scholar and hostel prospective teachers of physical science in their procedural knowledge and metacognition.

While comparing the mean scores of day scholar (36.41) and hostel (37.21) prospective teachers of physical science, hostel prospective teachers of physical science are better in their procedural knowledge.

While comparing the mean scores of day scholar (252.95) and hostel (257.26) prospective teachers of physical science, hostel prospective teachers of physical science are better in their metacognition.

1.8 There is no significant difference between joint and nuclear family prospective teachers of physical science in their procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition. But, there is significant difference between joint and nuclear family prospective teachers of physical science in their declarative knowledge.
While comparing the mean scores of joint family (38.26) and nuclear family (37.66) prospective teachers of physical science, the joint family prospective teachers of physical science are better in their declarative knowledge.

1.9 There is no significant difference among men, women and co-education college of education prospective teachers of physical science in their declarative knowledge, planning and monitoring. But, there is significant difference among men, women and co-education college of education prospective teachers of physical science in their procedural knowledge, conditional knowledge, information management, evaluation and metacognition.

While comparing the mean scores of men (38.85), women (36.66) and co-education (36.41) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their procedural knowledge.

While comparing the mean scores of men (36.50), women (35.15) and co-education (34.17) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their conditional knowledge.

While comparing the mean scores of men (38.00), women (36.62) and co-education (35.81) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their information management.

While comparing the mean scores of men (36.95), women (35.77) and co-education (34.80) college of education prospective teachers of physical
science, men college of education prospective teachers of physical science are better in their evaluating.

While comparing the mean scores of men (265.90), women (255.81) and co-education (252.55) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their metacognition.

1.10 There is significant difference among Tirunelveli, Thoothukudi and Kanyakumari district prospective teachers of physical science in their declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition.

While comparing the mean scores of Tirunelveli (37.72), Thoothukudi (38.84) and Kanyakumari (37.36) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their declarative knowledge.

While comparing the mean scores of Tirunelveli (36.75), Thoothukudi (37.27) and Kanyakumari (35.89) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their procedural knowledge.

While comparing the mean scores of Tirunelveli (34.85), Thoothukudi (35.37) and Kanyakumari (33.52) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their conditional knowledge.

While comparing the mean scores of Tirunelveli (36.52), Thoothukudi (37.56) and Kanyakumari (36.01) district prospective teachers of physical
science, Thoothukudi district prospective teachers of physical science are better in their planning.

While comparing the mean scores of Tirunelveli (36.23), Thoothukudi (36.73) and Kanyakumari (35.47) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their information management.

While comparing the mean scores of Tirunelveli (37.30), Thoothukudi (37.98) and Kanyakumari (36.57) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their monitoring.

While comparing the mean scores of Tirunelveli (35.79), Thoothukudi (35.69) and Kanyakumari (33.99) district prospective teachers of physical science, Tirunelveli district prospective teachers of physical science are better in their evaluating.

While comparing the mean scores of Tirunelveli (255.17), Thoothukudi (259.43) and Kanyakumari (248.81) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their metacognition.

1.11 There is no significant difference among OC, BC, MBC and SC & ST prospective teachers of physical science in their procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition. But there is significant difference among OC, BC, MBC and SC & ST prospective teachers of physical science in their declarative knowledge.
While comparing the mean scores of OC (37.63), BC (37.65), MBC (37.78) and SC & ST (38.81) community prospective teachers of physical science, SC & ST community prospective teachers of physical science are better in their declarative knowledge.

1.12 There is no significant association between order of birth and declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition of prospective teachers of physical science.

1.13 There is no significant association between computer literacy and planning, information management, evaluating and metacognition of prospective teachers of physical science. But, there is significant association between computer literacy and declarative knowledge, procedural knowledge, conditional knowledge and monitoring of prospective teachers of physical science.

1.14 There is no significant association between newspaper reading habits and declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating and metacognition of prospective teachers of physical science.

1.15 There is no significant association between library usage and declarative knowledge, procedural knowledge, information management and monitoring of prospective teachers of physical science. But, there is significant association between library usage and conditional knowledge, planning, evaluating and metacognition of prospective teachers of physical science.
5.1.2 ICT awareness of Prospective Teachers of Physical Science

2.1 a) 15.4% of prospective teachers of physical science have high level of general awareness.

b) 15.1% of prospective teachers of physical science have high level of software awareness.

c) 21.8% of prospective teachers of physical science have high level of hardware awareness.

d) 18.0% of prospective teachers of physical science have high level of internet awareness.

e) 15.1% of prospective teachers of physical science have high level of ICT awareness.

2.2 There is no significant difference between male and female prospective teachers of physical science in their general awareness and internet awareness. But, there is significant difference between male and female prospective teachers of physical science in their software awareness, hardware awareness and ICT awareness.

While comparing the mean scores of male (4.96) and female (4.17) prospective teachers of physical science, male prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of male (4.53) and female (4.07) prospective teachers of physical science, male prospective teachers of physical science are better in their hardware awareness.

While comparing the mean scores of male (18.04) and female (16.17) prospective teachers of physical science, male prospective teachers of physical science are better in their ICT awareness.
2.3 There is no significant difference between government aided and self-financed college prospective teachers of physical science in their hardware awareness. But, there is significant difference between government aided and self-financed college prospective teachers of physical science in their general awareness, software awareness, internet awareness and ICT Awareness.

While comparing the mean scores of government aided (5.56) and self-financed college (4.11) prospective teachers of physical science, the government aided prospective teachers of physical science are better in their general awareness.

While comparing the mean scores of government aided (5.06) and self-financed college (4.05) prospective teachers of physical science, the government aided prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of government aided (4.13) and self-financed college (3.47) prospective teachers of physical science, the government aided prospective teachers of physical science are better in their internet awareness.

While comparing the mean scores of government aided (19.03) and self-financed college (15.70) prospective teachers of physical science, the government aided prospective teachers of physical science are better in their ICT awareness.

2.4 There is significant difference between graduate and post graduate prospective teachers of physical science in their general awareness, software awareness, hardware awareness, internet awareness and ICT awareness.
While comparing the mean scores of graduate (4.32) and post graduate (4.90) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their general awareness.

While comparing the mean scores of graduate (4.15) and post graduate (4.91) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of graduate (4.04) and post graduate (4.59) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their hardware awareness.

