



T.C.
YEDITEPE UNIVERSITY
GRADUATE SCHOOL OF EDUCATIONAL SCIENCES
MASTER'S PROGRAM IN CURRICULUM AND INSTRUCTION

THE RELATIONSHIP BETWEEN METACOGNITIVE SKILLS AND
INNOVATIVE WORK BEHAVIOURS OF INFORMATION
COMMUNICATION TECHNOLOGIES SECTOR EMPLOYEES

BY
UMMAN ÖNCAN

2021



YEDİTEPE UNIVERSITY

GRADUATE SCHOOL OF EDUCATIONAL SCIENCES DIRECTORATE

THESIS SUBMISSION and APPROVAL FORM

THESIS TITLE: The Relationship Between Metacognitive Skills And Innovative Work Behaviours Of Information Communication Technologies Sector Employees

APPROVAL:

Doç Dr. Yelkin Diker Coşkun

(Advisor)

(Signature)

Doç Dr Gonca Kızılkaya Cumaoğlu

(Member)

(Signature)

Dr. Alper Bayazıt

(Member)

(Signature)

SUBMITTED BY :

DATE OF THESIS DEFENSE :

DATE OF THESIS APPROVAL :

PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.



17.12.2021

Umman Öncan

ACKNOWLEDGEMENTS

I would like to express my gratitude to my advisor Assoc. Prof. Dr. Yelkin Diker Coşkun for her support, guidance and continuous encouragement she granted me throughout the process.

This dissertation is dedicated to my beloved spouse Temel Öncan, to my son Ahmet Emre and my dear parents Asuman and Halil, without their support and patience this dissertation would not have been completed

TABLE OF CONTENTS

Thesis Submission And Approval Form.....	ii
PLAGIARISM	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	ix
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS.....	xiii
ABSTRACT.....	xiv
ÖZET	xvi
1.INTRODUCTION	1
1.1 Metacognition.....	10
1.1.1 Learning and Cognitive Perspective	10
1.1.2 Information Processing Theory and Metacognition	13
1.1.2.1 Definition of Metacognition	15
1.1.2.2 Components of Metacognition.....	18
1.1.2.2.1 Metacognitive Knowledge	19
1.1.2.2.2 Metacognitive Regulation	20
1.1.3 Cognitive and Metacognitive Strategies and Strategy Instruction	22
1.2 Innovation And Innovative Work Behaviour.....	29
1.2.1 Definitions of Innovation.....	29
1.2.2 Types of Innovation.....	31
1.2.3 Features of Innovation	32
1.2.4 Studying Innovative Objects or Innovative Subjects	34
1.2.5 Definition of Innovative Work Behavior (IWB)	35
1.3 Metacognition And Innovative Work Behaviour.....	40
1.4 The Aim And Significance Of The Research.....	43
1.5 Problem Sentence.....	43
1.6 Sub-problems	44

1.7 Assumptions	45
1.8 Limitations	45
2. THE METHOD	46
2.1 Research Model.....	46
2.2 Study Group	47
2.3 Data Collection Tools.....	51
2.3.1 Demographic Information Form.....	51
2.3.2 Metacognition Scale	51
2.3.3 Innovative Work Behaviour Scale.....	52
2.4 Data Collection.....	54
2.5 Data Analysis	54
2.6 Validity of the Scales	54
2.6.1 Content Validity	55
2.6.1.1 Content Validity of Metacognition Scale	55
2.6.1.2 Content Validity of Innovative Work Behaviour Scale	55
2.6.2 Construct Validity.....	55
2.6.2.1 Construct Validity of Metacognition Scale.....	55
2.6.2.2 Construct Validity of Innovative Work Behaviour Scale	56
2.6.3 Reliability of Metacognition Scale	57
2.6.4 Reliability of Innovative Work Behaviour Scale	57
2.7 Assessing Normality	58
2.7.1 Metacognition Scale	58
2.7.2 Innovative Work Behavior Scale.....	61
3. FINDINGS	64
3.1 Findings about the Main Problem	64
3.2. Findings about the First Sub Problem	65
3.2.1 Metacognition Level with respect to Gender	65
3.2.2 Metacognition Level with respect to Education Level	66
3.2.3 Metacognition Level with Respect to English Proficiency Level	68
3.2.4 Metacognition Level with Respect to Working Years in ICT Sector.....	70
3.2.5 Metacognition Level with Respect to Job Band (positioning in organizational hierarchy).....	71
3.2.6 Metacognition Level with Respect to Company Scale.....	74

3.2.7 Metacognition Level with Respect to Getting Training on Thinking Skills	76
3.3 Findings about the Second Sub Problem	77
3.3.1 Innovative Work Behaviour Level with Respect to Gender.....	78
3.3.2 Innovative Work Behaviour Level with Respect to Education Level	79
3.3.3 Innovative Work Behaviour Level with Respect to English Proficiency Level.....	81
3.3.4 Innovative Work Behaviour Level with Respect to Working Years in ICT Sector	82
3.3.5 Innovative Work Behaviour Level with Respect to Job Band (positioning in organizational hierarchy).....	84
3.3.6 Innovative Work Behaviour Level with Respect to Company Scale	87
3.3.7 Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills	90
3.4 Findings about the Third Sub Problem	91
4. RESULTS, DISCUSSIONS AND SUGGESTIONS.....	93
4.1 Results of the Study.....	93
4.1.1 Results Related to the Main Problem of the Study.....	93
4.1.1.1 Results for the Metacognition Scores of the ICT Sector Employees.....	93
4.1.1.2 Results for the Innovative Work Behaviour Scores of ICT Sector Employees.....	93
4.1.2 Results Related to First Sub Problem of the Study	94
4.1.2.1 Results Related to Metacognition Level with Respect to Job band (positioning in organizational hierarchy).....	94
4.1.2.2 Results Related to Metacognition Level with Respect to Getting Training to Develop Thinking Skills	95
4.1.3 Results Related to the Second Sub Problem of the Study	95
4.1.3.1 Results Related to Innovative Work Behaviour Level with Respect to Gender.....	96
4.1.3.2 Results Related to Innovative Work Behaviour Level with Respect to Job band (positioning in organizational hierarchy).....	96
4.1.3.3 Results Related to Innovative Work Behaviour Level with Respect to Company Scale	97
4.1.3.4 Results Related to Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills.....	97
4.1.4 Results Related to the Third Sub Problem of the Study	97
4.2 Discussions for the Results of the Study	98

4.2.1 Discussions for the Results of the Main Problem of the Study	98
4.2.1.1 Discussions for Metacognition Scores.....	98
4.2.1.2 Discussions for Innovative Work Behaviour Scores	98
4.2.2 Discussions for the Results of the First Sub Problem	99
4.2.2.1 Discussions for the Results of Metacognition Level and Job Band (positioning) in organizational hierarchy.....	100
4.2.2.2 Discussions for the Results of Metacognition Level and Getting Training to Develop Thinking Skills	101
4.2.3 Discussions for the Results of the Second Sub Problem.....	103
4.2.3.1 Discussions for the Results of Innovative Work Behaviour and Gender .	104
4.2.3.2 Discussions for the Results of Innovative Work Behaviour Level with Respect to Job Band (positioning) in Organizational Hierarchy	105
4.2.3.3 Discussions for the Results of Innovative Work Behaviour Level with Respect to Company Scale.....	107
4.2.3.4 Discussions for the Results of Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills	108
4.2.4 Discussions for the Results of Third Sub Problem.....	109
4.3 Suggestions with Regard to the Study.....	113
4.4. Further Researches	114
REFERENCES	116
APPENDIX.....	126
Appendix A: Demographic Form.....	126
Appendix B: Metacognition Scale	128
Appendix C: Innovative Work Behaviour Scale.....	130
Appendix D: Permissions.....	131

LIST OF TABLES

Table 2.1 Gender Distribution	47
Table 2.2 Education levels.....	47
Table 2.3 English Proficiency Levels	48
Table 2.4 Working years in ICT sector.....	48
Table 2.5 Job Bands and Descriptions.....	49
Table 2.6 Job Band (positioning) of the participants in their currently working company.....	50
Table 2.7 Number of employees working in the company	50
Table 2.8 Getting Training to improve thinking skills	50
Table 2.9 Case Processing Summary.....	54
Table 2.10 Metacognition Scale - KMO Measure of Sampling Adequacy and Bartlett's Test.....	56
Table 2.11 Innovative Work Behaviour Scale - KMO Measure of Sampling Adequacy and Bartlett's Test	56
Table 2.12 Reliability Statistics of Metacognition Scale.....	57
Table 2.13 Reliability Statistics of Innovative Work Behaviour	57
Table 2.14 Metacognition Scale	58
Table 2.15 Tests of Normality for the Metacognition Scores.....	59
Table 2.16 Innovative Work Behaviour Scale.....	61
Table 2.17 Tests of Normality for the Innovation Scores.....	61
Table 3.1 Findings about Metacognition Skill Levels of ICT Sector Employees	64
Table 3.2 Findings about Innovative Work Behaviour Levels of ICT Sector Employees	65
Table 3.3 Descriptive Statistics for Metacognition Scores with respect to Gender.....	65
Table 3.4 Independent Samples Test of Metacognition Scores with respect to Gender....	66
Table 3.5 Descriptive Statistics for Metacognition Scores According to Education Levels.....	67
Table 3.6 Test of Homogeneity of Variances for Education Levels.....	67
Table 3.7 ANOVA Test for Metacognition Scores According to Education Levels.....	68
Table 3.8 Descriptive Statistics for Metacognition Scores According to English Proficiency Level	68
Table 3.9 Test of Homogeneity of Variances for English Proficiency Level.....	69
Table 3.10 ANOVA for Metacognition Scores According to English Proficiency Level.	69

Table 3.11 Working Years in ICT Sector	70
Table 3.12 Test of Homogeneity of Variances for Working Years in ICT Sector	70
Table 3.13 ANOVA for Metacognition Scores According to Working Years in ICT Sector	71
Table 3.14 Job Bands in Organizational Hierarchy	71
Table 3.15 Descriptive Statistics for Metacognition Scores According to Job Band	72
Table 3.16 Test of Homogeneity of Variances for Title	72
Table 3.17 ANOVA for Metacognition Scores According to Job Band	72
Table 3.18. Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Job Band Category.....	73
Table 3.19 Number of Employees (Company Scale)	74
Table 3.20 Descriptive Statistics for Metacognition Scores According to Company Scale.....	75
Table 3.21 Test of Homogeneity of Variances for Company Scale	75
Table 3.22 ANOVA Metacognition Scores According to Company Scale.....	75
Table 3.23 Descriptive Statistics for Metacognition Scores According to GettingTraining on Thinking Skills.....	76
Table 3.24 Independent Samples Test for Metacognition Scores According to GettingTraining on Thinking Skills	76
Table 3.25 Descriptive Statistics for Innovative Work Behaviour Scores According to Gender.....	78
Table 3.26 Independent Samples Test for Innovative Work Behaviour Scores According to Gender.....	78
Table 3.27 Descriptive Statistics for Innovative Work Behaviour Scores According to Education Level	79
Table 3.28 Test of Homogeneity of Variances for Education Level	80
Table 3.29 ANOVA Innovative Work Behaviour Scores According to Education Level	80
Table 3.30 Descriptive Statistics for Innovative Work Behaviour Scores According to English Proficiency Level.....	81
Table 3.31 Test of Homogeneity of Variances for English Proficiency Level.....	81
Table 3.32 ANOVA Innovative Work Behaviour Scores According to English Proficiency Level	82
Table 3.33 Working Years in ICT Sector	82
Table 3.34 Test of Homogeneity of Variances for Working Years in ICT Sector	83

Table 3.35 ANOVA Innovative Work Behaviour Scores According to Working Years in ICT Sector	83
Table 3.36 Job Bands in Organizational Hierarchy	84
Table 3.37 Descriptive Statistics for Innovative Work Behaviour Scores According to Job Band	84
Table 3.38 Test of Homogeneity of Variances for Job Band	85
Table 3.39 ANOVA Innovative Work Behaviour Scores According to Job Band	85
Table 3.40 Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Job Band Category.....	86
Table 3.41 Number of Employees (Company Scale)	87
Table 3.42 Descriptive Statistics for Innovative Work Behaviour Scores According to Company Scale	88
Table 3.43 Test of Homogeneity of Variances for Company Scale on Innovative Work Behaviour.....	88
Table 3.44 ANOVA Innovative Work Behaviour Scores According to Company Scale	89
Table 3.45 Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Company Scale (Number of Employees) Category	89
Table 3.46 Descriptive Statistics for Innovative Work Behaviour Scores According to Getting Training on Thinking Skills	90
Table 3.47 Independent Samples Test for Innovative Work Behaviour Scores According to Getting Training on Thinking Skills	91
Table 3.48 Correlations Between Metacognition and Innovative Work Behaviour.....	92

LIST OF FIGURES

Figure 1. Information Processing Model. Gelişim. Senemoğlu, N. (2015). Öğrenme ve Öğretim Kuramdan Uygulamaya. Yargı Press, p.271	14
Figure 2. Histogram for the Metacognition Scores.....	60
Figure 3. Normal Q-Q Plot for the Metacognition Scores.....	60
Figure 4. Histogram for the Innovation Scores.....	62
Figure 5. Normal Q-Q Plot for the Innovation Scores.....	63



LIST OF ABBREVIATIONS

OECD	:Organization for Economic Co-operation and Development
IWB	:Innovative Work Behavior
CSI	:Cognitive Strategy Instruction
ICT	:Information and Communication Technologies
BİT	:Bilgi ve İletişim Teknolojileri
ANOVA	:Analysis of Variance
MAI	:Metacognitive Awareness Inventory
KMO	:Kaiser-Meyer-Olkin

ABSTRACT

The main purpose of this study is to reveal the metacognitive skills of Information and Communication Technologies (ICT) employees and their behavior to innovate in the workplace and also to investigate the relationship between these characteristics. The participants of the research, in which the relational survey model, one of the descriptive research methods, was used, consisted of ICT employees (N=144) who are members of the LinkedIn professional business network. ICT employees were evaluated over the categories following: Gender, education level, English proficiency level, working years in the ICT sector, job band (positioning in organizational hierarchy), employees number (company scales) of the firm, getting any training to develop thinking skills. Metacognition and workplace innovation behaviors of the participants were examined through these categories.

In the study, "Demographic Information Form" created by the researcher, "Metacognitive Scale" adapted into Turkish by Turan (2009), and "Innovative Work Behavior Scale (IWB Scale)" adapted into Turkish by Önhon (2016).)" have been applied.

Statistical results were obtained by descriptive statistics, t-test, ANOVA test, and correlation test. Metacognition scores of the employees vary significantly according to their Job Band ($p=0.013$, $p<0.05$). While the job band with the highest average is "Technician, Trainee, Administrator" (mean=4.35), the second highest average is found as the Management category (mean = 4.2792). The metacognitive scores of those who had previously received any training to improve their thinking skills also differed significantly ($p=0.002$, $p<0.05$). Those with this type of training showed a higher score (mean =4.1864). Employees' innovative behavior (IWB) scores at work vary significantly by gender ($p=$

0.02, $P < 0.05$). Accordingly, men scored higher compared to women (mean = 4.1273). Innovative Work Behavior (IWB) scores in the workplace differ significantly according to the titles of the employees at the workplace ($p = 0.028$, $p < 0.05$). Accordingly, while the highest average belongs to the Senior Management (mean = 4.2889), the next highest average belongs to the Management category (mean = 4.2475). When companies are categorized according to the number of employees, the Innovative Work Behavior scores in the workplace also show significant changes ($p = 0.025$, $p < 0.05$). In small business or start-up organizations where the number of firm employees ranges from 0 to 9, employees' Innovation scores at Work (IWB) were found to be higher (mean = 4.2626). The Innovative Work Behavior scores of those who had received any training to develop their thinking skills before were higher than those who did not ($p = 0.003$, $p < 0.05$, mean = 4.1447). Along with these, there is a strong correlation between the metacognition and innovative workplace behavior scores of ICT sector employees ($r = +0.628$).

In this study it was revealed that metacognitive skills and innovative work behaviours of ICT sector employees are high and there is a high correlation between metacognition and innovative work behavior skills.

Keywords: Metacognition, innovative work behaviour, innovation, Information and Communication Technologies (ICT)

ÖZET

Bu çalışmanın temel amacı, Bilgi ve İletişim Teknolojileri (BİT) çalışanlarının üstbiliş becerileri ile iş yerinde yenilik yapma davranışlarını ortaya koymak ve bu özellikler arasındaki ilişkinin araştırılmasıdır. Betimsel araştırma yöntemlerinden ilişkisel tarama modelinin kullanıldığı araştırmanın katılımcıları LinkedIn profesyonel iş ağına üye ICT çalışanlarından (N=144) oluşmaktadır. Çalışma grubunun cinsiyet, eğitim seviyesi, İngilizce seviyesi, ICT sektöründe çalışma süresi, çalıştığı firmadaki ünvanı, firmanın çalışan sayısı, düşünce becerilerini geliştirmeye yönelik eğitim alıp almadığı değişkenleri incelenmiştir.

Çalışmada araştırmacı tarafından oluşturulan “Demografik Bilgiler Formu”, Turan (2009) tarafından Türkçe’ye uyarlanan “Üstbiliş Ölçeği (Metacognitive Scale)” ve Önhon (2016) tarafından Türkçe’ye uyarlanan “İş Yerinde Yenilik Davranışı Ölçeği (Innovative Work Behaviour –IWB Scale)” uygulanmıştır.

İstatistiksel sonuçlar betimsel istatistikler, t-testi, ANOVA Testi ve Korelasyon testi ile elde edilmiştir.

Araştırmanın bulgularına göre çalışanların üstbiliş skorları, iş yerindeki ünvanlarına göre anlamlı şekilde değişmektedir ($p=0.013$, $p<0.05$). En yüksek ortalamaya sahip ünvan “Teknisyen, Administrator, Stajyer” iken (mean=4.3512), ikinci yüksek ortalamayı Yönetici kategorisi sağlamaktadır (mean = 4.2792). Daha önce düşünce becerilerini geliştirmeye yönelik herhangi bir eğitim almış olanların üstbiliş skorları da anlamlı derecede farklılaşır ($p=0.002$, $p<0.05$). Bu tür bir eğitim almış olanlar daha yüksek bir skor göstermiştir (mean =4.1864). Çalışanların iş yerinde yenilikçi davranış (IWB) skorları cinsiyete göre anlamlı şekilde değişir ($p= 0.02$, $P<0.05$). Buna göre erkekler,

kadınlarla karşılaştırıldığında daha yüksek puan almışlardır (mean= 4.1273). Çalışanların iş yerindeki ünvanlarına göre de iş yerinde yenilikçi davranış (IWB) skorları anlamlı düzeyde farklılaşmaktadır ($p=0.028$, $p<0.05$). Buna göre en yüksek ortalama Kıdemli Yönetici'ye ait iken (mean=4.2889) bir sonraki yüksek ortalama Yönetici kategorisine aittir (mean = 4.2475). Firmalar çalışan sayılarına göre kategorize edildiğinde, iş yerinde yenilikçilik davranış skorları da anlamlı düzeyde değişim göstermektedir ($p=0.025$, $p<0.05$). Firma çalışan sayısının 0 – 9 arasında değiştiği küçük işletme veya startup organizasyonlarda, çalışanların İş yerinde yenilikçilik skorları (IWB) daha yüksek bulunmuştur (mean=4.2626). Daha önce düşünce becerilerini geliştirmeye yönelik herhangi bir eğitim almış olanların iş yerinde yenilikçilik davranış skorları, almamış olanlara göre daha yüksektir ($p=0.003$, $p<0.05$, mean = 4.1447). Bunlarla birlikte ICT sektörü çalışanlarının üstbiliş ve iş yerinde yenilik davranışı skorları arasında güçlü bir korelasyon görülmüştür ($r= +0.628$).

Bu çalışmada BİT sektörü çalışanlarının üstbilişsel becerileri ve iş yerinde yenilik yapma davranışı düzeylerinin yüksek olduğu ve üstbiliş ile yenilikçi iş davranışı becerileri arasında yüksek bir ilişki olduğu ortaya konmuştur.

Anahtar Kelimeler: Üstbiliş, iş yerinde yenilikçilik davranışı, yenilikçilik, Bilgi ve İletişim Teknolojileri (BİT)

INTRODUCTION

Today's world is experiencing a tremendous change in the first quarter of the 21st century. Disruptive technological developments affecting global politics and economics are observed. Several global issues such as migration and demographic differentiation, scarcity of world resources and climate changes, rapid digitalization, automation, artificial intelligence and robotics are reshaping countries, societies and individuals. In particular, developments in technology are changing our lifestyles, living standards, the way of doing business and business expectations including production and efficiency (Price Waterhouse Coopers, 2017).

The emergence of new ways of doing business and anticipation that they will extend even more in the coming years will force people to find themselves in a constantly changing environment of business which involve both governments and social security institutions. In addition, the 3-step traditional working life process consisting of "education - work - retirement" will comply with a more dynamic process (İşin Geleceğindeki Odak:İnsan, Türkiye İşveren Sendikaları Konfederasyonu İşveren Dergisi,2019).

Therefore, these rapid developments and transformation will lead to the formation of an unstable, complex, and uncertain world. In other words, today's world can be named as VUCA (Volatility, Uncertainty, Complexity and Ambiguity) World (Altındağ, 2008).

McKinsey Global Institute considers the implementation of digital technologies as a key driver of future economic growth. According to their studies, 60 percent of the

potential productivity increase will be originated from the digital technologies by 2030. The situation is dissimilar for Turkey as well. The potential of automation, artificial intelligence and digital technologies which will strengthen the country's economy is very high (McKinsey, 2020).

In the "Future of Our Business Report" published by McKinsey in January 2020, it is stated that the economic benefits and social changes which digital technologies, automation, and artificial intelligence will probably create 3.1 million jobs in the next 10 years. It is stated that as a result of automation and digitalization, 7.6 million jobs can be lost and turn into new jobs, besides 8.9 million new jobs can be created by 2030, where 1.8 million of these new jobs, can be especially in technology-related areas. Besides, it is also stated that 7.7 million employees will need to be equipped with the necessary up-to-date skills (McKinsey, 2020).

In these days when we experience the 21st century with great uncertainties and problems, it is inevitable for us to be in a continuous development and learning process as individuals. Specializations gained in formal education, including higher education, are no longer sufficient in the process of adapting to rapidly changing technology, coping with the experienced climate, health and economic crises. The importance of acquiring new specializations, competencies and skills that will adapt to these changes both professionally and personally is much more recognized. Thanks to the developments in the field of internet and technology, the depth and amount of information that can be accessed has also increased a lot.

This rapid change in today's world requires continuous learning for individuals and hence learning skills emerge as the most important feature of the 21st century. Today's global economic needs and rapidly changing technological requirements drastically modify the way of doing business. As a result, the need for educated manpower to adapt to the new world has considerably increased. The most critical skill that individuals should acquire is "learning to learn". Hence, they have to keep up with the change (Diker Coşkun, 2009).

Thanks to the ability to learn to learn, learning continues throughout life. Actually lifelong learning term depends on "life-long learners. It involves personal improving, the continuous building of skills and knowledge throughout an individual's lifetime. This term includes the individual's personal development, building and acquisition of knowledge and skills throughout her or his life (Oriji & Uzoagu, 2019, p.2).

The concept of lifelong learning emerged in the 70s and its importance in education systems has gradually increased. Although there are differences between countries, the philosophy of "learning for continuous improvement" forms the fundamentals in new educational understandings. In order for lifelong education to be implemented, it should be aimed to develop a person's creativity, initiativeness, active and independent learning capacity, and memorization of knowledge should be opposed. Education should focus on developing thinking styles, mental activities, critical thinking. In lifelong education, all kinds of mass media should be used for the development of the individual on issues such as social roles, citizenship awareness and rights, health and culture. The government should play a controlling and regulatory role in the dissemination of such information. Instead of

providing individuals with expertise in a single field within a narrow occupational field, a broad-based vocational education system should be established that can solve problems, follow new developments and learn to learn for their development in different fields. In the education system, approaches such as memorization and book-based information, passive learner and elimination-oriented system should be left; the personal and social development of the individual should be given importance from a young age. Being able to make decision, participation in social, cultural and voluntary activities should be supported. Children and young adults should be taught for problem-solving ways to identify the problem, gather information, analyze information, make decisions, implement solution strategies and evaluate it. Lifelong education policies should be structured by the state as open to everyone within the framework of equality of opportunity (Diker, 2009).

Lifelong learning is a very critical professional development feature that affects the effectiveness, competitiveness and innovation power of organizations in an environment of continuous change and innovation. It is expected that those who work in fields such as medicine, business, engineering, and information technologies, which are developing rapidly with the effect of developments in information and technology, will gain continuous learning skills. Therefore, lifelong learning should be taught to individuals as a skill using various teaching methodologies by educators during their school years (Dunlap, 2008, p.1).

"Lifelong learning is intentional, purposeful learning that people engage in throughout their lives to gain personal fulfillment and improve the quality of their lives" (Overly, Mc- Quigg, Silvernail, & Coppedge, 1980 q. Dunlap, 2008, p.1).

Lifelong learners can rediscover what they have understood and learned. They seek to know beyond what they know. Moreover they have characteristics such as risk taking, persistent and they believe in continuous learning (Dunlap, 2008, p.2).

Crick, Broadfoot and Claxton (2004, p.254-256) based lifelong learning skills on the concept of “learning power”. Individuals with learning power can fulfill the lifelong learning function. Individuals who have learning power are effective learners. The characteristics that individuals having learning power, in other words, active learners are expressed under 7 headings:

Growth Orientation: Developing orientation can be expressed as an individual's positive perspective and attitude on learning. It includes awareness of being better at learning. The individual defines himself as a growing, changeable, adaptable learner. She / he is aware that learning is a life-long process, she / he will be self-confident and happy by improving her / his learning abilities, and she / he can also increase her / his mental strength.

Critical Curiosity: Effective learners have willingness to find and learn. While trying to find something to learn the truth they can apply learning strategies not superficially but more deeply. They enjoy asking questions and looking critically at emerging issues. They manage and reorganize their own learning process.

Meaning Making: Effective learners try to establish the connection between what they have learned and what they know. They compare what they have learned with their

own experiences and interests and expect it to be consistent, and their questions are to ensure this consistency. They like to learn in areas they are really interested in.

Dependence and Fragility: Dependent and fragile learners are more easily discouraged when they make mistakes. They do not have the courage to defend their ideas and to be oppositional. They passively receive information and cannot make sense of it and construct it through their own experiences. The opposite concept is resilience and robustness.

Creativity: Effective learners enjoy trying different perspectives and letting their thoughts go on. They have strong intuition, they can transform the signals they notice with their intuition into various diagrams and visuals and create connections. Less effective learners prefer precise information, they can solve problems in routine processes, but they are not successful in tasks that require creativity.

Relationships/Independence: Effective learners accept the existence of people they will get help from in their learning processes and use them as resources. But they are neither completely dependent on these people, nor completely independent. They can balance well being social and individual.

Strategic Awareness: Individuals who learn effectively are aware of their own learning paths. They know how they learn. Can manage their own learning. They are aware of how much time a learning will take, how and through which sources they will access, which learning ways and strategies they will use, how they will plan and implement these

methods. Can evaluate and reflect their own learning. they can motivate themselves to learn, and can quickly raise their moral when they are disappointed on learning process.

Based on all these features, it may be possible to say that effective learners have self-directed learning capacity supported by metacognitive awareness (Dunlop, 2008, p.2).

What we need is to bring in individuals who can use their metacognitive skills, have high self-directed learning capacity, learn effectively, and have developed lifelong learning skills to society.

The individuals should have knowledge and be aware of their own cognition systems and learning characteristics in order to manage their learning. Metacognition, which can be expressed as “thinking about thinking” in the most general sense, is being aware of how individuals learn in addition to understand something. The function of cognition is problem solving, while the function of metacognition is to perform a task or regulate cognitive processes in problem solving (Turan, 2009).

Metacognitive skills are the abilities which can be taught and developed. Approaches, strategies and methods to acquire these skills should be included in all education / training programs starting from primary school. If the individuals know how they think, how they learn and how they can use learning strategies effectively in new learning processes, they can actively apply these skills whenever they need throughout their life.

Today, institutions and countries are in great competition. The most important factor supporting this competition is the added value that knowledge provides to economic

and social life. Social welfare can be increased not only by transforming knowledge into production, but also by going one step further, providing innovative solutions for the problems. Although innovation is associated with predominant technology, it can be expressed as ideas, processes and solutions in different disciplines that increase the quality of work or life and create a change in the lives of those who use it. The starting point of innovation is the individual. With the innovative attitudes and behaviors, ideas, products or solutions can be produced which can affect the entire industry and even the economic levels of countries.

Innovative behavior includes the ability of the individual to produce a new and creative idea and bring this idea to life. This process requires the active use of the social, cognitive and metacognitive mechanisms of the individual in the process until the idea is put into practice (Kim & Lee, 2018).

Especially, developments in the field of information and communication technologies affect miscellaneous sectors and cause serious social and economic changes on both local and global levels. It is expected from the employees in this sector using their metacognitive skills effectively and possess innovative attitudes and behaviors. Therefore, approaches and methods to gain strategic and metacognitive awareness and thinking skills should be included in all education / training programs starting from primary school.

Lifelong learning continues for some reasons such as developing technical professional expertise, gaining professional competence and skills related to the field in which he/she works, developing self-confidence and sense of achievement, improving communication and leadership skills, and supporting himself in new responsibilities after

he/she enters business life (Güldamlaşı, 2016). Individuals can take these trainings from the companies they work for and / or also from private education institutions and courses. Strategies and methods that will increase individuals' thinking skills and metacognitive awareness should be added to these training programs. In the business world, it is possible to come across many trainings such as "strategic thinking", "critical thinking", "creative thinking", "design thinking", "problem solving", "creative design thinking and innovation for business", "design thinking and creativity for innovation" and etc... both in the trainings planned as special classroom trainings and in various online training platforms. It is thought that individuals will both improve their metacognitive skills and contribute to the innovation processes by taking such method trainings.

In this study, our objective is to analyze metacognitive skills and innovative work behaviors of the employees in Information and Communication Technologies (ICT) Sector in Turkey.

1.1 METACOGNITION

1.1.1 Learning and Cognitive Perspective

Although there is not a unique definition of learning determined by theorists and researchers, one of the definitions which is agreed by most education professionals and also coincides with the cognitive approach is as follows.

“Learning is an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience.”

(Schunk, 2012, p.3)

According to Senemoğlu (2015), learning is a relatively enduring transformation in behavior or potential behavior that does not be caused by physiological changes, but as a result of an individual's experience. Learning theories explain the conditions of learning and cases in which learning will or will not occur. Broadly speaking, some psychologists and educators in the literature have grouped learning theories into two: behavioral and cognitive theories.

Some explanations of behavioral and cognitive theories provide a foundation in order to better understand the concepts underlying human learning principles. Behavioral theories claim that learning involves the formation of relationships between stimuli and responses. Behavioral theorists state that the causes of learning do not need to include internal events such as thoughts, beliefs, feelings but rather observable environmental events (Schunk, 2012). Besides, Cognitive theories are deal with the individual's cognitions

about his/her environment and the way that cognitions affect his/her behavior (Senemoğlu, 2015).

Both behavioral and cognitive theories admit that individual and environmental differences affect learning, but that their degrees of influence are different. Behavioral theories emphasize the order and presentation of the environment and explain the effect of the environment on learning by reinforcing the responses.

Cognitive theories consider the teacher's narrations or content descriptions as an environmental input. An external orientation and feedback system for student practices increases learning. Cognitive theories argue that extrinsic factors alone are not enough for learning. For cognitive theories, how an individual accesses information, how he/she uses, changes, stores and recreates information is very important (Şahin, 2014).

Senemoğlu (2015) examined learning theories in four main categories: behavioral association theories, cognitive behavioral learning theories, cognitive learning theories, and neurophysiological learning theory. Examples of behavioral association theories are "Pavlov's Classical Conditioning", "Watson and Guthrie's contiguity theories", "Thorndike's theory of bonding", "Skinner's operant conditioning theory" and "Hull's systematic theory of behavior". "Tolman's sign - Gestalt" and "Bandura's cognitive - social learning" theories as cognitive-weighted behavioral learning theories; "Gestalt theory" and "Information Processing Theory" for cognitive learning theories; "Hebb's Neurophysiological Theory" can be exemplified for the neurophysiological learning theory. No learning theory is sufficient to explain and to solve all types of learning and all problems related to learning. Since each of them best describes a different type of learning.

Cognitive psychologists produce theories that suggest about essential characteristics of learning, about how people build knowledge structures, form thinking and problem-solving strategies, and how they learn them.

- How do people organize knowledge?
- How do people store information?
- How do people retrieve data and generate conclusions?