While comparing the mean scores of graduate (3.50) and post graduate (4.22) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their internet awareness.

While comparing the mean scores of graduate (16.01) and post graduate (18.62) prospective teachers of physical science, post graduate prospective teachers of physical science are better in their ICT awareness.

2.5 There is no significant difference between Tamil and English medium prospective teachers of physical science in their hardware awareness. But, there is significant difference between Tamil and English medium prospective teachers of physical science in their general awareness, software awareness, internet awareness and ICT awareness.

While comparing the mean scores of Tamil (4.14) and English (4.69) medium prospective teachers of physical science, English medium prospective teachers of physical science are better in their general awareness.
While comparing the mean scores of Tamil (3.96) and English (4.58) medium prospective teachers of physical science, English medium prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of Tamil (3.33) and English (3.90) medium prospective teachers of physical science, English medium prospective teachers of physical science are better in their internet awareness.

While comparing the mean scores of Tamil (15.48) and English (17.34) medium prospective teachers of physical science, English medium prospective teachers of physical science are better in their ICT awareness.

2.6 There is significant difference between urban and rural area college prospective teachers of physical science in their general awareness, software awareness, hardware awareness, internet awareness and ICT awareness.

While comparing the mean scores of urban (4.85) and rural (4.16) area college prospective teachers of physical science, the urban area college prospective teachers of physical science are better in their general awareness.

While comparing the mean scores of urban (4.62) and rural (4.05) area college prospective teachers of physical science, the urban area college prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of urban (4.35) and rural (3.98) area college prospective teachers of physical science, the urban area college prospective teachers of physical science are better in their hardware awareness.

While comparing the mean scores of urban (3.93) and rural (3.42) area college prospective teachers of physical science, the urban area college prospective teachers of physical science are better in their internet awareness.
While comparing the mean scores of urban (17.75) and rural (15.61) area college prospective teachers of physical science, the urban area college prospective teachers of physical science are better in their ICT awareness.

2.7 There is no significant difference between day scholar and hostel prospective teachers of physical science in their software awareness, hardware awareness, internet awareness and ICT awareness. But, there is significant difference between day scholar and hostel prospective teachers of physical science in their general awareness.

While comparing the mean scores of day scholar (4.34) and hostel (4.71) prospective teachers of physical science, the hostel prospective teachers of physical science are better in their general awareness.

2.8 There is no significant difference between joint and nuclear family prospective teachers of physical science in their general awareness, software awareness, hardware awareness, internet awareness and ICT awareness.

2.9 There is no significant difference among men, women and co-education college of education prospective teachers of physical science in their internet awareness. But, there is significant difference among men, women and co-education college of education prospective teachers of physical science in their general awareness, software awareness, hardware awareness, and ICT awareness.

While comparing the mean scores of men (5.05), women (4.87) and co-education (4.24) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their general awareness.

While comparing the mean scores of men (5.80), women (4.11) and co-education (4.23) college of education prospective teachers of physical science,
men college of education prospective teachers of physical science are better in their software awareness.

While comparing the mean scores of men (4.95), women (3.74) and co-education (4.18) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their hardware awareness.

While comparing the mean scores of men (19.70), women (16.28) and co-education (16.26) college of education prospective teachers of physical science, men college of education prospective teachers of physical science are better in their ICT awareness.

2.10 There is no significant difference among Tirunelveli, Thoothukudi and Kanyakumari district prospective teachers of physical science in their software awareness, internet awareness and ICT awareness. But there is significant difference among Tirunelveli, Thoothukudi and Kanyakumari district prospective teachers of physical science in their general awareness and hardware awareness.

While comparing the mean scores of Tirunelveli (4.70), Thoothukudi (4.41) and Kanyakumari (4.09) district prospective teachers of physical science, Tirunelveli district prospective teachers of physical science are better in their general awareness.

While comparing the mean scores of Tirunelveli (3.91), Thoothukudi (4.05) and Kanyakumari (4.34) district prospective teachers of physical science, Kanyakumari district prospective teachers of physical science are better in their hardware awareness.
2.11 There is significant difference among OC, BC, MBC and SC & ST prospective
teachers of physical science in their general awareness, software awareness,
hardware awareness, internet awareness and ICT awareness.

While comparing the mean scores of OC (5.23), BC (4.33), MBC (4.73)
and SC & ST (4.10) community prospective teachers of physical science, OC
community prospective teachers of physical science are better in their general
awareness.

While comparing the mean scores of OC (5.20), BC (4.14), MBC (4.57)
and SC & ST (4.11) community prospective teachers of physical science, OC
community prospective teachers of physical science are better in their software
awareness.

While comparing the mean scores of OC (4.83), BC (4.08), MBC (4.26)
and SC & ST (3.84) community prospective teachers of physical science, OC
community prospective teachers of physical science are better in their hardware
awareness.

While comparing the mean scores of OC (4.35), BC (3.58), MBC (3.90)
and SC & ST (3.11) community prospective teachers of physical science, OC
community prospective teachers of physical science are better in their internet
awareness.

While comparing the mean scores of OC (19.60), BC (16.13), MBC
(17.46) and SC & ST (15.57) community prospective teachers of physical
science, OC community prospective teachers of physical science are better in
their ICT awareness.
2.12 There is no significant association between order of birth and general awareness, software awareness, hardware awareness, internet awareness and ICT awareness of prospective teachers of physical science.

2.13 There is no significant association between computer literacy and general awareness, hardware awareness and internet awareness of prospective teachers of physical science. But, there is significant association between computer literacy and software awareness and ICT awareness of prospective teachers of physical science.

2.14 There is no significant association between newspaper reading habits and general awareness, software awareness, internet awareness and ICT awareness of prospective teachers of physical science. But, there is significant association between newspaper reading habits and hardware awareness of prospective teachers of physical science.

2.15 There is no significant association between library usage and general awareness, software awareness, hardware awareness, internet awareness and ICT awareness of prospective teachers of physical science.