These are fundamental questions for cognitive psychologists about how individuals use new knowledge. The cognitive psychologists focus not only on how individuals process information but also how they monitor and manage their thinking. Furthermore, the cognitive psychologists also concentrate on the results of the individuals' thinking on their information-processing capabilities. Cognitive psychologists are mainly concerned with the architecture of the mind. According to them there are two types of memory: short-term and long-term. Some education professionals divided short-term memory into two parts: "immediate memory" and "working memory". Immediate memory works consciously or unconsciously, keeps the inputs for about 30 seconds and during this time the person decides whether the perceived data is important or not. If the individual decides that the perceived data is important during this time, the input is transferred into the working memory where conscious processing takes place. Working memory is a type of memory that allows immediate action to be taken with the current situation or information. Working memory can handle limited information at a given time. However, by grouping and organizing the information, the working capacity of working memory can be increased. Long-term memory considers two types of information: semantic and procedural

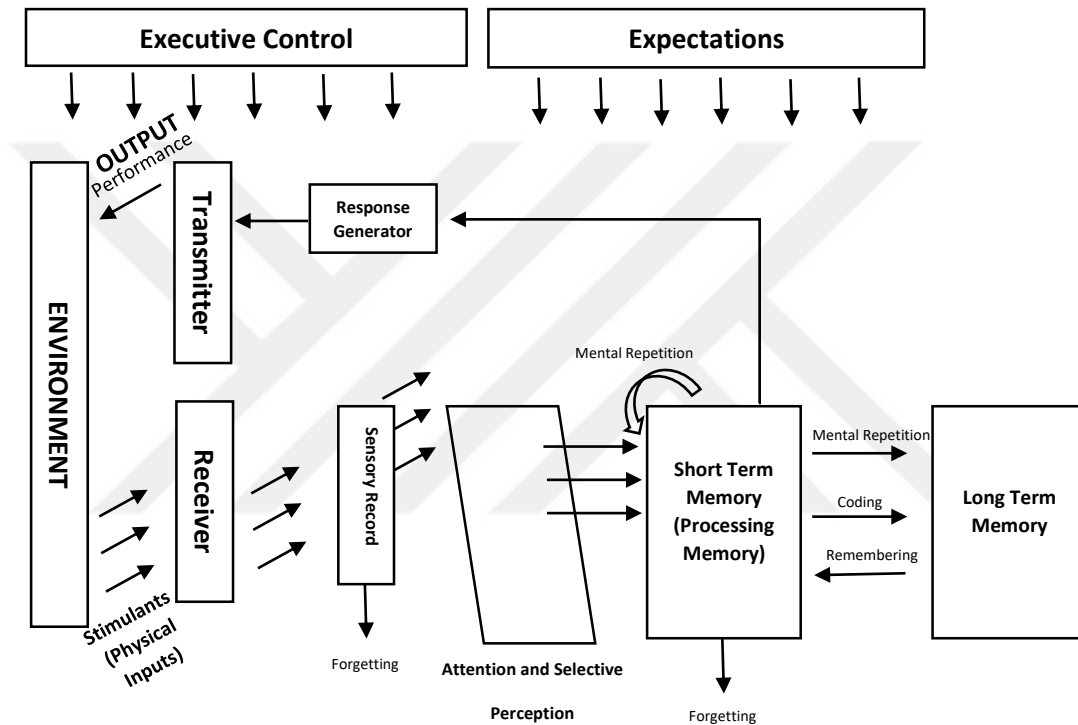
information, which is the way we do things. This type of memory stores and retrieves information. Unlike working memory, long-term memory has infinite capacity. People who perform effective learning transfer information from working memory to long-term memory as quickly as possible (Ornstein & Hunkins, 2018).

1.1.2 Information Processing Theory and Metacognition

According to Senemoğlu (2015) cognitive learning theories examine the mental processes used in understanding the world. These mental processes are used in many situations, such as understanding a concept or solving a complex problem. A mental structure change enables the individual to both gain new behaviors and change his current behaviors. One of the theories that examine learning from a cognitive perspective is Information Processing Theory. The Information Processing Theory focuses on how new information is imported, how the received information is processed and stored for a long time and how the stored information is retrieved. The stimuli we perceive with our sense organs from the environment are selected and converted into neural messages. These messages can then be stored and changed in the nervous system for later recall. With the remembered information, a different kind of product is formed by the interaction of the nervous and muscular system, transforming into different activities and movements that reveal what we have learned, like speaking or writing (Senemoğlu, 2015). She claims that many writers are united in a common model related to learning or information processing. In fact, all these processes that transform information occur physically as an electro-chemical change in the brain. According to the information processing model, there are three types of memory: sensory memory, short term - processing memory and long-term

memory. In addition, the model includes cognitive processes that involve the internal and cognitive activities that ensure the transfer of information from one memory store to anotherone.

Figure1 Information Processing Model



Note.Senemoğlu, N. (2015). *Öğrenme ve Öğretim Kuramdan Uygulamaya*. Yargı Press, p.271

Environmental stimuli are received by sense organs and information is recorded through the sensory record. The information that comes to the sensory record through attention and selective perception processes is selected and transferred to short-term (working) memory. Various strategies are used to keep information in short-term memory for a while, and when this information is needed to be remembered later, the information is transferred to long-term memory by creating meaningful coding and human can use

various retrieval methods to call back the information to working memory. The information called is sent to the reaction generator. The reaction generator directs information to the transmitters (muscles). Thus, the learner demonstrates his performance. Management and regulation of all these processes take place through metacognitive (executive) control (Senemoğlu, 2015).

Cognitive processes, which enable information to be transferred from one memory to another while transforming information include attention, selective perception, mental repetition, coding, and remembering. However, metacognitive (executive) cognition enables cognitive processes to be known and regulated (Altındağ, 2008). Using metacognitive skills effectively enables the individual to recognize how the individual learns, to identify learning needs and to apply appropriate strategies for learning styles (Altun, 2011).

1.1.2.1 Definition of Metacognition

Here, while talking about the concept of metacognition, it is necessary to express the difference between metacognition and cognition. Cognition is having knowledge or perception of something. Against this metacognition is different. If a person is aware of how to learn, it is about metacognition (Senemoğlu, 2015). While cognition provides problem solving, metacognition regulates an individual's cognitive processes in the performance of a task or problem solving. An individual who has control and awareness of his own thinking process can plan, monitor and evaluate his or her thinking. Metacognition provides planning, monitoring and evaluating individual's thinking system and also provides a suitable framework for self-assessment (Turan, 2009).

“Metacognition, having knowledge about the individual's structure and working style of own cognition system; awareness of the individual's own cognition and learning characteristics” (Senemoğlu, 2015, p. 335).

Gama (2004) claims that metacognition is responsible for controlling cognitive processes. It is high-level way of thinking. According to metacognition theories, self – reflection is important for the individual in terms of monitoring her own learning processes, self-management and self-evaluation.

“What is metacognition? It has usually been broadly and rather loosely defined as any knowledge or cognitive activity that takes as its object, or regulates, any aspect of any cognitive enterprise. It is called metacognition because its core meaning is ‘cognition about cognition (Flavell, 1985, p. 104)” (Schunk, 2014, p.286).

Flavell (1979) states that metacognition plays a significant role in not only on verbal communication, reading comprehension, writing, language learning and social cognition but also on self command and self education . Individuals with metacognitive awareness can define their own ways of learning and understanding in order to use the knowledge which they have and share with others (Hamman & Stevenson, 1998).

Hamman & Stevens (1998) claim that from the strategy usage perspective, cognitive knowledge includes awareness of declarative, procedural, and conditional information. Various studies show that students with high metacognitive awareness can learn more effectively, perform better, apply more strategies and adjust their learning.

There are also studies on the relationship between academic achievement and metacognitive awareness.

Metacognition enables the individual to become a successful learner, and also there are studies associated with intelligence. Individuals who use their metacognitive skills effectively can plan how to approach a certain learning task, monitor the understanding process, and evaluate how much progress has been made towards the completion of a task. There is a discussion on the definition of metacognition in the literature. For example, it is used in conjunction with concepts such as metacognition, self-regulation, executive control, and meta-memory, and these concepts are often used interchangeably. Although there are differences between the definitions, they all emphasize the importance of executive processes in controlling and regulating cognitive processes (Livingston, 2003).

If the individual can ask and answer his / her purpose in learning a subject, what he / she knows about that subject, how much time he will need to learn, how he can learn by following a path, how he / she can find mistakes and whether he/she finally accomplishes the expected learning, this is an indicator of the individual's metacognitive knowledge (Senemoğlu, 2015, p.336).

According to Hıdıroğlu (2018), metacognition becomes even more distinguishable and observable in cases of high-level intellectual activities. In these types of activities, the mind focuses on important parts, constantly updates existing situations, analyzes goals and sub-goals, sequences steps / processes, turns big problems into small problems. Organizing and keeping thoughts under control in complex situations with all these multiple mental states or representations is related to the concept of metacognition. The mind tries to

respond with more metacognitive action, especially when there is disharmony and confusion between thought and information. Metacognitive actions, just like cognitive actions, become automatic when they are continuously performed. Automated metacognitive actions reduce the mental load and provide higher intellectual outputs.

1.1.2.2 Components of Metacognition

Flavell (1979) expressed metacognition in a model, which he explained, with 4 basic elements that are in a dynamic interaction with each other. These are metacognitive knowledge, metacognitive experiences, goals (or tasks), actions (or strategies).

Metacognitive knowledge is the knowledge of the individual generally related to cognitive tasks, goals, actions and experiences. Goals (or tasks) refer to the objectives of a cognitive enterprise. However, actions (or strategies) are conscious behaviors and activities applied to achieve the cognitive goal.

Panaoura, Philippou & Christou (2003) claim that in modern psychological literature, “metacognition” has been used to refer to knowledge about cognition and regulation of cognition. These two metacognitive elements are interrelated. Metacognitive knowledge includes information about how people learn and process information and individual knowledge of their own learning processes (Livingston, 2003). On the other hand, metacognitive regulations include activities used for monitoring and regulating learning such as planning - monitoring and evaluation (Turan, 2009). Livingston (2003), based on Flavell (1979), argues that metacognition includes metacognitive knowledge and metacognitive experiences or regulation.

1.1.2.2.1 Metacognitive Knowledge

“Metacognitive knowledge consists primarily of knowledge or beliefs about what factors or variables act and interact in what ways to affect the course and outcome of cognitive enterprises. There are three major categories of these factors or variables—person, task, and strategy.” (Flavell, 1979)

The person category, which is one of the sub-dimensions of metacognitive knowledge, includes general information about how the person learns and processes information as well as the individual's knowledge about himself and other people's learning process. This knowledge is also an information that there may be differences in certain subjects or situations in the individual's own cognition process and that there may be differences with other individuals (Turan, 2009). For example, a person can learn how much he knows about a cognition object or that it can sometimes be difficult to remember. A knowledge can now be easily brought to mind, but later it may be forgotten or vice versa. A person understands better by reading, and that his / her friend learns better by listening. All of these are concerned in person category of metacognitive knowledge (Flavell, 1979).

The goals or tasks knowledge variable includes metacognitive knowledge about task demands or goals. For example, the child knows that some tasks are more demanding and difficult than others. During the performance of a task, an evaluative knowledge about the learning goal is needed regarding whether the available information is sufficient or insufficient, familiar or unfamiliar, well or poorly organized, or reliable to achieve that task or purpose. This information provides an understanding of how to manage the task fulfillment process and how successful it can be in achieving the goal. Strategy category,

on the other hand, is the knowledge on which strategies will be effective and when they will be used to achieve a certain goal. For example, a child may begin to believe that he or she will learn by repeating a topic in their own words and paying particular attention to the main points. Just like cognitive strategies, metacognitive strategies can be learned (Flavell, 1979). Livingston (2003) argues that knowledge about strategy comprise not only knowledge on both cognitive and metacognitive strategies but also conditional knowledge on when and where strategies are suitable to use.

1.1.2.2.2 Metacognitive Regulation

For the second dimension of metacognition, while Flavell (1979) said "metacognitive experience", Brown (1987) (cited in Turan, 2009) stated that "Metacognitive experiences include the use of metacognitive strategies or metacognitive regulation." In this second dimension of metacognition, the strategies that will be suitable to achieve the goal are planned, selected, applied, evaluated whether they work or not, and those that are not suitable are eliminated or rearranged. Metacognitive strategies are applied in the form of dynamic successive processes. These processes support to regulate and control learning and include planning and monitoring cognitive activities, also controlling the results of these activities (Livingston, 2003).

Turan (2009) states that the metacognitive experience is the conscious cognitive and affective experiences that accompany cognitive actions. Metacognitive experiences can be short or long term, simple or complex in content. Metacognitive experiences occur in situations that require highly conscious thinking, for example in a work or school task,

where planning and evaluation are required, where decisions and actions are carried out at the same time (Flavell, 1979).

Yurdakul (2004) assumes that metacognitive experiences consist of metacognitive activities and metacognitive strategies used simultaneously with these processes. These are basically addressed in three groups: planning, monitoring or supervision and evaluation.

Metacognitive experiences have an important effect on cognitive goals, cognitive actions and metacognitive knowledge. By these experiences, metacognitive knowledge can be arranged again. Being aware of and thinking about the experience gained from cognitive achievements and failures improves metacognitive experiences. It also provides the development of metacognitive knowledge. Metacognitive knowledge, metacognitive experiences, cognitive strategies / actions and cognitive goals are in a dynamic interaction (Turan, 2009).

Thus, the individual decides and applies which learning strategies will be used in line with the metacognitive knowledge he has acquired based on his metacognitive experiences. If the goals are achieved as a result of using these strategies, the metacognitive knowledge is verified. Otherwise, according to the result of metacognitive experience, the individual's metacognitive knowledge will change. The individual decides that the cognitive strategy fails to achieve its goal and puts another strategy into action. The more metacognitive experience, the greater metacognition and the more likely to make the right decision to reach the goal using which strategy in which situation. Thus, the individual can become an effective learner who can organize his own learning (Senemoğlu, 2015, p.337 - 338).

1.1.3 Cognitive and Metacognitive Strategies and Strategy Instruction

Cognitive and metacognitive strategies are different from each other (Anderson, 2002). Cognitive strategies help achieving the goal. Metacognitive strategies, on the other hand, are activities and experiences that enable to understand and evaluate whether the goal has been achieved. Metacognitive strategies control cognitive activity or experience, enable the achievement of cognitive goals, and include processes that regulate and control learning (Yurdakul, 2004). Cognitive strategies enable the learning. Metacognitive strategies, on the other hand, monitor and regulate the learning process and are concerned with how the learner reflects (Jegede, Taplin, Fan, Chan, Yum, 1999, p.5).

To distinguish between cognition and metacognition, it is necessary to focus on how information is used. If metacognition is “thinking about thinking”, realizing whether the cognitive goal has been fulfilled represents metacognition. While cognitive strategies help to achieve a certain goal. for example, understanding a text, metacognitive strategies help to understand the extent to which that goal has been achieved such as asking yourself questions to assess whether you understand the text. Metacognitive experiences often occur when cognitive strategies don't work, such as realizing that you don't understand a text you read. Metacognitive and cognitive strategies are actually very similar to each other. They are separated from each other depending on the purpose of use. If the aim is to obtain information while reading a text, the strategy used is cognitive; Understanding what you are reading in the text requires using a metacognitive strategy (Livingston, 2003).

“Metacognitive strategies activate and control other cognitive strategies in the learning and thinking process. These strategies also give plans and decisions for

other cognitive strategies to be used in the future. In solving a complex problem, a metacognitive strategy either tests an existing hypothesis or helps to develop new hypotheses” (Yurdakul, 2004, p.101).

According to Demircioğlu (2008), basic metacognitive strategies in the literature are strategies for combining new knowledge with old knowledge, choosing deliberate thinking strategies, planning thinking processes, planning strategy selection, checking and monitoring strategy compliance, and evaluating your own cognition. These processes ensure the regulation and management of cognitive processes. Demircioğlu (2008) quotes from Montague (1992) who identified three cognitive strategies: 1) Helping the learner by individual teaching to identify the components of the problem, 2) Methodological analysis of the problem by the learner asking himself questions, 3) Encouraging the learner for monitoring the learner’s own performance in the process. At the point of applying these strategies, it is important for teachers to design the learning environments accordingly.

There is a vast body of literature showing that metacognitive strategies can be learned. Guiding students through their learning experiences will enable them to develop the metacognitive strategies (Turan, 2009).

Dunlop and Grabinger (1996) which is also cited in Yurdakul (2011) argue that when learners participate in learning activities and use their metacognitive skills, they develop metacognitively and metacognition cannot be taught mechanically. In constructivist learning environments, learners should be encouraged to use knowledge, teachers should support learners' metacognitive development as a model for problem solving and questioning (Lebow,1993).

Those with better metacognitive skills tend to be more cognitively successful. Metacognitive skills are learnable competencies. Most often, teaching of metacognitive strategies has been included in Cognitive Strategy Instruction (CSI) programs. Cognitive Strategy Instruction (CSI) is an approach that improves learning by making use of thinking skills and thinking processes. Cognitive Strategy Instruction (CSI) helps students to engage in more strategic, self-reliant, flexible and productive in their learning efforts. For an effective metacognitive instruction, the student should be informed about both cognitive processes and strategies to be employed as metacognitive knowledge and gain experience in using both cognitive and metacognitive strategies and evaluating their results. Having knowledge about cognitive processes and strategies improves students' metacognitive knowledge levels, while strategy usage and assessment experience improves students' metacognitive regulation. Providing knowledge without experience is insufficient in the development of metacognitive control (Livingston, 2003).

When metacognition is included in instruction programs and supplied experiences which improve metacognitive control, it is observed that learning improves. Besides, Yurdakul (2004) claims that metacognition enables learners to use information flexibly.

Well-designed instruction programs should be a process in which the students are taught how to learn and remember, motivate themselves and control their learning effectively. Learning strategies should be taught to students starting from primary school and continue to secondary and higher education. Various studies have demonstrated that teachers give little explanation to their students about how to study or learn. Learning strategies refer to the behavioral and thinking processes used by the students and affect

students' learning, which include cognitive strategies such as putting information into memory, retrieve from memory, and metacognitive processes (Senemoğlu, 2017, p.557 - 558).

Senemoğlu (2017) bases learning strategies on Gagne's learner strategies. These strategies are based on the internal-cognitive and metacognitive processes explained in the Information Processing Theory, and are defined as the strategies the learner uses in his own learning and in guiding his learning. The learner must take the responsibility of learning himself. What is important in using the learning strategy is that the learner can choose and use the appropriate strategy for the situation. In the literature, names such as “strategic learners”, “independent learners”, “self-regulated learners”, “self-instructing learner” are given to the students who can learn by themselves. Senemoğlu (2017) preferred to use the term "self - instructing learners" for such students. "Self - instructing learners" can effectively apply the following steps:

1. Accurately recognize a learning situation and analyze the goal: determine what to learn and the learning framework; determine by what criteria, where and when
2. Planning the strategy: it can be expressed as the preparation of a plan consisting of appropriate strategies that will provide the desired learning according to the goal analysis in the first step.
3. Strategy implementation: the learner puts the strategy plan prepared into practice.

4. **Monitoring the results of the strategy:** the learner monitors and evaluates to what extent the strategy he chooses and implements has achieved his goal. For example, "Does studying this subject schematically make it easier for me to understand?" is a question which he can ask himself.

5. **Adapting the strategy:** if the strategy used by the learner did not yield a satisfactory result in achieving the learning goal, the learner should be able to make changes in the strategy plan (Senemoğlu, 2017, p.559).

Learning strategies should be given to students from primary school to higher education, and individuals who can apply these strategies in all new learning that they will encounter in real life after school should be brought to the society. Blakey & Spence (1990) cited a series of strategies that teachers can implement in classrooms that improve students' metacognitive competencies:

1. Identifying the knowledge the students know: Students should identify what they know and what they don't know. "As students research the topic, they will verify, clarify and expand, or replace with more accurate information, each of their initial statements."

2. Talking about thinking: Teachers should demonstrate and discuss loudly their thinking process. Students can model the thinking process and develop their thinking vocabulary. Thus, they can start talking their own thinking.

3. Keeping a thinking journal: Students should keep a diary about their learning. This should reflect students' thinking processes in their everyday life. They should

take notes on the uncertainties and contradictions they have realized and the difficulties they overcome.

4. Planning and self-regulation: Students' responsibility in planning and organizing their own learning should be increased. If someone's learning is planned and followed by someone else, this is very difficult for a student to have self-control on his / her learning. Students can be taught planning activities such as estimating how much time they need to complete an activity, organizing materials and listing things to do.

5. Debriefing the thinking process: Debriefing aims making students aware of their thinking processes. The teacher asks the students to reconsider their learning activity and collects information about their thinking processes. Students classify related ideas by considering the thinking strategies they use. Finally, they identify the successful strategies by evaluating how much they have achieved their learning goals and try to formulate strategies that may be more useful.

6. Self-Evaluation: Self-evaluation can be requested from students with various checklists or verbal explanations. Over time, students realize that they can use similar learning strategies in learning activities in various areas and can adapt these strategies to new situations.

Teachers should create a learning environment that supports metacognition and is equipped with activities that will enable students to become aware of their own thoughts. They should be able to model metacognitive strategies for students. Problem solving or research activities are an opportunity to develop metacognitive strategies. Teachers should

also focus on how their students perform their duties and set goals not only for content goals, but also for metacognitive processes. Hence, they discover that understanding and transferring cognitive and metacognitive processes improves learning (Blakey & Spence, 1990).



1.2 INNOVATION AND INNOVATIVE WORK BEHAVIOUR

In today's ever more rapidly changing world, countries, organizations and individuals must be able to keep up with this change. In particular, rapidly changing technologies, global economic and political problems, and increasing competition require organizations and countries to adopt innovation, starting with the individual. When considered as a concept, innovation should be taken into account as a process, not a short-term and one-time effort. This process can be expressed as the generation of new ideas and implementation in the area where it will benefit.

It is necessary to create a workforce with the right combination of knowledge and skills in order to increase innovation and increase the potential for innovation. Creating such a trained workforce is only possible by correctly teaching science and technology at all levels of education. A strong science and technology base must be provided for sustainable innovation. With this base, it is an important gain for countries to raise individuals who are capable of producing new ideas that will provide competitive advantage and are equipped with skills that can transform them into practice (Eren, 2010).

1.2.1 Definitions of Innovation

Schumpeter (1911) defines innovation as "the introduction of a new feature of a product or an existing product that customers do not yet know; the introduction of a new production method; opening a new market; finding a new source of raw materials or semi-finished products; an industry to have a new organization". He states that entrepreneurs create a continuous dynamism in the economy and the market thanks to their innovative

role. Creating economic and social value is a priority in innovation. Accordingly, the differences and innovations realized in products, services and business methods are evaluated within the scope of innovation. Innovation in its broadest sense can be defined as the transformation of knowledge into economic and social benefit. Innovation increases the competitiveness of companies by increasing their productivity and profitability. In terms of its contribution to the country's economies, innovation greatly affects the country's employment, social welfare, sustainable growth and quality of life (Elçi, 2006).

Countries that put innovation at the center of their policies should especially evaluate and highlight innovative capacity (Eren, 2010, p.9).

Rogers (1995) which has also been cited in Kılıçer (2011), states that the concept of innovation and diffusion of innovations, while it was the field of rural sociologists, is now studied in many different fields from business to sociology, from communication to education and marketing and so on.

Goldsmith & Foxall (2003) shares that innovation can be defined as ideas or practices that are perceived as new in terms of the audience in which they are presented.

While Porter (1991) evaluates innovation in terms of bringing forward the competitive advantage of businesses, Drucker (2002) defines it as an effort to create a purposeful, focused change in the economic or social potential of an enterprise (Önhon, 2016).

“An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behavior is

concerned, whether or not an idea is ‘objectively’ new as measured by the lapse of time since its first use or discovery.” (Rogers, 1983 , p.11).

Innovation changes the foundation of power and can invalidate valid knowledge and competences. Therefore, innovation can also have a disruptive side to both manufacturers and end users (Sevinç, 2014).

While Schumpeter (1934) states innovation "creative destruction", he states that new technologies activate economic developments in a dynamic process that replaces the old one. According to Schumpeter, "radical" innovations create significant destructive changes, while "incremental" innovations continually advance the change process (Oslo Guide TR, 2005, p33). In Oslo Guide TR (2005), which is internationally accepted and published by the OECD (Organisation for Economic Co-operation and Development) and the European Commission, innovation is defined as the realization of a new or significantly improved product (which can either good or service), or process, a novel marketing method, or a novel organizational method in internal practices, workplace organization or external relations.

1.2.2 Types of Innovation

According to Oslo Guide TR (2005), four types of distinction are made for innovation: product, process, marketing and organizational innovations. Product and process innovations are closely related to technological innovations and technological process innovations.

1. Product innovations can take advantage of new knowledge or technologies or introduce a new use or consist of a combination of existing technologies. It includes significant improvements in both promotion and functional features of goods and services.
2. Process innovation is the realization of significant innovations in production or delivery methods. Process innovation includes significant technical or method changes in the hardware or software of service-oriented companies.
3. Marketing innovation encompasses important changes that occur in all marketing processes from product design, packaging, promotion and pricing. What distinguishes a marketing innovation from other changes in a firm's marketing tools is the implementation of a previously unused marketing method.
4. Organizational innovation is the application of a new organizational method in the firm's commercial practices, organizational structure or external relations.

Firms can aim to improve performance, gain market advantage and gain competitive advantage by innovating, reducing costs or increasing demand. Thanks to innovations in their operations, they can provide more efficient and quality service.

1.2.3 Features of Innovation

Features of innovation can be listed as follows: while innovation can be an idea, product or process, there is something perceived as new in every innovation. It is different and original from the existing one. It increases both the quality of life and the level of welfare. Innovation creates a change in the lives of its users. Innovation is a continuous process. It is one of the important means of competition. Innovation is a product of the

cultural environment that supports it, and it feeds on this cultural environment. Innovation is also a problem-solving process. It is a product of the integration of different functions and disciplines. It provides both adaptation to the environment and integration with the environment. Innovation has a diffusional feature (Kılıçer, 2011, p.3-4).

“Innovation is driven by the ability to see connections, to spot opportunities and to take advantage of them” (Tidd & Bessant, 2015, chp1 p.7).

According to De Jong (2007) cited from King and Anderson (2002), he defines the characteristics of innovation as follows: it is something that is perceived as new in the social environment in which it is introduced. It should be based on an opinion. Ideas are the starting point for innovation. But it should not just stay with the idea, it cannot be called innovation without development and implementation effort. It should be aimed to provide a benefit. It can lead to benefits such as not only financial gains but also personal growth, increased satisfaction, better interpersonal relationships and better harmony. Innovation is deliberate, not accidental, and is not a routine change. Its effects can be generalized and public.

While innovation provides an advantage in organizational success and sustainable competition, its effect on the social and economic development of countries cannot be ignored. The relationship of innovation attitude with socio-economic development and employment has been studied by many organizational theorists and managers in scientific research for a long time (Eren, 2010, p.8).

1.2.4 Studying Innovative Objects or Innovative Subjects

Many academic disciplines including sociology, psychology and economics, have concentrated on innovation. Innovation research in the literature is generally divided into two different approaches, object-based and subject-based. Object-based studies deal with the innovation itself. On the other hand, subject-based studies concentrate on specific actors both initiating and implementing innovation (De Jong, 2007, p17).

Examples of object-based innovations incorporate new products, services or processes, radical or incremental innovations, and technology transfers. According to De Jong (2007, p.17), studies in object-based innovation research define innovation, new product development process, adoption and diffusion patterns, technology transfer and innovative business development.

In defining innovation category, researchers have studied various types of innovation, for example, they have identified innovation in the service sector. In the new product development category, mainly innovative product development models were emphasized, success criteria in product development were determined, and researches on the development of new services were presented. In adoption and diffusion category, the adoption and diffusion of innovation and diffusion models have been studied. In transfer of technology category, the premises and consequences of technological change, technology transfer, technology policies and emergence of dominant designs are emphasized. Subject based innovation studies, on the other hand, focus on the actors who realize the innovation and how they can innovate more effectively and efficiently. This section of the literature contains research performed at several levels such as countries,

industries, organizations, and individuals. At the “Country Level”, there are studies on subjects such as exploring and benchmarking the innovativeness power of countries. At the “Industry Level”, Interactions with different industries are discussed in the innovation and innovation process within a particular industrial sector. While there are studies in the fields of creating an innovative organization and management of innovation at the “Organizations Level”, topics such as innovation management and innovative work climates in work groups are also evaluated in the “Groups Level”. At the individual level, there are studies on creativity (De Jong, 2007, p.17).

In this study, innovation will be discussed in the subject based category at the individual level. Individual innovation and Innovative Work Behavior (IWB) will be emphasized.

1.2.5 Definition of Innovative Work Behavior (IWB)

De Jong (2007, p.18) stated that individual innovation is associated with the proactive behavior of individuals, which is a relatively new approach in the literature. Proactive behaviors are handled in the form of self - initiated and future-oriented actions taken by the individual to change and improve his / her conditions. Proactive work behavior and similarly innovative work behavior can be included in proactive behaviors.

De Jong & Hartog (2007, p.3) defined Innovative Work Behavior (IWB) as an individual’s behaviour that aims to initiate and introduce new and useful ideas, processes, products or procedures within a work role, group or organization. Thus, it can be said that Innovative Work Behavior (IWB) begins with creativity. Creativity or idea generation is

the first stage of innovation. However, Innovative Work Behavior (IWB) is more than just creativity. The new and creative ideas generated should be transformed to implementation of useful products, services or processes

As mentioned by Tang (1998) creativity is the ability to distinguish unusual situations and models, to notice the relationships among them and to produce new ideas and objects

Amabile (1988) defined the innovation as the successful implementation of creative ideas in an organization. King and Anderson (2002) cited in De Jong & Hartog (2007, p.3) supported this definition that innovativeness also includes the practical implementation of creative ideas. In this process from creative idea generation to idea implementation, innovative behavior can be seen as a multidimensional series of proactive actions of employees.

Jannsen (2000, p.2) states that innovative behavior is a complex set of behaviors on the workplace and defines it as Innovative Work Behavior (IWB) in the workplace. In addition, based on the work of Scott & Bruce (1994), it states that Innovative Work Behavior (IWB) includes three categories of behavioral tasks: idea generation, idea promotion, and idea realization. Jannsen (2000) claimed that idea generation is the first step of Innovative Work Behavior (IWB). It means that creating of new and useful ideas in any subjects, such as business-related problems, incompatibilities or new market trends. The second stage of Innovative Work Behavior (IWB) is the “idea promotion” that means promoting new idea to find the supporters and sponsors of the idea. The last stage of the innovation process is idea realization that means experiencing the innovative idea as a model or prototype within a work role or organization level (Jansenn, 2000, p.2). In the

implementation phase, employees demonstrate a set of behaviors aimed at realizing the idea. For instance, employees may try to convince others of the value of the idea. Employees can also effort in developing, testing and commercializing the idea. A wide variety of problems to be solved can be encountered in these processes.

According to Basadur (2004), organizational creativity is continual and circular process. It begins with finding problems, such as noticing and predicting opportunities for change, continues with conceptualization of solving the problem and implementation of the problem. In his approach, organizational creativity includes the stages of deliberately identifying the problem, developing a solution idea for the problem and implementing it, which we often use in daily life. Using divergent and convergent thinking skills is at the forefront. Every implemented solution also provides new and useful problems to explore. This effort is therefore a cyclical process.

Scott & Bruce (1994, p.4) states that individual innovation starts with creativity but cannot be limited to this. Creativity is related to the generation of new and useful ideas. Innovation, on the other hand, is the production and adoption of new and useful ideas, as well as the realization of these ideas. Although creativity is often defined as "doing something for the first time anywhere creating a new knowledge", innovation also includes the adaptation of products or processes to an organization. Innovation is a process influenced by many social factors. Idea generation is only one stage of innovation that has multistage process. Problems, failures, disputes, emergence of new information and trends regarding the business can trigger the generation of new ideas. In order to overcome developing bottlenecks, such as failure to fully meet customer demands, changes in market

trends, problems in organizational and operational processes, employees develop solutions by creating new ideas in the form of new products and services, differentiation of business methods or changes in processes (Önhon, 2016, p.133).

From this perspective, problem recognition and the generation of ideas or solutions are a starting point for innovation. But not limited to this, creative ideas must be realized (De Jong, 2007,p.20). In the next stage of the process, the innovative individual seeks support for the idea and seeks to build a coalition of supporters for it (Scott & Bruce, 1994, p.4).

Innovativeness can cause a resistance in work environments where employees are not open to change and who adhere to existing thinking patterns. In the business environment, subordinates, superiors and other stakeholders may resist the innovative behavior of the employee. Innovation is also a socio-political process where employees who are not open to change and who adhere to existing thinking patterns are expected to show resistance (Janssen, 2005, p.6). For this reason, an employee should engage in social work in order to adopt the new idea to his colleagues, supporters and sponsors in the business environment, and be able to form strong coalitions to convince his colleagues, supporters and sponsors to bring his idea into the practice (Janssen, 2000, p.2).

Finally, in the third phase, the innovative individual completes her idea by constructing a prototype or model that can be "touched or experienced, disseminated, mass produced, used and productive" for institutionalization. (Scott & Bruce 1994, p.4). Önhon (2016) cited from Kanter (1988) that this phase, called as idea realization, is the phase of testing innovation by modeling and producing a prototype and putting it into practice.

While simple innovations can happen through individual efforts, more complex innovations must be realized through teamwork in the context of subject expertise, specific knowledge and competencies.