5.1.3 Academic Achievement of Prospective Teachers of Physical Science

3.1 a) 18.2% of prospective teachers of physical science have high level of achievement in content and methods of teaching of physical science.

b) 17.9% of prospective teachers of physical science have high level of achievement in education in the emerging Indian society.

c) 16.4% of prospective teachers of physical science have high level of achievement in psychology of learning and human development.

d) 14.9% of prospective teachers of physical science have high level of achievement in educational innovations and curriculum development.
e) 15.1% of prospective teachers of physical science have high level of academic achievement.

3.2 There is no significant difference between male and female prospective teachers of physical science in their achievement in education in the emerging Indian society. But, there is significant difference between male and female prospective teachers of physical science in their achievement in content and methods of teaching of physical science, psychology of learning and human development, educational innovations and curriculum development and academic achievement.

While comparing the mean scores of male (9.63) and female (10.99) prospective teachers of physical science, the female prospective teachers of physical science are better in their achievement in content and methods of teaching of physical science.

While comparing the mean scores of male (8.51) and female (9.72) prospective teachers of physical science, the female prospective teachers of physical science are better in their achievement in psychology of learning and human development.

While comparing the mean scores of male (7.71) and female (9.87) prospective teachers of physical science, the female prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of male (36.17) and female (40.41) prospective teachers of physical science, the female prospective teachers of physical science are better in their academic achievement.
3.3 There is no significant difference between government aided and self-financed college prospective teachers of physical science in their achievement in content and methods of teaching of physical science, education in the emerging Indian society, educational innovations and curriculum development and academic achievement. But, there is significant difference between government aided and self-financed college prospective teachers of physical science in their achievement in psychology of learning and human development.

While comparing the mean scores of government aided (10.30) and self-financed college (9.44) prospective teachers of physical science, the government aided prospective teachers of physical science are better in their achievement in psychology of learning and human development.

3.4 There is no significant difference between graduate and post graduate prospective teachers of physical science in their achievement in content and methods of teaching of physical science, education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development.

3.5 There is no significant difference between Tamil and English medium prospective teachers of physical science in their achievement in content and methods of teaching of physical science. But, there is significant difference between Tamil and English medium prospective teachers of physical science in their achievement in education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development and academic achievement.
While comparing the mean scores of Tamil (11.09) and English (10.41) medium prospective teachers of physical science, the Tamil medium prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

While comparing the mean scores of Tamil (10.13) and English (9.02) medium prospective teachers of physical science, the Tamil medium prospective teachers of physical science are better in their achievement in psychology of learning and human development.

While comparing the mean scores of Tamil (9.25) and English (8.21) medium prospective teachers of physical science, the Tamil medium prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of Tamil (41.44) and English (38.36) medium prospective teachers of physical science, the Tamil medium prospective teachers of physical science are better in their academic achievement.

3.6 There is no significant difference between urban and rural area college prospective teachers of physical science in their achievement in content and methods of teaching of physical science, psychology of learning and human development. But, there is significant difference between urban and rural area college prospective teachers of physical science in their achievement in education in the emerging Indian society, educational innovations and curriculum development and academic achievement.

While comparing the mean scores of urban (10.34) and rural (11.00) area college prospective teachers of physical science, the rural area college
prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

While comparing the mean scores of urban (8.18) and rural (9.07) area college prospective teachers of physical science, the rural area college prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of urban (38.49) and rural (40.80) area college prospective teachers of physical science, the rural area college prospective teachers of physical science are better in their academic achievement.

3.7 There is no significant difference between day scholar and hostel prospective teachers of physical science in their achievement in education in the emerging Indian society, psychology of learning and human development. But, there is significant difference between day scholar and hostel prospective teachers of physical science in their achievement in content and methods of teaching of physical science, educational innovations and curriculum development and academic achievement.

While comparing the mean scores of day scholar (11.00) and hostel (10.04) prospective teachers of physical science, the day scholar prospective teachers of physical science are better in their achievement in content and methods of teaching of physical science.

While comparing the mean scores of day scholar (8.95) and hostel (7.62) prospective teachers of physical science, the day scholar prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.
While comparing the mean scores of day scholar (40.51) and hostel (36.96) prospective teachers of physical science, the day scholar prospective teachers of physical science are better in their academic achievement.

3.8 There is no significant difference between joint and nuclear family prospective teachers of physical science in their achievement in content and methods of teaching of physical science, psychology of learning and human development. But, there is significant difference between joint and nuclear family prospective teachers of physical science in their achievement in education in the emerging Indian society, educational innovations and curriculum development and academic achievement.

While comparing the mean scores of joint (11.20) and nuclear (10.62) family prospective teachers of physical science, the joint family prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

While comparing the mean scores of joint (9.27) and nuclear (8.58) family prospective teachers of physical science, the joint family prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of joint (41.64) and nuclear (39.41) family prospective teachers of physical science, the joint family prospective teachers of physical science are better in their academic achievement.

3.9 There is significant difference among men, women and co-education college of education prospective teachers of physical science in their achievement in content and methods of teaching of physical science, education in the emerging
Indian society, psychology of learning and human development, educational innovations and curriculum development.

While comparing the mean scores of men (8.50), women (9.74) and co-education (11.24) college of education prospective teachers of physical science, co-education college of education prospective teachers of physical science are better in their achievement in content and methods of teaching of physical science.

While comparing the mean scores of men (8.50), women (10.10) and co-education (11.03) college of education prospective teachers of physical science, co-education college of education prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

While comparing the mean scores of men (6.20), women (8.56) and co-education (10.01) college of education prospective teachers of physical science, co-education college of education prospective teachers of physical science are better in their achievement in psychology of learning and human development.

While comparing the mean scores of men (5.30), women (7.69) and co-education (9.17) college of education prospective teachers of physical science, co-education college of education prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of men (28.50), women (36.10) and co-education (41.45) college of education prospective teachers of physical science, co-education college of education prospective teachers of physical science are better in their academic achievement.
3.10 There is significant difference among Tirunelveli, Thoothukudi and Kanyakumari district prospective teachers of physical science in their achievement in content and methods of teaching of physical science, education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development.

While comparing the mean scores of Tirunelveli (9.61), Thoothukudi (11.09) and Kanyakumari (11.95) district prospective teachers of physical science, Kanyakumari district prospective teachers of physical science are better in their achievement in content and methods of teaching of physical science.