1.3 METACOGNITION AND INNOVATIVE WORK BEHAVIOUR

In light of all these explanations, innovative behavior requires the combined action series in the creation and promotion of new ideas. These actions include planning, monitoring and regulation. Metacognition emerges as an important pioneering factor for the individual to manage and regulate his / her thoughts and actions, from generating ideas to implementing them. The innovation is a process in which many unforeseen situations and problems can be encountered. In such cases, being able to use the mind flexibly, discovering new information with existing knowledge and ultimately realizing the innovative idea is part of the innovative behavior. In this context, planning what to learn in order to solve a problem, discovering what kind of information is related to existing knowledge, checking and evaluating how to achieve the goal is about using metacognition well (Kim & Lee, 2018).

As explained in the previous section, metacognition provides to organize the cognitive processes of the individual in the performance of a task or in problem solving. An individual who has control and awareness of his own thinking can plan, monitor and evaluate the thinking process. Metacognition is the awareness of the individual's own cognition structure and learning characteristics.

“Investigators have recently concluded that metacognition plays an important role in oral communication of information, oral persuasion, oral comprehension, reading comprehension, writing, language acquisition, attention, memory, problem solving, social

cognition, and, various types of self-control and self-instruction”

Flavell (1979, p.1).

Individuals should be able to determine and realize their goals, manage their own learning in line with their goals, display strategic behaviors to solve the problems they encounter. They should be able to monitor and evaluate their own behaviors. Taken together, these features of metacognitive skills show that it can be an effective factor on innovative behavior. As mentioned above, innovation in any field starts with the generation of new and useful ideas. In order for a new idea to be formed, information must be researched, absorbed and combined with existing knowledge (Kim & Lee, 2018).

As Galunic & Rodan (1998, p.3) stated, by means of knowledge discovery and using knowledge, individuals have the opportunity to develop new insights and skills. The breadth and depth of available knowledge can be a driving force in generating innovative ideas. The discovery of new knowledge and the creative reassembly of existing knowledge enables the synthesis of new knowledge. Innovation behavior can also be developed thanks to the integration of knowledge with information (Popadiuka & Choo, 2006).

As mentioned by Janssen (2000), Inovative Work Behavior (IWB) represents the process of intentionally generating new ideas, developing, changing, spreading and implementing ideas (idea generation, idea promotion and idea realization). In all of these processes, the individual should consciously implement actions such as planning his thoughts and actions, choosing the relevant strategies, applying the strategies, monitoring and evaluating how much he / she has achieved the goal. These results are only possible by the active and effective use of metacognitive skills.

In this study, in line with all these points of view, the relationships between metacognitive skills and innovative work behavior will be examined with various variables.



1.4 THE AIM AND SIGNIFICANCE OF THE RESEARCH

Innovative behavior requires the combination of a series of actions in the creation, presentation of new ideas. These actions include planning, monitoring, and regulation. Metacognition emerges as an important leading factor for the individual to manage and regulate his / her thoughts and actions, from generating ideas to implementing them.

The expectations for innovation from employees in the field of ICT, which is one of the fastest growing industry of our age, are quite high. The main purpose of this study is to examine the metacognitive competencies and innovative work behavior based on the variables such as gender, age, education level, university category graduated (public or private university), university department, English proficiency level, perceived socioeconomic level, working years in ICT sector, title in the firm, company scales of the firm, getting training to develop thinking skills and also to analyze the relationship between metacognitive skills and innovative work behavior.

The results of this study on the metacognition and innovative work behavior levels of ICT sector employees will contribute to the literature by providing an in-depth analysis.

1.5 Problem Sentence

What are the scores of the ICT sector employees on the Metacognition and Innovative Work Behavior Scales?

1.6 Sub-problems

1. Do the Metacognition Scale scores of ICT employees differ significantly according to the variables of the

- a. Gender
- b. Education Level
- c. English Proficiency Level
- d. Working years in ICT sector
- e. Job band (positioning in organizational hierarchy)
- f. Employees number (company scales) of the firm.
- g. Getting any training to develop thinking skills

2. Do the Innovative Work Behavior scale scores of ICT employees differ significantly according to the variables of the

- a. Gender
- b. Education Level
- c. English Proficiency Level
- d. Working years in ICT sector
- e. Job band (positioning in organizational hierarchy)

f. Employees number (company scales) of the firm¹.

g. Getting any training to develop thinking skills

3. Is there a significant relationship between metacognition skills and innovative work behavior skills of ICT sector employees?

1.7 Assumptions

The assumptions made are as follows:

- a) While we measure the relationship between continuous variables, we kept constant the effect of other variables.
- b) Participants have accurately perceived the questions.
- c) Participants were objective.

1.8 Limitations

The limitations of this study are as follows:

- a) Time span is limited by the academic year of 2020-2021 during which the data were collected.
- b) The study group is limited by the LinkedIn users working in Information and Communication Technologies (ICT) sector who answered the online scale shared via LinkedIn platform.

2. THE METHOD

The research model, study group, data collection tools, data collection methods and the methods used in the analysis of the collected data are mentioned in this section.

2.1 Research Model

This study is characterized as descriptive model conducted with the correlational survey research. Descriptive researches describe a given situation as precisely and carefully as possible. Descriptive models summarize the characteristics (ability, preference, disposition, behavior, etc.) of the research subject (individuals, groups, or sometimes physical environments - school, workplace, etc.). Researchers not only want to describe situations and events, but also want to see how the investigated features are related to each other. The definition of these relationships provides a better understanding of the phenomenon and also allows various predictions to be made. Researches that examines the relationships and connections between features are called as correlational researches (Büyüköztürk & Çakmak & others, 2018).

In this study, it is explored to what extent the metacognitive skills are employed by the employees working in the ICT sector and their levels of demonstrating innovative behavior in the workplace. Besides, the relationship between metacognition and innovative work behavior scales scores have also been analyzed.

2.2 Study Group

The study group consists of 144 people employed in the ICT sector. LinkedIn Professional Network Platform is used to reach the study group. Based on our survey, the following demographic information has been collected.

The gender distribution of all participants (N=114), which compromises of 117 males (81.2%) and of 27 females (18.8 %) has been reported in Table 2.1.

Table 2.1 Gender Distribution		
Gender	N	%
Female	27	18.8
Male	117	81.2
Total	144	100

The distribution the participants' education levels are summarized with the Table 2.2. Notice that, the majority of participants, i.e. 59 %, have Bachelor degree. and 30 % of the participants hold a master degree

Table 2.2 Education levels		
Education Level	N	%
Associate degree	9	6%
Bachelor	85	59%
Master	43	30%
PhD	7	5%
Total	144	100%

Table 2.3 incorporates the English proficiency levels of the participants. Note that, most of them, i.e. 56 %, have advanced English Proficiency level.

Table 2.3 English Proficiency Levels		
English Proficiency Level	N	%
Beginner	4	3%
Intermediate	60	42%
Advance	80	56%
Total	144	100%

The participants' experience in the sector can be observed from Table 2.4 where %48 of the participants works for 0 – 7 in the sector while %38 of them have experience in the sector between 8 and 15 years.

Table 2.4 Working years in ICT sector		
Years	N	%
0 - 7	69	48%
8 - 15	55	38%
16 - 23	14	10%
23 - 30	4	3%
30+	2	1%
Total	144	100%

In the study, the job band (positioning) in organizational hierarchy within the organization were discussed under 6 sub-categories. These are grouped according to the areas of responsibility and skillw of the employees in the companies which are presented with Table 2.5.

Table 2.5 Job Bands and Descriptions

<i>Job Band Name</i>	<i>Job Band Description</i>
Technician, Trainee, Administrator	Works under supervision; follows procedures; performs routine technical or administrative tasks
Technical Professional	Performs difficult technical tasks. He is self-sufficient, transforms his technical knowledge into practice. Carries management and technical responsibility in small projects
Senior Professional	Has expertise and technical experience to perform complex technical activities. Can manage projects, give consultancy; can do team leadership and technical supervision
Management	Can do team management. Can lead in a functional, technical or process projects. Can manage situations of complexity and uncertainty; have tactical responsibilities
Senior Management	Formulates strategy. Implements the vision. Has operational responsibilities. Performs cost and risk management
Executive Management	Sets vision, policy and strategy; Manages organizational goals

Table 2.6 includes the job band – positioning in organizational hierarchy of the participants in their currently working companies.

Table 2.6 *Job Band (positioning) of the participants in their currently working company*

	N	%
Technician, Trainee, Administrator	6	4%
Technical Professional	42	29%
Senior Professional	55	38%
Management	22	15%
Senior Management	10	7%
Executive Management	9	6%
Total	144	100%

Observe that, the majority of them have Senior Professional (%38) and Technical Professional (%29) respectively.

Table 2.7 reports the scales of the companies for which the participants work.

Table 2.7 *Number of employees working in the company*

<i>Company Scale (Number of employees)</i>	N	%
0 - 9	11	8%
10 - 49	24	17%
50 - 249	46	32%
250+	63	44%
Total	144	100%

Note that, most of the companies, i.e. 44%, incorporate more than 250 employees.

Table 2.8 presents the distribution of the participants who received a training on thinking skills.

Table 2. 8 *Getting Training to improve thinking skills*

Training on thinking skills	N	%
Yes	96	67%
No	48	33%
Total	144	100%

It can be stated that most of them had the training.

2.3 Data Collection Tools

The data collection process is performed by addressing “Demographic Information Form” created by the researcher with the “Metacognition Scale” which has been established by Shraw & Dennison (1994) and adapted to Turkish by Turan (2009) and the “Innovative Work Behaviour Scale” developed by Janssen (2000, 2001) and adapted to Turkish by Önhon (2016).

2.3.1 Demographic Information Form

The demographic information form has been designed taking into account specific variables. Ages of the participants, gender, education level, university category, university department graduated, English proficiency level, perceived socio-economic level, working years in ICT sector, title in the company, company scale (number of the working employees), having training category for improving thinking skills are considered in the Demographic Information Form.

2.3.2 Metacognition Scale

In this research, it is employed the Metacognition Scale which has been adapted to Turkish by Turan (2009) who prepared the adaptation of the scale considering the scale which is suggested earlier as Metacognitive Awareness Inventory (MAI) by Shraw and Dennison (1994).

Unlike the original study, the scale developed by Turan (2009) consists of 28 items and one dimension. Each item in the scale incorporates Likert-type options (1 to 5 Strongly Disagree, Disagree, Not Sure, Agree, Strongly Agree). Points were distributed from one to five in the options. Since there are no negative propositions in the scale, a high score indicates a high level of metacognition.

According to the study of Turan (2009), the average of the participants' metacognitive scores is 100.18, and the standard deviation is 13.16. The lowest score that can be attained is 28 while the highest possible score which can be obtained is 140 point.

Turan (2009) stated that she found the Kaiser - Meyer - Olkin Coefficient (KMO) as 0.966 and the results of the Barlett's test to be significant at the level of $p < 0.01$ for the scale she created. After the trial application applied to 846 people, the reliability of the scale was calculated as Cronbach $\alpha = 0.93$; after the scale was applied to the study group, the Cronbach α value was recalculated and found to be 0.91. In this study, the scale was also used after asking permission by the researcher with personal communication via e-mail on 5.10.2020 in Appendix D.

2.3.3 Innovative Work Behaviour Scale

In order to measure the Innovative Work Behaviour (IWB) I have used the IWB scale which has been originally proposed by Janssen (2000, 2001) and adapted to Turkish by Önhon (2016). Janssen (2000, 2001) defined the IWB scale which consists of three sub-dimensions, i.e. idea generation, idea promotion and idea-realization, keeping in mind the study by Kanter (1988) who defined the stages of innovation.

The first three statements in the scale refer to the “idea generation” sub-dimension, the next three to the “idea promotion” sub-dimension, and the last three to the “idea-realization” sub-dimension.

As the answering format, a scale with 5 equal intervals which are 1-Never, 2-Rarely, 3-Sometimes, 4-Frequently, 5-Always was used. The reliability coefficient (Cronbach Alpha) of the original English scale is found to be 0.97.

The scale adapted by Önhon (2016) was applied to 270 subjects. As the result of factor analysis, it has been observed that the “idea generation” sub-dimension is formed the same as the original scale developed by Janssen (2000, 2001). However, it has been found that the expressions on the “idea promotion” and the “idea-realization” are gathered under one dimension.

Hence, the first factor named as “generating innovative ideas” in a similar way, and the second factor called as “implementing the innovation” since they imply the application and implementation of innovation in an organization, respectively. As a result of the reliability analysis, the reliability coefficient of the first factor (Cronbach's Alpha) was found to be 0.750, and the reliability coefficient (Cronbach's Alpha) of the second factor was found to be 0.814 .

In this study, the scale was also used after asking permission by the researcher with personal communication via e-mail on 3.10.2020 in Appendix D.

2.4 Data Collection

The data has been gathered by means of Survey Monkey application running on LinkedIn Professional Network Platform. The survey has been realized by questionnaire forms sent to several LinkedIn users for which only 192 of them have replied. Besides, 48 out of 192 users have been eliminated due to the refusal to respond and absenteeism arguments. Consequently, the answers of 144 subjects have been included into the analysis.

2.5 Data Analysis

191 subjects have been responded to the questionnaire and among them it has been taken into account 144 of them. Due to missing and erroneous answers 47 subjects have been excluded from the study. These values are introduced with Table 2.9.

Table 2.9 Case Processing Summary		
Cases	N	%
Valid	144	75
Excluded	47	25
Total	191	100

2.6 Validity of the Scales

In this section, the validity of both “Metacognition” and “Innovative Work Behaviour” scales will be analyzed. To this end, both the content validity and the construct validity will be focused on.

Validation is the process of gathering and interpreting evidence to test the validity, usefulness, appropriateness and meaningfulness of the inferences output from the scales (Fraenkel, Wallen & Hyun, 2012).

2.6.1 Content Validity

Note that, both scales used in this study were adopted from the original studies and they are used in our study. Hence, content validity studies of the scales were accomplished during their development in the original studies.

2.6.1.1 Content Validity of Metacognition Scale

The Metacognitive Scale developed by Turan (2009) in Turkish was prepared using the Metacognitive Awareness Inventory - MAI developed by Shraw and Dennison (1994). Two field experts have analyzed and corrected the scale items by considering both the original text and its translation. The clarity of the statements was tested on 5 sample subjects with similar characteristics to the study group category by Turan (2009).

2.6.1.2 Content Validity of Innovative Work Behaviour Scale

Innovative Work Behaviour Scale is translated to Turkish by Önhon (2016) from Janssen (2000, 2001)'s original study. Turkish translation of the scale was reviewed by the field expert consultant academicians and applied as a pilot study on 50 people that have similar characteristics to the study group category by Önhon (2016).

2.6.2 Construct Validity

In order to perform the factor analysis, both Kaiser-Meyer-Olkin (KMO) and Bartlett have been applied to assess the appropriateness of our data for factor analysis.

2.6.2.1 Construct Validity of Metacognition Scale

The results of the KMO and Bartlett Test have been presented with Table 2.10

Table 2.10 Metacognition Scale - KMO Measure of Sampling Adequacy and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.799
Bartlett's Test of Sphericity	Approx. Chi-Square	1321.156
	df	378
	Sig.	.000

As it can be observed from Table 2.10, the KMO measure of sampling adequacy is 0.799. According to Kaisen (1974) KMO values between 0.7 and 0.8 are acceptable.

As another indication for the strength of the relationship among the variables we can consider the result of Bartlett's Test. The significance of Bartlett's Test of Sphericity is 0 (<0.05) which also means that the correlation matrix is not an identity matrix. Hence, considering both results, it can be concluded that the data is suitable for the factor analysis (Büyüköztürk, 2018).

2.6.2.2 Construct Validity of Innovative Work Behaviour Scale

On the other hand, the results of both KMO and Bartlett's Test have been presented with Table 2.11

Table 2.11 Innovative Work Behaviour Scale - KMO Measure of Sampling Adequacy and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	412.737
	df	36
	Sig.	.000

From Table 2.11, the KMO measure of sampling adequacy is 0.859 which is larger than 0.5 and it is also meritorious (Kaiser, 1974). Furthermore, the significance of Bartlett's Test of Sphericity is 0 (<0.05) which also imply that the correlation matrix is not an identity matrix. Hence considering both results, it can be concluded that the data is suitable for the factor analysis (Büyüköztürk, 2018).

2.6.3 Reliability of Metacognition Scale

Table 2.12 Reliability Statistics of Metacognition Scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.874	.885	28

From Table 2.12, Cronbach's alpha coefficient is .874 at $p<0,01$ level. If the coefficient is above 0.7 then it is suitable for reliability (Harmancı, 2019). Thus, it can be said that the scale has appropriate reliability value to be applied.

2.6.4 Reliability of Innovative Work Behaviour Scale

Table 2.13 Reliability Statistics of Innovative Work Behaviour

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.834	.839	9

From Table 2.13 , the scale's Cronbach's alpha coefficient is .834 at $p<0,01$ level. . If the coefficient is above 0.7 then it is suitable for reliability (Harmancı, 2019). Thus, it can be said that the scale has appropriate reliability value to be applied.

2.7 Assessing Normality

It was performed both the Kolmogorov-Smirnov and Shapiro-Wilk tests to assess normality of the data. The tests were applied separately for “Metacognition” and “Innovative Work Behaviour” scales. The results of the normality test are shared in the section below for both scales.

2.7.1 Metacognition Scale

The instrument has 28 items and each of them is scored with 5-likert type scales. Coding the responses as “1” for “Strongly Disagree”, “2” for “Disagree”, “3” for “Not Sure”, “4” for “Agree”, “5” for “Strongly Agree” are resulted.

The average response value to this scale is 115.42 with the standard deviation 9.75 and the standard error 0.068. The skewness-kurtosis statistics (skewness = 0.348; kurtosis = -0.359) were observed. The minimum and maximum values are 93 and 139 respectively. Median value of the total scores for the scale is 114.5.

The overall average score of the averages for each participants is 4.12. Median value of average scores is 4.089.

The overall average of participants’ average of scores is 4,12.

The summary results are demonstrated in the following table (Table 2.14)

Table 2.14 Metacognition Scale					
	N	Min	Max	$\bar{X}$	SD
Metacognition Skill	144	93	139	115.42	9,75

Two statistical tests of normality, namely Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to Metacognition scores. Both of the Kolmogorov-Smirnov and Shapiro-Wilk have been performed by means of SPSS. The results have been reported with Table 2.15.

Table 2.15 Tests of Normality for the Metacognition Scores

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Metacognition	.072	144	.065	.981	144	.055

a. Lilliefors Significance Correction

When the significance value is greater than $\alpha = .05$, then there is no reason to think that our data differs significantly from a normal distribution. Observe that the significance values of both Kolmogorov-Smirnov and Shapiro-Wilk tests are greater than $\alpha = 0.05$ hence it can be rejected the null hypothesis that it is non-normal.

Furthermore, the histogram and the Q-Q plot of the metacognition scores have been depicted with Figure 2 and Figure 3, respectively. Considering both figures, the normality of the collected data can also be observed.

Figure 2 Histogram for the Metacognition Scores

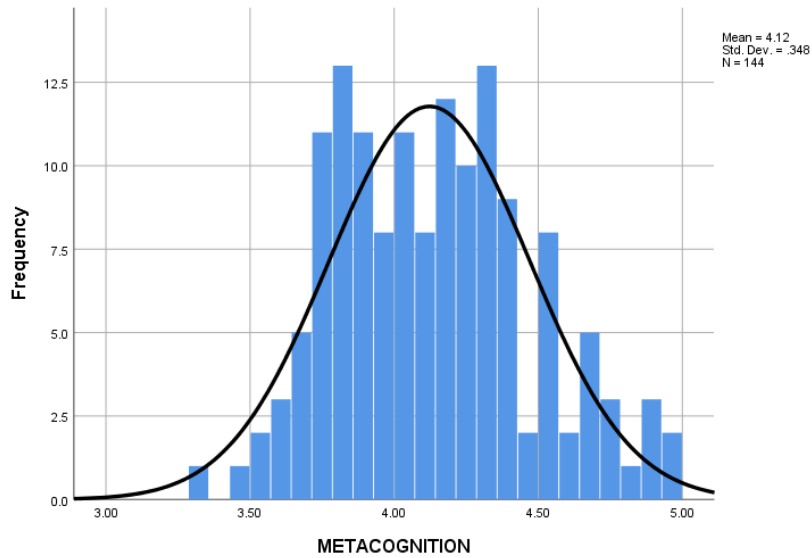
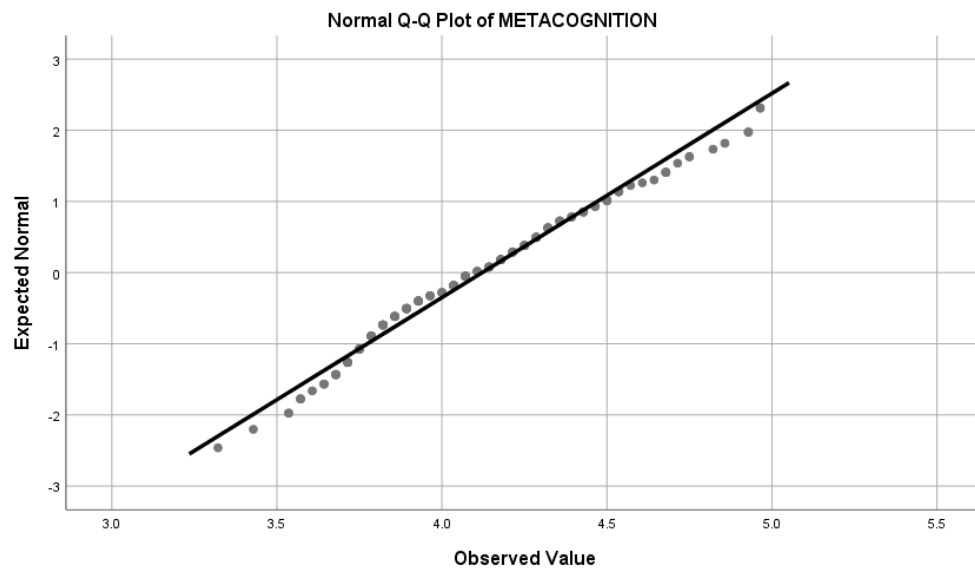


Figure 3 Normal Q-Q Plot for the Metacognition Scores



From all these results, it can be concluded that the data set meets the normality assumption. Thus, the data set is suitable for statistical analysis using T-Test, ANOVA and Correlation tests.

2.7.2 Innovative Work Behavior Scale

Innovative Work Behaviour Scale incorporates 9 questions and each of them is scored with 5-likert type scales. The responses are interpreted as follows. “1” for “Never”, “2” for “Rarely”, “3” for “Sometimes”, “4” for “Often”, “5” for “Everytime”.

The average value of this scale is 36.5, with a standard deviation of 4,5558 and standard error of 0,031634. The skewness and kurtosis statistics are measured as -0.20249 and 0.068884, respectively. Besides, the minimum and maximum values are 24 and 45, respectively. Median value of the total scores for the scale is 36.

The overall average score of the averages for each participants is 4.055. Median value of the average scores is 4. The overall average of participants’ average of scores is 4,05. The summary results are demonstrated in the following table (Table 2.16)

Table 2.16 Innovative Work Behaviour Scale

	N	Min	Max	$\bar{X}$	SD
Metacognition Skill	144	24	45	36.5	4,56

In order to test the normality of the data I have performed the Kolmogorov-Smirnov and Shapiro-Wilk tests run within SPSS software package. The results have been reported in Table 2.17

Table 2.17 Tests of Normality for the Innovation Scores

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Innovation	.085	144	.012	.978	144	.019

a. Lilliefors Significance Correction

It has been considered as $\alpha = 0.05$. The results have been reported in Table 2.17 where the significance values of both Kolmogorov-Smirnov and Shapiro-Wilk tests are greater than $\alpha = 0.05$. Consequently, the null hypothesis can be rejected stating that the collected data is not normal.

Below its presented the histogram and Q-Q plots which have been depicted with Figure 4 and Figure 5, respectively. Notice that both of these figures imply also the normality of the data.

Figure 4 Histogram for the Innovation Scores

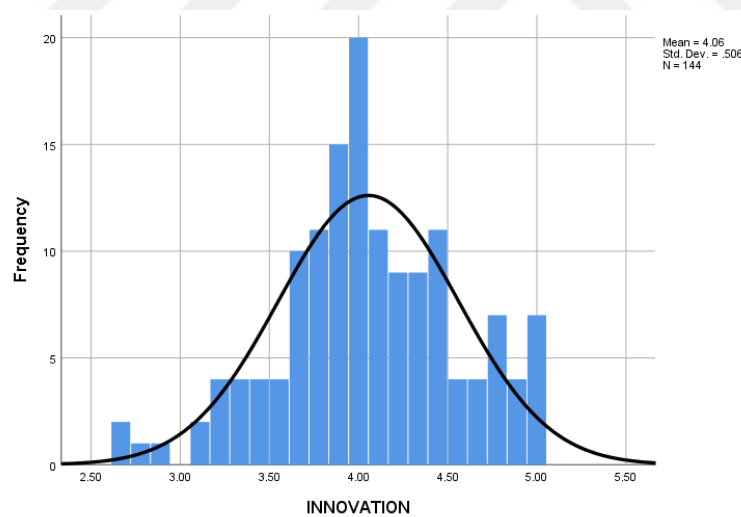
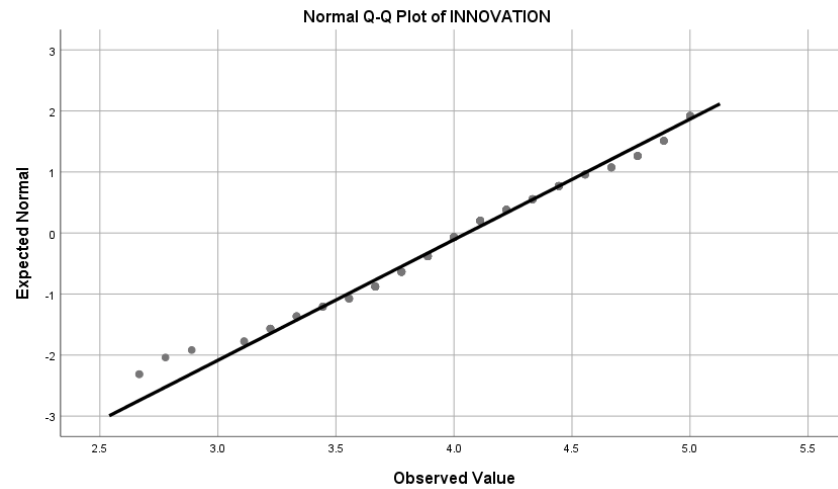


Figure 5. Normal Q-Q Plot for the Innovation Scores



Hence, it can be concluded that the data set meets the normality assumption. The data set is suitable for statistical analysis using T-Test, ANOVA and Correlation tests.

3. FINDINGS

In this section, the findings related with the problem statement and the sub problems will be introduced

3.1 Findings about the Main Problem

The main problem defined as “What are the scores of the ICT sector employees on the Metacognition and Innovative Work Behavior Scale?” The answer to this question is presented below.

The findings about what the scores of the ICT sector employees on the Metacognition scale are presented below. The summary results of Metacognition scale are demonstrated in the following table (Table 3.1).

Table 3.1 Findings about Metacognition Skill Levels of ICT Sector Employees					
	N	Min	Max	$\bar{X}$	SD
Metacognition Skill	144	93	139	115.42	9,75

The average response value to this scale is 115.42 with the standard deviation 9,75 and the standard error 0,07 The skewness-kurtosis statistics (skewness = 0.35; kurtosis = -0.36) were observed. The minimum and maximum values are 93 and 139 respectively. The median of the total scores for the scale is 114.5. The overall average score of the averages for each participants is 4.12. Median value of the average scores is 4.089.

The findings about what the scores of the ICT sector employees on the Innovative Work Behaviour scale are presented below. The summary results of the Innovative Work Behaviour scale are included in the following table (Table 3.2).

Table 3.2 Findings about Innovative Work Behaviour Levels of ICT Sector Employees

	N	Min	Max	$\bar{X}$	SD
Innovative Work Behaviour	144	24	45	36,5	4,5558

The average response value to this scale is 36.5, the standard deviation (SD=4,5558), and the skewness-kurtosis statistics , i.e. skewness = -0.20249; kurtosis = 0.068884, are obtained. The minimum and maximum values are (min = 24; max = 45). Median value of the total scores for the scale is 36. The overall average score of the averages for each participants is 4.055. Median value of the average scores is 4.

3.2. Findings about the First Sub Problem

The first sub-problem is “How Metacognition Scores of the employees in ICT sector vary by variables of gender, education level, English Proficiency Level, Working years in ICT sector, job band (positioning in organizational hierarchy), company scale (number of employees of the firm), taking any training to develop thinking skills.

3.2.1 Metacognition Level with respect to Gender

Now, it will be discussed whether there is a significant difference in metacognition level according to gender of the participants. Table 3.3 summarizes descriptive statistics for metacognition scores.

Table 3.3 Descriptive Statistics for Metacognition Scores with respect to Gender
Group Statistics

Gender	N	Mean	Std. Deviation	Std. Error Mean
--------	---	------	----------------	-----------------

Metacognition	1.00	27	4.0648	.37261	.07171
	2.00	117	4.1355	.34287	.03170

Table 3.4 summarizes independent samples test for Metacognition scores versus genders.

Table 3.4 Independent Samples Test of Metacognition Scores with respect to Gender

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Difference	95% Interval of Difference Lower Upper
metacognition	Equal variances assumed	.039	.843	-.95	142	.344	-.07072	.07441	-.218 .0763
	Equal variances not assumed			-.90	36.838	.373	-.07072	.07840	-.229 .0881

It can be observed from Table 3.4, t-value is -0.950 and the 2-tailed p-value is 0.344. Therefore, it can be stated that there is no significant difference between female and male subjects for the metacognition scores. That is to say, the NULL hypothesis which claims that there is no difference between the genders cannot be rejected.

3.2.2 Metacognition Level with respect to Education Level

Table 3.5 introduces the descriptive statistics for the metacognition levels of the participants according to their education level. Education levels are introduced in 5 groups in this study. The grading of the groups are as follows: High school degree is 1, Associate degree is 2, Bachelor degree is 3, Master degree is 4, PhD degree is 5.

Table 3.5 Descriptive Statistics for Metacognition Scores According to Education Levels

Descriptive								
metacognition								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
2.00	9	4.2302	.23965	.07988	4.0459	4.4144	3.79	4.54
3.00	85	4.0920	.35167	.03814	4.0162	4.1679	3.43	4.96
4.00	43	4.1379	.35889	.05473	4.0274	4.2483	3.32	4.96
5.00	7	4.2551	.36095	.13643	3.9213	4.5889	3.79	4.75
Total	144	4.1223	.34838	.02903	4.0649	4.1797	3.32	4.96

Table 3.6 provide Test of Homogeneity of Variances which is performed before applying the ANOVA test it is required to check that the variances of each comparison group are equal. To this end the Levene statistic has been employed. As it can be observed the significance value of the Levene statistic based on a comparison of medians is 0.521 (greater than 0.05) which implies that there is no real difference between groups. Namely, it implies that the requirement of homogeneity of variance is met and hence it can be said that ANOVA is robust.

Table 3.6 Test of Homogeneity of Variances for Education Levels

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
metacognition	Based on Mean	.812	3	140	.489
	Based on Median	.755	3	140	.521
	Based on Median and with adjusted df	.755	3	137.806	.521
	Based on trimmed mean	.803	3	140	.494

Table 3.7 ANOVA Test for Metacognition Scores According to Education Levels

ANOVA					
metacognition					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.317	3	.106	.867	.460
Within Groups	17.040	140	.122		
Total	17.356	143			

The results of the ANOVA are reported with Table 3.7. Since the value of F is 0.867, which reaches significance with a p-value of .460 (which is greater than the .05 alpha level), it can be concluded not having a significant result. In other words, there is no statistically significant difference between the means of the different levels of the education variable.

3.2.3 Metacognition Level with Respect to English Proficiency Level

In this item, it will be introduced whether there is a significant difference in metacognition scores among English proficiency levels of the participants. English proficiency levels are grouped as Beginner – 1, Intermediate – 2 and Advanced – 3

Table 3.8 Descriptive Statistics for Metacognition Scores According to English Proficiency Level

metacognition								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Beginner	4	4.2679	.45690	.22845	3.5408	4.9949	3.68	4.75
Intermediate	60	4.1054	.31304	.04041	4.0245	4.1862	3.32	4.82
Advanced	80	4.1277	.37049	.04142	4.0452	4.2101	3.43	4.96
Total	144	4.1223	.34838	.02903	4.0649	4.1797	3.32	4.96

Table 3.9 Test of Homogeneity of Variances for English Proficiency Level
Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Metacognition	Based on Mean	1.117	2	141	.330
	Based on Median	1.003	2	141	.370
	Based on Median and with adjusted df	1.003	2	135.289	.370
	Based on trimmed mean	1.100	2	141	.336

According to Levene Statistics homogeneity of variance is met and ANOVA is robust.

Table 3.10 ANOVA for Metacognition Scores According to English Proficiency Level

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.104	2	.052	.426	.654
Within Groups	17.252	141	.122		
Total	17.356	143			

It can be presented from the ANOVA test, there is not a significant result. The value of F is 0.052, which is significant with a p-value of .654 (which is greater than the alpha value of .05). This implies that there exists no statistically significant difference between the means of the different levels of the English proficiency level of the participants.