While comparing the mean scores of Tirunelveli (10.19), Thoothukudi (10.92) and Kanyakumari (11.25) district prospective teachers of physical science, Kanyakumari district prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

While comparing the mean scores of Tirunelveli (8.68), Thoothukudi (10.15) and Kanyakumari (10.22) district prospective teachers of physical science, Kanyakumari district prospective teachers of physical science are better in their achievement in psychology of learning and human development.

While comparing the mean scores of Tirunelveli (7.78), Thoothukudi (9.77) and Kanyakumari (9.17) district prospective teachers of physical science, Thoothukudi district prospective teachers of physical science are better in their achievement in educational innovations and curriculum development.

While comparing the mean scores of Tirunelveli (36.26), Thoothukudi (41.93) and Kanyakumari (42.58) district prospective teachers of physical science, Kanyakumari district prospective teachers of physical science are better in their academic achievement.
3.11 There is no significant difference among OC, BC, MBC and SC & ST prospective teachers of physical science in their achievement in psychology of learning and human development, educational innovations and curriculum development and academic achievement. But there is significant difference among OC, BC, MBC and SC & ST prospective teachers of physical science in their achievement in content and methods of teaching of physical science and education in the emerging Indian society.

While comparing the mean scores of OC (11.65), BC (10.99), MBC (10.80) and SC & ST (9.93) community prospective teachers of physical science, OC community prospective teachers of physical science are better in their achievement in content and methods of teaching of physical science.

While comparing the mean scores of OC (11.80), BC (10.77), MBC (10.20) and SC & ST (10.96) community prospective teachers of physical science, OC community prospective teachers of physical science are better in their achievement in education in the emerging Indian society.

3.12 There is no significant association between order of birth and achievement in content and methods of teaching of physical science, education in the emerging Indian society, psychology of learning and human development and academic achievement of prospective teachers of physical science. But, there is significant association between order of birth and achievement in educational innovations and curriculum development of prospective teachers of physical science.

3.13 There is no significant association between computer literacy and achievement in education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development and academic achievement of prospective teachers of physical science. But, there is
significant association between computer literacy and achievement in content and methods of teaching of physical science of prospective teachers of physical science.

3.14 There is no significant association between newspaper reading habits and achievement in psychology of learning and human development and educational innovations and curriculum development of prospective teachers of physical science. But, there is significant association between newspaper reading habits and achievement in content and methods of teaching of physical science, education in the emerging Indian society and academic achievement of prospective teachers of physical science.

3.15 There is no significant association between library usage and achievement in education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development and academic achievement of prospective teachers of physical science. But, there is significant association between library usage and achievement in content and methods of teaching of physical science of prospective teachers of physical science.

5.1.4 Relationship among Metacognition, ICT Awareness and Academic Achievement of Prospective Teachers of Physical Science

4.1 There is no significant relationship between academic achievement and declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring and metacognition of prospective teachers of physical science. But, there is significant relationship between academic achievement and evaluating of prospective teachers of physical science.
4.2 There is significant relationship between academic achievement and general awareness, software awareness, hardware awareness, internet awareness and ICT awareness of prospective teachers of physical science.

4.3 There is no significant relationship between metacognition and general awareness, software awareness, hardware awareness, internet awareness and ICT awareness of prospective teachers of physical science.

5.1.5 Influence of Metacognition and ICT Awareness on Academic Achievement of Prospective Teachers of Physical Science

5.1 There is significant influence of metacognition and ICT awareness on the academic achievement of prospective teachers of physical science.

5.1.6 Factor Analysis of Metacognition, ICT Awareness and Academic Achievement of Prospective Teachers of Physical Science

6.1 There is significant factor with positive loading of the variables namely declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating, metacognition, general awareness, hardware awareness, software awareness, internet awareness, ICT awareness, achievement in content and methods of teaching of physical science, education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development and academic achievement of prospective teachers of physical science. The factor for the study has been identified as Cognitive Pedagogical Excellence.
5.2 INTERPRETATIONS

5.2.1 Metacognition of Prospective Teachers of Physical Science

On the whole only 16.4% of prospective teachers of physical science have high level of metacognition. Majority of prospective teachers of physical science have (66.1%) moderate level of metacognition. This could be because the prospective teachers have not been trained in metacognitive strategy instruction and hence they lack metacognitive knowledge. This may be one of the significant reasons for poor quality of teaching which in turn results in poor quality of education. This finding was supported by Choudhury and Chowdhury (2015) and contradicted by Oz (2014), Mai (2015), Ridlo & Lutfiya (2017) and Coskun (2018).

The government aided prospective teachers of physical science are better than self-financed college prospective teachers in their conditional knowledge. It could be due to the fact that government aided students are provided with many resource facilities, individual attention and continuous feedback on their teaching. They are given training in using when, how and why procedures and plan of actions that provides students an easy to follow procedure for solving any problem. Teacher educators demonstrate how to use metacognitive knowledge and strategies when working on a variety of tasks. This finding was contradicted by Jaleel and Premachandran (2016), Das (2017) and Sonowal and Kalita (2017) who expressed that there was no significant difference in the metacognitive awareness of students based on the type of management of the school.

The post graduate prospective teachers of physical science are better than the graduate prospective teachers in their procedural knowledge. This may be due to the fact that post graduates are more matured and experienced. They have more exposure and training in the education field. Procedural knowledge is grasped only out of
practice to do things. They have self awareness and control over their own thinking. They are more self-directed learners. Self-questioning guides them before, during and after task performance. This finding was supported by Young and Fry (2008) and Das (2017) who reported that scores on the Metacognitive Awareness Inventory (MAI) significantly differed between graduate and undergraduate college students. This finding is consistent with the findings of previous studies that showed that metacognitive ability of post graduate students pursuing B.Ed. was found to be higher than the graduate students (Das, 2017). Fazal (2011) also agreed that teachers with higher academic and professional qualifications achieved higher scores on the MAI. But Chwee et al. (2010) contradicted this finding by concluding that there is no significant difference by educational level.

The Tamil medium prospective teachers of physical science are better than English medium prospective teachers in their declarative knowledge. Nowadays Tamil medium students outperform English medium students in many aspects. They have the desire to progress in par with the English medium students. Hence they take so much effort and try to understand any concept by translating it in Tamil which is their mother tongue. They gather knowledge about the information or resources needed to do a task. They recall and revise the details of their learning experience.