3.2.4 Metacognition Level with Respect to Working Years in IT Sector

Here it is presented whether there is a significant difference in metacognition level with respect to working years of the participants in IT sector. The groups are formed according to the working years, which is presented with Table 3.11

<i>Table 3.11 Working Years in ICT Sector</i>	
Groups	Working Years
1	0 - 7
2	8 - 15
3	16 - 23
4	24 - 30
5	30+

<i>Table 3.12 Test of Homogeneity of Variances for Working Years in ICT Sector</i>					
		Levene Statistic	df1	df2	Sig.
Metacognition	Based on Mean	.199	4	139	.938
	Based on Median	.329	4	139	.858
	Based on Median and with adjusted df	.329	4	129.856	.858
	Based on trimmed mean	.199	4	139	.939

From the Levene Statistic based on a comparison of medians is .858. This is not a significant result, which means the requirement of homogeneity of variance has been met, and the ANOVA test can be considered to be applied.

Table 3.13 ANOVA for Metacognition Scores According to Working Years in ICT Sector

Metacognition					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.097	4	.024	.196	.940
Within Groups	17.259	139	.124		
Total	17.356	143			

According to ANOVA test the value of F is 0.196, which reaches significance with a p-value of .940 (which is greater than the .05 alpha level). Therefore we can state that there is no statistically significant difference between the means of the different levels of working years in IT sector.

3.2.5 Metacognition Level with Respect to Job Band (positioning in organizational hierarchy)

It will be presented metacognition levels of the participants according to their job bands in the current companies they work. The titles are categorized as introduced with Table 3.14.

Table 3.14 Job Bands in Organizational Hierarchy

Groups	Job Band Name
1	Technician, Trainee, Administrator
2	Technical Professional
3	Senior Professional
4	Management
5	Senior Management
6	Executive Management

Table 3.15 Descriptive Statistics for Metacognition Scores According to Job Band

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	6	4.3512	.46589	.19020	3.8623	4.8401	3.79	4.93
2.00	42	3.9838	.28068	.04331	3.8964	4.0713	3.32	4.50
3.00	55	4.1481	.36534	.04926	4.0493	4.2468	3.54	4.96
4.00	22	4.2792	.35435	.07555	4.1221	4.4363	3.75	4.96
5.00	10	4.1036	.31919	.10094	3.8752	4.3319	3.68	4.68
6.00	9	4.0952	.26726	.08909	3.8898	4.3007	3.71	4.32
Total	144	4.1223	.34838	.02903	4.0649	4.1797	3.32	4.96

Table 3.16 Test of Homogeneity of Variances for Title

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
metacognition	Based on Mean	1.447	5	138	.211
	Based on Median	1.262	5	138	.284
	Based on Median and with adjusted df	1.262	5	126.391	.284
	Based on trimmed mean	1.443	5	138	.213

Table 3.17 ANOVA for Metacognition Scores According to Job Band

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.708	5	.342	3.012	.013
Within Groups	15.648	138	.113		
Total	17.356	143			

According to ANOVA test there is a significant result. The value of F is 3.012, which reaches significance with a p-value of .013 (which is LESS than the .05 alpha level). This implies there is a statistically significant difference between the means of the different levels of title category.

Table 3.18. Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Job Band Category

Dependent Variable: Metacognition

(I) Job Band	(J) Job Band	Mean Difference (I-J)	Std. Error	Sig.
Technician, Trainee, Administrator	Technical Professional	.3673	.14697	.289
	Senior Professional	.2031	.14478	.852
	Management	.0720	.15509	.999
	Senior Management	.2476	.17389	.844
	Executive Management	.2560	.17748	.837
Technical Professional	Technician, Trainee, Administrator	-.3673	.14697	.289
	Senior Professional	-.1642	.06900	.346
	Management	-.2954	.08862	.048*
	Senior Management	-.1197	.11849	.960
	Executive Management	-.1114	.12369	.976
Senior Professional	Technician, Trainee, Administrator	-.2031	.14478	.852
	Technical Professional	.1642	.06900	.346
	Management	-.1312	.08495	.793
	Senior Management	.0445	.11576	1.000
	Executive Management	.0528	.12108	.999
Management	Technician, Trainee, Administrator	-.0720	.15509	.999
	Technical Professional	.2954	.08862	.048*

	Senior Professional	.1312	.08495	.793
	Senior Management	.1756	.12843	.866
	Executive Management	.1840	.13324	.861
Senior Management	Technician, Trainee, Administrator	-.2476	.17389	.844
	Technical Professional	.1197	.11849	.960
	Senior Professional	-.0445	.11576	1.000
	Management	-.1756	.12843	.866
	Executive Management	.0083	.15472	1.000
Executive Management	Technician, Trainee, Administrator	-.2560	.17748	.837
	Technical Professional	.1114	.12369	.976
	Senior Professional	-.0528	.12108	.999
	Management	-.1840	.13324	.861
	Senior Management	-.0083	.15472	1.000
p<0.05				

There are differences between Technical Professional (mean = 3.98) and Management (mean = 4.28) according to the results of the Scheffe Test, which was conducted to find out which categories the participants received from the Metacognition scale according to the job band category.

3.2.6 Metacognition Level with Respect to Company Scale

Company Scale is the number of employees of the companies that the participants work at. The groups according to the number of employees are;

Table 3.19 Number of Employees (Company Scale)	
Groups	Number of Employees
1	0 - 9
2	10 - 49
3	50 - 249
4	250+

Table 3.20 Descriptive Statistics for Metacognition Scores According to Company Scale

	N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
0 - 9	11	4.237	.327	.099	4.017	4.46	3.57	4.93
10 - 49	24	4.217	.341	.069	4.073	4.36	3.64	4.86
50- 249	46	4.039	.352	.052	3.935	4.14	3.32	4.93
250+	63	4.126	.344	.043	4.039	4.21	3.54	4.96
Total	144	4.122	.348	.029	4.064	4.18	3.32	4.96

Table 3.21 Test of Homogeneity of Variances for Company Scale

		Levene Statistic	df1	df2	Sig.
Metacognition	Based on Mean	.328	3	140	.805
	Based on Median	.340	3	140	.796
	Based on Median and with adjusted df	.340	3	137.99	.796
	Based on trimmed mean	.321	3	140	.810

Table 3.22 ANOVA Metacognition Scores According to Company Scale

Metacognition					
	Sum of Squares	df	Mean Square	F	Sig.

Metacognition	Equal variance s assumed	.312	.577	3.22	142	.002	.19234	.0596	.07440	.31027
	Equal variance s not assumed			3.33	103.1	.001	.19234	.0576	.07798	.30670

SPSS reports a t-value of 3.224 and a 2-tailed p-value of .002. This result would almost always be considered a significant result (for standard alpha levels .05 and .01). Therefore, we can be confident in rejecting the null hypothesis implying that there is no difference between those who had taken innovation training and those who had not taken training on thinking skills. The metacognition scores are higher for the participants who have been trained (mean = 4.19).

3.3 Findings about the Second Sub Problem

The second sub-problem is “How Innovative Work Behaviour Scores of the employees in ICT sector vary by some demographic information?”

Findings are offered here under the sub-titles: gender, education level, , English proficiency level, working years in ICT sector, job band (positioning in organizational hierarchy), company scale (number of employees of the firm), taking any training to develop thinking skills.

We have performed one-way Anova and t- tests to find out whether there is a significant difference between Metacognition Levels of the participants with regard to the sub-titles mentioned above.

3.3.1 Innovative Work Behaviour Level with Respect to Gender

It is introduced whether there is a significant difference in Innovative Work Behaviour level according to gender of the participants. Table 3.31 incorporates descriptive statistics for Innovative Work Behaviour scores.

Table 3.25 Descriptive Statistics for Innovative Work Behaviour Scores According to Gender

Group Statistics					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Innovation	Female	27	3.7449	.62991	.12123
	Male	117	4.1273	.44642	.04127

Table 3.26 Independent Samples Test for Innovative Work Behaviour Scores According to Gender

Independent Samples Test										
Levene's Test for Equality of Variances				t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
innovation	Equal variances assumed	5.553	.020	-3.691	142	.000	-.3820	.10360	-.58720	-.17760
	Equal variances not assumed			-2.986	32.279	.005	-.3820	.12806	-.64316	-.12164

As it can be observed from Table 3.32, t-value is 5.55 and the 2-tailed p-value is 0.020. Therefore, we can state that there is a significant difference between female and male subjects for the Innovative work Behaviour scores. From these results, we can conclude that males (mean = 4.13) are more innovative than females (mean = 3.74) in the workplace.

3.3.2 Innovative Work Behaviour Level with Respect to Education Level

Here is the Innovative Work Behaviour levels with respect to education level of the participants. Education levels are introduced in 5 groups in this study (The grading of the groups is High school degree is 1, Associate degree is 2, Bachelor degree is 3, Master degree is 4, PhD degree is 5)

Table 3.27 Descriptive Statistics for Innovative Work Behaviour Scores According to Education Level

Descriptive								
Innovation								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
2.00	9	4.3457	.46296	.15432	3.9898	4.7015	3.67	5.00
3.00	85	4.0144	.46978	.05095	3.9131	4.1157	2.89	5.00
4.00	43	4.0568	.57037	.08698	3.8813	4.2324	2.67	5.00
5.00	7	4.1746	.53617	.20265	3.6787	4.6705	3.44	5.00
Total	144	4.0556	.50620	.04218	3.9722	4.1389	2.67	5.00

Table 3.28 Test of Homogeneity of Variances for Education Level

		Levene Statistic	df1	df2	Sig.
Innovation	Based on Mean	.374	3	140	.772
	Based on Median	.366	3	140	.777
	Based on Median and with adjusted df	.366	3	131.912	.777
	Based on trimmed mean	.392	3	140	.759

The significance value of the Levene statistic based on a comparison of medians is .777. This is not a significant result. Thus, we can claim that the requirement of homogeneity of variance has been satisfied, and the ANOVA becomes robust.

Table 3.29 ANOVA Innovative Work Behaviour Scores According to Education Level

ANOVA					
innovation					
	Sum Squares	of df	Mean Square	F	Sig.
Between Groups	1.001	3	.334	1.311	.273
Within Groups	35.641	140	.255		
Total	36.642	143			

The value of F is 1.311, which reaches significance with a p-value of .273 (which is greater than the .05 alpha level). This implies there is no statistically significant difference between the means of the different levels of the education variable.

3.3.3 Innovative Work Behaviour Level with Respect to English Proficiency Level

In this item, we present whether there is a significant difference in Innovative Work Behaviour scores among English levels of the participants. English levels are grouped as follows: Beginner – 1, Intermediate – 2 and Advance – 3

Table 3.30 Descriptive Statistics for Innovative Work Behaviour Scores According to English Proficiency Level

	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
1.00	4	4.0278	.52411	.26206	3.1938	4.8618	3.6	4.7
2.00	60	4.0648	.48423	.06251	3.9397	4.1899	2.6	5.0
3.00	80	4.0500	.52739	.05896	3.9326	4.1674	2.6	5.0
Total	144	4.0556	.50620	.04218	3.9722	4.1389	2.6	5.0

Table 3.31 Test of Homogeneity of Variances for English Proficiency Level

		Levene Statistic	df1	df2	Sig.
Innovation	Based on Mean	.197	2	141	.821
	Based on Median	.133	2	141	.875
	Based on Median and with adjusted df	.133	2	139.120	.875
	Based on trimmed mean	.232	2	141	.793

Table 3.32 ANOVA Innovative Work Behaviour Scores According to English Proficiency Level

Innovation					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.011	2	.005	.021	.980
Within Groups	3.6631	141	.260		
Total	3.6642	143			

From ANOVA table above the value of F is 0.021, which reaches significance with a p-value of .980 (which is greater than the .05 alpha level). This means that we have observed no statistically significant difference between the means of the different levels of the English proficiency level.

3.3.4 Innovative Work Behaviour Level with Respect to Working Years in ICT Sector

Here we investigate whether there is a significant difference in Innovative Work Behaviour level with respect to working years of the participants in IT sector. The groups are constructed according to the years are presented as follows:

Table 3.33 Working Years in ICT Sector	
Groups	Working Years
1	0 - 7
2	8 - 15
3	16 - 23
4	24 - 30
5	30+

Table 3.34 Test of Homogeneity of Variances for Working Years in ICT Sector

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
innovation	Based on Mean	.849	4	139	.496
	Based on Median	.797	4	139	.529
	Based on Median and with adjusted df	.797	4	135.238	.529
	Based on trimmed mean	.868	4	139	.485

Table 3.35 ANOVA Innovative Work Behaviour Scores According to Working Years in ICT Sector

ANOVA					
innovation					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.428	4	.107	.411	.801
Within Groups	36.214	139	.261		
Total	36.642	143			

From ANOVA test above the value of F is 0.411, which reaches significance with a *p*-value of .801 (which is greater than the .05 alpha level). As a result, this implies no statistically significant difference between the means of the different levels of the working years in IT sector category.

3.3.5 Innovative Work Behaviour Level with Respect to Job Band (positioning in organizational hierarchy)

We scrutinize metacognition levels of the participants according to their titles in the current companies they work. The titles are categorized as follows:

Table 3.36 Job Bands in Organizational Hierarchy

Groups	Job Band Name
1	Technician, Trainee, Administrator
2	Technical Professional
3	Senior Professional
4	Management
5	Senior Management
6	Executive Management

Table 3.37 Descriptive Statistics for Innovative Work Behaviour Scores According to Job Band

Descriptive Statistics								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
1	6	4.222	.39	.16229	3.81	4.64	3.67	4.67
2	42	3.859	.45	.06983	3.72	4.00	2.67	4.78
3	55	4.062	.5041	.06797	3.93	4.20	2.67	5.00
4	22	4.247	.5828	.12427	3.99	4.51	2.89	5.00
5	10	4.288	.4748	.15017	3.95	4.63	3.67	5.00

6	9	4.086	.4222	.14076	3.76	4.41	3.56	5.00
Total	144	4.055	.5062	.04218	3.9722	4.14	2.67	5.00

Table 3.38 Test of Homogeneity of Variances for Job Band

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Innovation	Based on Mean	.660	5	138	.654
	Based on Median	.663	5	138	.652
	Based on Median and with adjusted df	.663	5	131.55	.652
	Based on Trimmed mean	.670	5	138	.647

Table 3.39 ANOVA Innovative Work Behaviour Scores According to Job Band

Innovation					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.142	5	.628	2.589	.028
Within Groups	33.500	138	.243		
Total	36.642	143			

The value of F is 2.589, which reaches significance with a p-value of .028 (which is less than the .05 alpha level). Thus, we can say that there is a statistically significant difference between the means of the different levels of Job Band.

Table 3.40 Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Job Band Category

(I) Job Band	(J) Job Band	Mean Difference (I-J)	Std. Error	Sig.
Technician, Trainee, Administrator	Technical Professional	.3624	.21503	.724
	Senior Professional	.1596	.21183	.989
	Management	-.0253	.22692	1.000
	Senior Management	-.0667	.25443	1.000
	Executive Management	.1358	.25967	.998
Technical Professional	Technician, Trainee, Administrator	-.3624	.21503	.724
	Senior Professional	-.2028	.10096	.546
	Management	-.3877	.12967	.099
	Senior Management	-.4291	.17336	.301
	Executive Management	-.2266	.18098	.904
Senior Professional	Technician, Trainee, Administrator	-.1596	.21183	.989
	Technical Professional	.2028	.10096	.546
	Management	-.1848	.12429	.818
	Senior Management	-.2263	.16938	.877
	Executive Management	-.0238	.17716	1.000
Management	Technician, Trainee, Administrator	.0253	.22692	1.000
	Technical Professional	.3877	.12967	.099
	Senior Professional	.1848	.12429	.818
	Senior Management	-.0414	.18791	1.000
	Executive Management	.1611	.19495	.984
Senior Management	Technician, Trainee, Administrator	.0667	.25443	1.000
	Technical Professional	.4291	.17336	.301
	Senior Professional	.2263	.16938	.877
	Management	.0414	.18791	1.000

	Executive Management	.2025	.22638	.977
Executive Management	Technician, Trainee, Administrator	-.1358	.25967	.998
	Technical Professional	.2266	.18098	.904
	Senior Professional	.0238	.17716	1.000
	Management	-.1611	.19495	.984
	Senior Management	-.2025	.22638	.977

Based on observed means.

The error term is Mean Square(Error) = .243.

According to Scheffe test there is slightly statistically difference between only job band categories Technical Professional (mean = 3.86) and Management (mean = 4.25). Note that the significance value is 0.099 which is less than 0.10.