The urban area college prospective teachers of physical science are better than rural area college prospective teachers in their metacognition and all its dimensions. Urbanization provides the urban students with many opportunities. They know where and how to tap the relevant resources for deep learning. They are aware of their own strategies and modify their thought processes if the situation demands. They have better analytical and critical thinking. Previous researches also support that urban college students and teacher educators were better than their rural counterparts in their
metacognition (Sheeja & Annaraja, 2011; Rani & Govil (2013); Choudhury & Chowdhury, 2015; Das, 2017). But these findings were contradicted by Anandaraj and Ramesh (2014) and Jaleel and Premachandran (2016).

The hostel prospective teachers of physical science are better than day scholar prospective teachers in their procedural knowledge and metacognition. Hostel students discuss with their counterparts about various informations on how to perform cognitive tasks. This discussion leads to knowledge about the execution of procedural skills. Thinking aloud technique helps one to share their thought processes as one is engaged in a task that requires thinking. They say out loud all of their thoughts and feelings that occur when performing tasks like solving a problem, answering a question, conducting an experiment and reading through textbook notes.

The joint family prospective teachers of physical science are better than nuclear family prospective teachers in their declarative knowledge. It could be due to the fact that they are guided by senior members of family in all walks of life. They are exposed to knowledge of facts, beliefs and events and general strategies that might be used for different tasks.

The prospective teachers of physical science from men colleges of education are better than the prospective teachers from women and co-education colleges of education in their procedural knowledge, conditional knowledge, information management, evaluating and metacognition. Men college prospective teachers may be reflective thinkers who are aware of their learning processes and products as well as how to regulate those processes for more effective learning. Their knowledge of cognition and self awareness skill helps them to improve compared to their counterparts, thus leading to learning that is self directed, goal oriented and self evaluated.
The prospective teachers of physical science from Thoothukudi district are better than the prospective teachers from Tirunelveli and Kanyakumari districts in their metacognition and all its dimensions except evaluating. Thoothukudi district is a land of many freedom fighters. They have been practicing metacognition strategies for hundreds of years in freedom fighting. This practice of knowledge and regulation of cognition is transferred to their younger generations. Moreover Thoothukudi is a harbour city. It serves as an export and import trade centre. So its people apply their knowledge and regulation of cognition in various spheres of life.

Whereas Tirunelveli district prospective teachers are better than Thoothukudi and Kanyakumari district prospective teachers in their evaluating. Tirunelveli district is the role model in education for the other two districts. It is called as the Oxford of South India. Hence those students excel in evaluating.

The SC & ST community prospective teachers of physical science are better than OC, BC and MBC community prospective teachers in their declarative knowledge. This community strives hard to come up in life in this competitive world. The government supports them in terms of scholarship and reservation. This gives them psychological and mental courage to use their declarative knowledge more than others.

Computer literacy of prospective teachers of physical science is influencing their declarative knowledge, procedural knowledge, conditional knowledge and monitoring. Greater the computer literacy, greater will be the metacognitive knowledge of cognition and skill that makes the prospective teachers to be aware when to use appropriate technology, how to learn with technology and how to use technology for pedagogical purposes. This computer literacy helps one to self-check at each stage of a task performed.
Library usage of prospective teachers of physical science is influencing their conditional knowledge, planning, evaluating and metacognition. Library usage enables the students to refer many reference books, encyclopedias, e-books and many other resources to learn. They learn when to use a strategy in a task, what one should do before one begins to study, plan to execute an activity and reflect on what new knowledge they have gained. Library usage sharpens one’s cognition to use appropriate metacognitive strategies to learn and to do tasks.

5.2.2 ICT Awareness of Prospective Teachers of Physical Science

On the whole only 15.1% of prospective teachers of physical science have high level of ICT awareness. Majority of prospective teachers of physical science have (68.9%) moderate level of ICT awareness. This could be because the prospective teachers do not have the pre-requisite competencies in handling the ICT tools. Research shows that the faculty of education themselves lack awareness on the usage of these tools (Jagadesh, 2017). Majority of the student-teachers lack skills in various ICT applications and equipment operations that are important to support and enhance their learning experiences and ICT integration in instruction. The finding that there was moderate level of ICT awareness was supported by Francisca (2012) and Sahni (2012). Rajasekar and Vaiyapuri (2007), and Thakur (2014) also supported that there was a low degree of ICT awareness and computer knowledge of teachers whereas, Akpojotor (2016) and Muhammad and Prema contradicted (2017) that the level of ICT awareness of teachers as well as students was very high.

The male prospective teachers of physical science are better than female prospective teachers in their software awareness, hardware awareness and ICT awareness. For centuries, education has been a male domain. There are gender differences in the types of knowledge and ways of knowledge they are exposed to
from birth. Moreover male prospective teachers spend more time in using these technologies and they develop their competency without giving room for any barriers. Beena and Mathur (2012), Francisca (2012), Sinha (2012), Sahni (2012), Babu (2013) and Muhammad and Prema (2017) also supported that male students have shown better awareness as compared to female students in the use of ICT in education. The finding was contrasted by Rajasekar and Vaiyapuri (2007) and Philomina and Amutha (2016) who found that the female teachers were better than males in computer knowledge and ICT awareness respectively. The finding that there was no significant difference in the level of ICT awareness among the male and female trained teachers was consistent with the conclusions of Gulhane (2011), Thakur (2014), Amutha and Kennedy (2015) and Verma and Dahiya (2016).

The government aided college prospective teachers of physical science are better than the self-financed college prospective teachers in their ICT awareness and all its dimensions except hardware awareness. The government aided college prospective teachers seize every opportunity given to them and try to succeed in it. The aided colleges utilize monetary benefits received from UGC to equip themselves with the latest ICT tools. They also encourage and train the prospective teachers to use these ICT tools. This interpretation draws support from the previous findings of Francisca (2012). Sahni (2012) also found that knowledge of computers was higher in case of prospective teachers of aided colleges than self-financing colleges. But this finding was not supported by Rajasekar and Vaiyapuri (2007) and Beena and Mathur (2012) who reported that there was no significant difference between the types of management of students in their ICT awareness in education.

Post graduate prospective teachers of physical science are better than graduate prospective teachers in their ICT awareness and all its dimensions. Post graduate
prospective teachers are more matured than graduates and their exposure to ICT knowledge is also more. Post graduate learners have opportunity to access vast ICT resources, collaborate with others, consult with experts, share knowledge, and solve complex problems using ICT tools. This finding was supported by Rajasekar and Vaiyapuri (2007) and Francisca (2012). But it was contradicted by Amutha and Kennedy (2015).

English medium prospective teachers of physical science are better than Tamil medium prospective teachers in their ICT awareness and all its dimensions except hardware awareness. Most of the books, e-resources and websites are available only in English medium. Hence the English medium prospective teachers have more opportunity to be aware of ICT tools. They use them more freely and can interact with anyone globally to clarify their doubts.

The urban area college prospective teachers of physical science are better than rural area college prospective teachers in their ICT awareness and all its dimensions. This may be due to the fact that the urban colleges are furnished with modern technology labs. The teacher educators are also using these modern gadgets in their teaching. It motivates the prospective teachers to use the computer lab facilities in the college. They are further more trained to use technology in their teaching practice, which may enhance their awareness of ICT. This interpretation coincided with the findings of Rajasekar and Vaiyapuri (2007) and Thakur (2014).

The hostel prospective teachers of physical science are better than day scholar prospective teachers in their general awareness. Hostellers have better interaction among themselves. The present generation has a high fascination towards the ICT world. Nowadays majority of students have laptops of their own. So they practice any ICT tool by discussing with each other and clarifying their doubts. This encourages
students to use ICT in study, share and process information better and thus enhance their understanding.

The prospective teachers of physical science from men colleges of education are better than the prospective teachers from women and co-education colleges of education in their ICT awareness and all its dimensions except internet awareness. Majority of men gain their ICT competence through personal study, family or friends and through training outside the college. They use ICT tools frequently. Nowadays mobiles have all features of a computer. All men have smartphones in their pockets. The usage of smart phones and whatsapp features also enables them to share their knowledge with their friends and clarify any doubt on ICT tools. The household responsibilities and other womenhood barriers of both women teacher educators and prospective teachers restrict women from practising ICT tools in their spare time. Though computer and mobile phones are available everywhere, lack of time in practicing the ICT tools brings the difference.

The prospective teachers of physical science from Tirunelveli district are better than the prospective teachers from Thoothukudi and Kanyakumari districts in their general awareness. Students from Tirunelveli district may have more confidence in using ICT tools effectively. They also have a right, positive attitude towards technology. The easy availability and accessibility of laptops, tablets, smartphones and social networks like facebook, whatsapp and twitter help the Tirunelveli district students to have more general awareness about ICT.

Whereas the prospective teachers of physical science from Kanyakumari districts are better than the prospective teachers from Tirunelveli and Thoothukudi districts in their hardware awareness. People live in a techno savvy world. Computer is used in all spheres of life. It has been introduced to students’ right from their
primary class. Children are aware of it through video, mobile and online games. Even a layman uses computer and mobile applications very easily. School students undergo short term training courses to repair and service the hardwares. This may be the fact for the hardware awareness of Kanyakumari district students.

OC community prospective teachers of physical science are better than BC, MBC and SC & ST community prospective teachers in their ICT awareness and all its dimensions. The reason may be that the OC community students have an iconic status in society. They are generally intelligent by heredity as well as prosperous and influential. They have a relatively higher level of education and awareness than other community people. The literacy levels among the OC community students in both sexes are very high as compared to others. They have excelled in fields as diverse as administration, teaching, legal profession, social service, literature, theology and academics.

Computer literacy of prospective teachers of physical science is influencing their software awareness and ICT awareness. The reason may be computer literacy enables one to have the ability to quickly and easily navigate a computer. Greater the computer literacy, greater will be the ICT awareness of students to use digital technology, communication tools and networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society. Onasanya et al. (2011) reported that the level of computer literacy of the science teachers examined was low. The males belonged to higher computer literacy level than the females.

Newspaper reading habits of prospective teachers of physical science is influencing their hardware awareness. Many newspapers both in Tamil and English have separate sections every week which features only computer and technological innovations. Students gain rich knowledge about latest hardware devices and
peripheral devices in market and their applications in different fields by regularly reading these sections. Thus it contributes to hardware awareness.

5.2.3 Academic Achievement of Prospective Teachers of Physical Science

On the whole only 15.1% of prospective teachers of physical science have high level of academic achievement. Majority of prospective teachers of physical science have (66.7%) moderate level of academic achievement. This could be because academic achievement is influenced by so many factors both personal and social. It is a multi-dimensional phenomenon. The gap in academic achievement may be due to the variance in students’ cognitive ability, achievement motivation, attitude and interest towards the subject of study that have direct influence on the academic achievements. This finding that there was moderate level of academic achievement was supported by Muhammad & Prema (2017).

The female prospective teachers of physical science are better than male prospective teachers in their academic achievement and all its dimensions except education in the emerging Indian society. Past researches suggest that girls are in general more successful than boys. Moreover boys develop gender stereotypes according to which girls are perceived as academically superior with regard to motivation, ability, performance, and self-regulation. Girls want to please adults to a higher degree than do boys, which leads to girls' higher grades. Gender differences in academic achievement from a developmental point of view may be due to difference in self-regulation.

This result was consistent with the findings of Basri et al. (2018) where the performance of female students was more than the male. But it was contradicted by Muhammad and Prema (2017) where the male students were better than female in their academic achievement. The research studies conducted by Jebraj and

The government aided prospective teachers of physical science are better than self-financed college prospective teachers in their achievement in psychology of learning and human development. The reason may be that in government aided colleges only qualified, efficient and dynamic teachers are appointed. These colleges provide good infrastructure facilities and are competitive in producing high results compared to private colleges of education. They are more accountable to the management, students and parents. They use all psychological principles of learning to spur all their students to do their best. They find alternative ways to make learning accessible to all the students. Agrawal and Teotia (2015) contradicted this finding that there was no significant difference in the academic achievement with regard to type of management.

The Tamil medium prospective teachers of physical science are better than the English medium prospective teachers in their academic achievement and all its dimensions except content and methods of teaching of physical science. Recently more emphasis has been given for learning through Tamil medium right from school days. Nowadays there are many learning materials and resources available in the market and internet in Tamil medium. Hence it is easy for the Tamil medium students to excel in their academic achievement.

The rural area college prospective teachers of physical science are better than the urban area college prospective teachers in their achievement in education in the
emerging Indian society, educational innovations and curriculum development and academic achievement. This may be because rural students have nowadays a mindset that education is important. They also wanted to come up in life as urban area students. They are proactive with an appropriate futuristic set of mind. They show unwavering encouragement and enthusiasm to achieve. They understand their environment properly and maintain their inner resources like self-efficacy and self-esteem. Nowadays parents also show interest, support and monitor the learning progress of their children. Hence they have outperformed their counterparts. Benipal and Singh (2014) supported this finding that there was a significant difference in the academic achievement but urban students were greater than that of rural students. Agrawal and Teotia (2015) contradicted this finding that there was no significant difference in the academic achievement with regard to type of locale.

The day scholar prospective teachers of physical science are better than hostel prospective teachers in their achievement in content and methods of teaching of physical science, educational innovations and curriculum development and academic achievement. The excellent performance of day scholar students is because of the availability of various sources like mass media and electronic media. Parents, elders at family, neighbours and friends help the students to perform better. There is an interpersonal relations and communication with parents. The child is always within the purview of parents who inculcate values and daily habits in a child. This finding was contradicted by Panda and Behera (2011) where residential students were better than non residential students.

The joint family prospective teachers of physical science are better than the nuclear family prospective teachers in their achievement in education in the emerging Indian society, educational innovations and curriculum development and academic
achievement. This may be because students have the opportunity to discuss with parents, family members and siblings about their educational problems and get guidance in all their endeavours. The students get encouragement and confidence through the involvement and attention of the parents. Family system can gauge family satisfaction among the adolescents which in turn enhances the chances of academic achievements.

The prospective teachers of physical science from co-education colleges of education are better than the prospective teachers from men and women colleges of education in their academic achievement and all its dimensions. This may be due to the reason that co-educational institutions are better as the presence of girls in the class calm boys and improve their academic performance and lead to less violent outbursts. Girls add positive influences to the classroom environment. Males innately prefer competitive learning activities and they try to excel their female counterparts. Females learn better in a co-operative learning community. Co-education provides equitable learning opportunities for male and female students. Majority of teachers also actively address stereotypes and encourage gender equity in their classrooms.

The prospective teachers of physical science from Kanyakumari district are better than the prospective teachers from Tirunelveli and Thoothukudi districts in their academic achievement and all its dimensions except educational innovations and curriculum development. The reason may be that Kanyakumari district has the highest literacy rate compared to any other district in Tamilnadu in both rural and urban areas. Women are almost at par with men as regards the literacy rate. There are many educational institutions right from primary to higher education level in close proximity to satisfy the educational needs of the people. The people have realized the importance of education since it is very close to Kerala state border which has the
highest literacy rate in India. Missionaries also have started many educational institutions for the upliftment of the socially deprived poor people. Hence the academic achievement is high.

Whereas the prospective teachers of physical science from Thoothukudi district are better than the prospective teachers from Tirunelveli and Kanyakumari districts in their achievement in educational innovations and curriculum development. Thoothukudi district stands second in literacy rate in Tamil Nadu. Thoothukudi district students always excel in results of public exams compared to students of Tirunelveli and Kanyakumari districts. They strive hard to achieve a high position and status compared to the other district students. It has many very old educational institutions. The colleges of education in this district have good infrastructure facilities, computer, library and laboratory resources, well qualified and experienced teacher educators. It is an industrial area, where most of the people are employed. This provides a conducive environment to have proper orientation towards quality education.

The OC community prospective teachers of physical science are better than BC, MBC and SC & ST community prospective teachers in their achievement in content and methods of teaching of physical science and education in the emerging Indian society. The reason may be that OC community students are always high achievers. Research demonstrates that high-achieving students tend to reflect on their thought processes during learning and are aware of the cognitive strategies they use. They are more aware about the content and methodologies of teaching since they are considered as Guru in olden days and most of them pursued teaching profession. History also reveals their contribution to the educational field, society and country.
Order of birth of prospective teachers of physical science is influencing their achievement in educational innovations and curriculum development. This may be due to the fact that the Indian familial values like showing affection and concern, guiding the siblings, taking care of the welfare of the family members may influence their achievement.

Computer literacy of prospective teachers of physical science is influencing their achievement in content and methods of teaching of physical science. The reason may be academic performance of students had significant relationship with internet usage as well as internet knowledge and web-based learning time (Okorie, 2010; Hanbay, 2013). Erdogdu and Erdogdu (2015) revealed that availability of internet connection at home or school has positive impacts on academic success.

Newspaper reading habits of prospective teachers of physical science is influencing their achievement in content and methods of teaching of physical science, education in the emerging Indian society and academic achievement. Newspapers is a powerful teaching tool and an important educational resource to students because it helps to improve their general knowledge as they reflect on the current status and issues, gives knowledge about various subjects and it improves their critical thinking skills. It provides different perspectives for students ranging from education to latest trends. It is more current than textbooks and can boost the performance of students in general.

The library usage of prospective teachers of physical science is influencing their achievement in content and methods of teaching of physical science. The reason may be that library usage enables the students to find sufficient material for enriching their knowledge of science. It supplements their knowledge with the latest methods,
strategies and techniques of teaching science and researches conducted on them. It trains them in the scientific method of problem solving and develop scientific attitude.

5.2.4 Relationship among Metacognition, ICT Awareness and Academic Achievement of Prospective Teachers of Physical Science

There is significant relationship between academic achievement and evaluating of prospective teachers of physical science. This is because learners evaluate by taking a deep look at the outcome of one’s learning and determines if the learning matches’ one’s learning goals. They appraise then and there and reflect on what new knowledge one has gained. This aspect dominates more in students and hence it is a significant factor of academic achievement. This result was consistent with the findings of Young and Fry (2008), Suman (2009), Dixit (2011), Balya and Khimnani (2011), Hrbackova et al. (2012), Pishghadam and Khajavy (2013), Chowdhry (2013), Jayapraba (2013), Narang and Saini (2013), Oz (2014), Mozafari et al. (2016), Sonowal and Kalita (2017), Saeedzadeh et al. (2018), and Singh (2018) who revealed that there was a significant and positive relationship between metacognition and academic achievement of students.

There is significant, positive relationship between academic achievement and general awareness, software awareness, hardware awareness, internet awareness and ICT awareness of prospective teachers of physical science. This is because ICT develops the necessary skills to live, learn, work and play in the 21st century. The uses of the ICT to access global resources in educational pedagogy are growing. Today’s young people have fondness for new information technologies and they use internet by the age of 10. Nowadays internet is much cheaper, easily available at home and helps in managing information. Internet based educational materials are flexible, reusable and available any-where and any-time and are extremely cost
effective. ICT awareness and practice can provide an environment for constructivists learning to occur. Hence it enhances the academic achievement of the students. This finding was supported by Muhammad and Prema (2017) that there was a significant relationship between ICT awareness and academic achievement.

5.2.5 Influence of Metacognition and ICT Awareness on Academic Achievement of Prospective Teachers of Physical Science

There is significant influence of metacognition and ICT awareness on the academic achievement of prospective teachers of physical science. This may be due to the fact that the academic achievement is influenced by factors related to the prospective teacher’s personal background and the environment in which they work. The use of metacognitive strategies ignites one's thinking and can lead to more profound learning and improved performance, especially among learners who are struggling to learn. The metacognitive processes can improve learning by guiding students' thinking and help them to follow a sensible strategy as they think through a problem, make decisions or attempt to understand a text. ICT provide an array of powerful tools that may help in transforming the present isolated teacher-cantered and text-bound classrooms into rich, student-focused, interactive knowledge environments. Since student performance is mainly explained by a student’s characteristics, educational environment and teachers’ characteristics, ICT may have an impact on these determinants and consequently on the outcome of education. Thus the awareness of ICT and metacognition of the prospective teachers of physical science influence the academic achievement.
5.2.6 Factor Analysis of Metacognition, ICT Awareness and Academic Achievement of Prospective Teachers of Physical Science

There is significant factor with positive loading of the variables namely declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, evaluating, metacognition, general awareness, hardware awareness, software awareness, internet awareness, ICT awareness, achievement in content and methods of teaching of physical science, education in the emerging Indian society, psychology of learning and human development, educational innovations and curriculum development and academic achievement of prospective teachers of physical science. The factor identified has been named as Cognitive Pedagogical Excellence. It includes metacognition, ICT awareness and academic achievement.

5.3 RECOMMENDATIONS

The following are the recommendations based on the findings.

A. Recommendations to the Higher Education Department

1. The teacher education curriculum should be revised from time to time based on the various metacognitive strategies and usage of ICT resources in teaching and learning, by keeping in view the needs of the students and the society.

2. Practical training in ICT should be made mandatory and a separate paper may be included exclusively for it in the teacher education curriculum at all levels.

3. In the physical science pedagogical paper, metacognitive elements and ICT integrated activities may be included. Problem-based and project-based methods may be given more emphasis.

4. High quality and culturally accessible digital content must be made available for teachers and students.
5. Teacher educators must be given orientation and in-service training on metacognitive strategies and pedagogical use of ICT with the help of experts at national and global levels.

6. Give awareness to administrators and teachers to avail grant-in-aids from government and private funding agencies for the benefit of weaker sections to give remedial coaching.

B. Recommendations to the Administrators

1. Take initiatives to avail grants from funding agencies like UGC, govt. agencies, private organizations, foundations, charitable trusts, corporate companies, NGO to uplift the rural, BC, MBC, SC & ST community prospective teachers by giving them training and remedial coaching to improve their ICT awareness and skills as well as give practice in metacognitive strategies like modelling visually and through verbalization, self questioning, thinking aloud, practice in mindfulness both guided and independent, graphics or diagramming, use of mnemonics and self-assessment.

2. Improve existing instructional and infrastructural facilities for ICT integration. Students and teachers must have sufficient access to digital technologies and the internet in their classrooms.

3. Teachers who are well acquainted with ICT alone should be appointed.

4. Workshops /Seminars can be organized for prospective teachers on metacognitive strategies and usage of ICT tools for teaching.
C. Recommendations to the Teacher Educators

1. Make students be aware of their strengths and weakness as learners (knowledge of self). Train them in various metacognitive strategies, so that they can choose a best learning strategy (knowledge of strategy) to do their learning tasks.

2. Encourage discussion among day scholars to improve their metacognitive strategies. Provide more group activities.

3. Single sex female and co-education college students may be given frequent tests on reasoning and comprehension to enable them to analyze their cognitive processes. They can be given continuous practice of ICT usage through follow up activities and exercises based on their lessons.

4. Allot few periods for library usage in a week for preparing assignments, seminars and make students review what they have read with their peer groups to improve their metacognition.

5. Create awareness and interest in female students on how ICT can be used effectively in their learning by giving practice in doing science exercises and practicals using recent softwares.

6. Self-financed colleges can arrange special computer classes per week to give training to their students to improve their ICT awareness and ICT skills.

7. Give training and orientation in the usage of ICT at under graduate level itself.

8. Give proper orientation to Tamil major students to remove their phobia in using ICT by exposing them to websites and books in Tamil medium. This improves their academic achievement also.
9. Male students can be given repeated practice of metacognitive strategies. Can be trained in using ICT, to search and acquire the knowledge they needed and thereby enhance their academic achievement.

10. Hostellers may be provided with computer and internet facilities to use and practice ICT tools to improve their academic achievement.

11. Parents must be motivated to provide ICT facilities to their children and give training in using ICT for academic purposes.

12. Single sex male and female college students must be trained in constructivist and collaborative approaches of education and in ICT skills. More brain based activities, peer group activities and discussion techniques may be provided to them to improve their academic achievement.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

1. Influence of ICT skills and pedagogical content knowledge on the teaching competency of teachers may be studied.

2. Relationship between thinking styles and usage of ICT among teacher trainees may be studied.

3. An experimental study on the effect of metacognitive strategies on the academic performance of students may be conducted.

4. Awareness and usage of ICT skills in inclusive education may be studied.

5. Preparation of ICT modules and its effectiveness on the academic outcome of teacher trainees may be studied.

6. Effect of social media on the academic achievement of secondary school students may be conducted.

7. Effect of m-learning on the effectiveness of teaching practice of prospective teachers of physical science may be studied.