3.3.6 Innovative Work Behaviour Level with Respect to Company Scale

Company Scale is the employee number of the companies that the participants work at. The employee numbers are grouped as:

Table 3.41 Number of Employees (Company Scale)	
Groups	Number of Employees
1	0 - 9
2	10 - 49
3	50 - 249
4	250+

In the following, Innovative Work Behaviour levels of participants will be introduced with respect to Company Scale category

Table 3.42 Descriptive Statistics for Innovative Work Behaviour Scores According to Company Scale

Descriptive Statistics								
innovation								
	N	MMe an	SStd. Dev	Std. Error	95% Confidence Interval for Mean		MM in	MMa x
					Lower Bound	Upper Bound		
0-9	11	4.26	.3627	.10935	4.019	4.506	3.78	5
10 - 49	24	4.19	.3782	.07720	4.034	4.354	3.44	5
50 - 249	46	3.88	.5766	.08502	3.712	4.055	2.67	5
250+	63	4.09	.4870	.06136	3.969	4.214	2.89	5
Total	144	4.056	.5062	.04218	3.972	4.138	2.67	5

Table 3.43 Test of Homogeneity of Variances for Company Scale on Innovative Work Behaviour

		Levene Statistic	df1	df2	Sig.
Innovation	Based on Mean	1.539	3	140	.207
	Based on Median	1.501	3	140	.217
	Based on Median and with adjusted df	1.501	3	129.780	.218
	Based on trimmed mean	1.546	3	140	.205

Table 3.44 ANOVA Innovative Work Behaviour Scores According to Company Scale

Innovation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.370	3	.790	3.227	.024
Within Groups	34.272	140	.245		
Total	36.642	143			

From ANOVA test, the value of F is 3.227, which reaches a significance with a p-value of .025 (which is less than the .05 alpha level). We conclude that there is a statistically significant difference between the means of the different levels of the Company Scale.

Table 3.45 Scheffe Test Results Showing Average Differences Obtained as a result of Group Comparisons on Company Scale (Number of Employees) Category

(I) Company Scale	(J) Company Scale	Mean Difference (I-J)	Std. Error	Sig.
0 - 9	10 - 49	.0682	.18015	.986
	50 - 249	.3786	.16606	.163
	250+	.1709	.16168	.773
10 - 49	0 - 9	-.0682	.18015	.986
	50 - 249	.3104	.12459	.087*
	250+	.1027	.11868	.861
50 - 249	0 - 9	-.3786	.16606	.163
	10 - 49	-.3104	.12459	.087*
	250+	-.2077	.09596	.202
250+	0 - 9	-.1709	.16168	.773
	10 - 49	-.1027	.11868	.861
	50 - 249	.2077	.09596	.202

Based on observed means. The error term is Mean Square(Error) = .245

According to Scheffe method we can claim that there is slightly statistical difference between only company scales 10 – 49 (mean= 4.19) and 50 – 249 (mean = 3.88). Notice that the significance value is 0.087 which less than 0.10. In addition, companies with 0 - 9 employees have the highest Innovative Work Behavior averages (mean = 4.26).

Company scale'I 10 – 49 olan firma çalışanlarının ortalaması (mean = 4.19), ölçek median değerinden yüksektir (median = 4). The lowest average score belongs to 50 – 249 (mean = 3.88) company scale category.

3.3.7 Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills

In this item, it is analyzed whether there is a significant difference in Innovative Work Behaviour scores of the participants with respect to taking any training about innovative thinking skills. The participants who took the training is grouped as 1 and the ones who did not take training is grouped as 2.

Table 3.46 Descriptive Statistics for Innovative Work Behaviour Scores According to Getting Training on Thinking Skills

Group Statistics					
Training		N	Mean	Std. Deviation	Std. Error Mean
Innovation	Yes	96	4.1447	.45173	.04610
	No	48	3.8773	.56435	.08146

Table 3.47 Independent Samples Test for Innovative Work Behaviour Scores According to Getting Training on Thinking Skills

Independent Samples Test										
Levene's Test for Equality of Variances			t-test for Equality of Means							
	F	Sig.	t	df	SSig. (2-tailed)	Mean Difference	SStd. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
innovation	Equal variances assumed	1.819	.180	3.075	142	.003	.26736	.08695	.09548	.43925
	Equal variances not assumed			2.856	77.978	.005	.26736	.09360	.08102	.45370

SPSS outputs a t-value of 3.075 and a 2-tailed p-value of .003. Therefore, we can reject the null hypothesis stating that there is no difference between those who had taken innovation training and those who had not taken training on thinking skills. The Innovative Work Behaviour scores are higher for the participants who have taken training (mean = 4.1447)

3.4 Findings about the Third Sub Problem

The third sub problem that is dealt with can be defined as follows: Is there a significant relationship between metacognition and innovative work behaviour scores of ICT sector employees?

For this problem Correlations Analysis were conducted for Metacognition and Innovative Work Behaviour Scores of the participants

Table 3.48 Correlations Between Metacognition and Innovative Work Behaviour

		metacognition	innovation
Metacognition	Pearson Correlation	1	.628**
	Sig. (2-tailed)		.000
	N	144	144
Innovation	Pearson Correlation	.628**	1
	Sig. (2-tailed)	.000	
	N	144	144

** . Correlation is significant at the 0.01 level (2-tailed).

These indicators are directly proportional as expected.

According to Pearson Correlation Coefficients presented in Table 3.1 it can be said that Metacognition and Innovative Work Behaviour are highly correlated (+0.628).

4. RESULTS, DISCUSSIONS AND SUGGESTIONS

In this section, the research findings will be evaluated. Results, discussions, and suggestions for the study will be presented.

4.1 Results of the Study

This study was carried out mainly to examine metacognitive competencies and innovative work behaviour scores in line with various variables and also scrutinize whether there is a relationship between metacognitive skills and innovative work behaviours of ICT sector employees or not.

4.1.1 Results Related to the Main Problem of the Study

The main problem of the study is how the scores of the ICT sector employees on the Metacognition and Innovative Work Behavior Scales are.

4.1.1.1 Results for the Metacognition Scores of the ICT Sector Employees

The average response value to this scale is 115.42; the minimum and maximum values are 93 and 139 respectively. Median value of the total scores for the scale is 114.5. The overall average score of the averages for each participants is 4.12. Median value of the average scores is 4.089.

4.1.1.2 Results for the Innovative Work Behaviour Scores of ICT Sector Employees

The average response value to this scale is 36.5. The minimum and maximum values are 24 and 45 respectively. Median value of the total scores for the scale is 36. The

overall average score of the averages for each participants is 4.055. Median value of the average scores is 4.

4.1.2 Results Related to First Sub Problem of the Study

The first sub problem scrutinizes the presence of any possible relation of Metacognition Scores to the variables of employees' gender, education level, English proficiency level, working years in ICT sector, job band (positioning in organizational hierarchy), company scales (number of employees) of the firm, getting training to develop thinking skills.

No significant difference was found for “gender”, “education level”, “English proficiency level”, “working years in ICT sector” and “company scales of the firm” categories while the metacognition scores of the employees were analyzed.

Against this “Job Band” and “Getting training to develop thinking skills” results which have made a significant difference in metacognition scores of the participants are explained in the following:

4.1.2.1 Results Related to Metacognition Level with Respect to Job band (positioning in organizational hierarchy)

There is a statistically significant difference between the means of the different levels of Job Band category ($p=0.013$, $p<0.05$). According to Scheffe Test results Technical Professional (mean = 3.98) and Management (mean = 4.28) categories differ significantly in Innovative Work Behavior scores.

The highest metacognition scores belong to Technician, Trainee, Administrator category (mean=4.35). The second highest scores are from Management (mean = 4.28). It is observed that both values are higher than the median score (4.089) of the average scores. The lowest metacognition score belongs to Technical Professional (mean=3.98).

4.1.2.2 Results Related to Metacognition Level with Respect to Getting Training to Develop Thinking Skills

There is a significant difference between those who had taken innovation training and those who had not taken training on thinking skills ($p=0.002$, $p<0.05$). The metacognition scores are higher for the participants who have been trained (mean = 4.1864) versus have not been trained (mean=3.9940).

4.1.3 Results Related to the Second Sub Problem of the Study

The second sub-problem of the research investigates how the Innovative Work Behavior scores change according to employees' gender, education level, English proficiency level, working years in ICT sector, job band (positioning in organizational hierarchy), company scales (number of employees) of the firm, getting training to develop thinking skills.

No significant difference was found for the Innovative Work Behavior scores of the employees according to “education level”, “English proficiency level”, “working years in ICT sector variables”.

Against this, results of the categories “Gender”, “Job band (positioning in organizational hierarchy)”, “Company Scale”, “Getting Training on Thinking Skills”

which have made significant difference in Innovative Work Behavior scores are given below.

4.1.3.1 Results Related to Innovative Work Behaviour Level with Respect to Gender

We observe a significant difference between female and male subjects for the Innovative work Behaviour scores. Men's Innovative Work Behaviour score (mean= 4.1273) are higher than women's (mean= 3.7449). ($p=0.020$, $p<0.05$)

4.1.3.2 Results Related to Innovative Work Behaviour Level with Respect to Job band (positioning in organizational hierarchy)

It can be stated that there exist a statistically significant difference between the means of the different levels of Job Band Category ($p= 0.028$, $p<0.05$). According to Scheffe test there is slightly statistically difference ($p<0.10$) between only job band categories Technical Professional (mean = 3.86) and Management (mean = 4.25).

The highest Innovative Work Behaviour scores belong to Senior Management category (mean=4.29). The second highest scores are from Management (mean = 4.25). It is observed that both values are higher than the median score (4) of the average scores.

The lowest Innovative Work Behaviour scores belong to Technical Professional category (mean = 3.86).

4.1.3.3 Results Related to Innovative Work Behaviour Level with Respect to Company Scale

According to Scheffe method we can claim that there is slightly statistical difference between only company scales 10 – 49 (mean= 4.19) and 50 – 249 (mean = 3.88). Notice that the significance value is 0.087 which less than 0.10. In addition, companies with 0 - 9 employees have the highest Innovative Work Behavior averages (mean = 4.26).

The average score of the participants from the companies having 10- 49 employees (mean = 4.19) is higher than the median score of the scale (median = 4). The lowest average score belongs to 50 – 249 (mean = 3.88) company scale category.

4.1.3.4 Results Related to Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills

We can claim that is statistically significant difference between those who had taken innovation training and those who had not taken training on thinking skills ($p=0.003$, $p<0.05$). The Innovative Work Behaviour scores are higher for the participants who have taken training (mean = 4.1447).

4.1.4 Results Related to the Third Sub Problem of the Study

The third sub problem of the study investigates the relationship between Metacognition and Innovative Work Behaviour Levels of ICT sector employees.

According to the Correlations Analysis conducted for Metacognition and Innovative Work Behaviour Scores of the participants Metacognition and Innovative Work Behaviour are highly correlated (+0.628).

4.2 Discussions for the Results of the Study

4.2.1 Discussions for the Results of the Main Problem of the Study

The main problem of this study is “What are the scores of the ICT sector employees on the Metacognition and Innovative Work Behavior Scales?” According to the evaluation of the results are presented in the following

4.2.1.1 Discussions for Metacognition Scores

According to Turan (2009)'s original study, the average of the participants' metacognitive scores was 100.18, and the standard deviation was 13.16. The lowest score that can be attained is 28 while the highest possible score which can be obtained is 140 point. Compared to the results of Turan (2009)'s study, the average of the scores of ICT employees from the Metacognition scale is higher (115.42). In addition, the average score of the participants from the Metacognition scale is above the median score of the scale (114.5). Accordingly, it can be said that the skills of using metacognition of ICT employees are high.

4.2.1.2 Discussions for Innovative Work Behaviour Scores

The minimum score that can be obtained from the scale is 9 and the maximum score is 45. The minimum score of the participants was found to be higher than the minimum

score that can be obtained (24). Maximum scores are consistent. In addition, the average of the scores of the participants from the Innovative Work Behavior scale is above the median score of the scale (36). Accordingly, it can be said that ICT employees have a high level of innovative behavior skills in the workplace.

4.2.2 Discussions for the Results of the First Sub Problem

The first sub problem is ‘Do the Metacognition Scale scores of ICT employees differ significantly according to variables of the “gender”, “education level”, “English proficiency level”, “working years in ICT sector”, “Job band (positioning in organizational hierarchy)”, “company scales of the firm”, “getting training to improve thinking skills”?’.

No significant difference was found for “gender”, “education level”, “English proficiency level”, “working years in ICT sector” and “company scales of the firm” categories while the metacognition scores of the employees were analyzed.

In the literature, there are several studies on comparison of metacognition scores according to gender. It has been observed that very different results have been obtained in this regard. For example Siswati & Corebima (2017) found in their study that gender does not effect on students’ metacognitive skills. At the same time Altındağ (2008) found in his study that there is a significant difference between the metacognitive scores of male and female students, and showed that female students scored higher than males. In this study, it was concluded that metacognition skills does not differ according to gender.

Against this “job band” and “Getting training to develop thinking skills” results have made a significant difference in metacognition scores of the participants.

The evaluations for the results of the variables that show a significant difference are as follows:

4.2.2.1 Discussions for the Results of Metacognition Level and Job Band (positioning) in organizational hierarchy

The problem is “How are the metacognition scores of the employees in ICT sector differs with respect to ‘Job Band’ category?”

The job band (positioning) in organizational hierarchy within the organization were discussed under 6 sub-categories. These are grouped according to the areas of responsibility and skills of the employees in the companies.

As a result of the study, it was found that metacognition scores have significant difference on job band category. Scheffe Test results showed that Technical Professionals and Management job bands have differences on scales averages.

In this study, it was found that people with “Technician, Trainee, Administrator” category (mean=4.35) and Management (mean = 4.2792) employ their metacognitive skills at a higher rate than other job bands. It is observed that both values are higher than the median score (4.089) of the average scores. The lowest metacognition score belongs to Technical Professional (mean=3.98). From the result it can be said that the level of using metacognitive skills of technical professionals is not high.

There are various studies in the literature on the importance and application of metacognitive skills in the workplace. Turner Walker (2006) revealed in his study that those who use metacognitive strategies have more effective problem solving and decision-

making mechanisms. Metacognition is a must-have feature in the business world. Especially, one of the challenges in modern days employees face to complexity and competitive environment. Lyons & Bandura (2019) found a high correlation between employee job performance and metacognitive characteristics.

Munby, Hutchinson & Chin (2009) suggested that work environments should also be a learning environment, and that metacognitive functions should be focused on to improve the technical knowledge and skills of employees and to adapt new employees to workplace instructions.

High metacognition or awareness of the process of one's own thinking are the key factors for effective leadership.

However, no study has been found in the literature in which metacognitive skills are questioned according to titles in the context of titles at work. The recommendations in the literature are generally that leaders and managers should develop their metacognitive characteristics because they are decision makers. In addition, leaders should create environments that will enable their subordinates to use their metacognitive skills so that they can produce correct work outputs, and they need to facilitate the development of these features of their employees through trainings.

4.2.2.2 Discussions for the Results of Metacognition Level and Getting Training to Develop Thinking Skills

The problem is “How are the metacognition scores of the employees in ICT sector differs with respect to ‘Getting Training to Develop Thinking Skills ’ category?”

In this study, it is found that Metacognition scores of the participants who have been getting training on developing thinking skills are higher than not getting such type of training.

“Metacognition, having knowledge about the individual's own cognition system, structure and work; awareness of the individual's own cognition and learning characteristics.” (Senemoğlu, 2015).

An individual who has control and awareness of his own thinking process can plan, monitor and evaluate his or her thinking. Metacognition provides planning, monitoring and evaluating individual's thinking system and also provides a suitable framework for self-assessment (Turan, 2009).

Metacognitive skills are learnable competencies. Most often, teaching of metacognitive strategies has been included in Cognitive Strategy Instruction (CSI) programs. Cognitive Strategy Instruction (CSI) is an approach that improves learning by making use of thinking skills and processes. CSI helps students to engage in more strategic, self-reliant, flexible and productive in their learning efforts (Livingston, 2003). Metacognitive strategies should be taught to students starting from primary school and continue to secondary and higher education. (Senemoğlu, 2015). In their study, Turner Walker (2016) revealed that when metacognitive strategies are used (such as thinking aloud and visualization), individuals' characteristics such as problem solving, memory retention and lateral thinking produce more effective results. In this way, as conceptualizing the workplace as a learning environment, they stated that metacognitive strategies should be applied in both new employee compliance trainings and technical trainings.

Learning metacognitive strategies can be included in training programs, as well as trainings at adult level can be created in order to raise awareness and apply them. What kind of trainings are applied in this context in the business world, program development studies of these trainings and how such trainings affect the metacognitive skills of employees may be the subject of the future researches.

4.2.3 Discussions for the Results of the Second Sub Problem

The second sub problem is ‘Do the Innovative Work Behavior scale scores of ICT employees differ significantly according to the variables of “gender”, “education level”, “English proficiency level”, “working years in ICT sector”, “Job band (positioning in organizational hierarchy)”, “company scales of the firm”, “getting training to improve thinking skills”?’

No significant difference was found for the Innovative Work Behavior scores of the employees according to “Education level”, “English proficiency level”, “working years in ICT sector variables”.

In this study, it is interesting that the Innovative Work Behavior scores for the education level did not show a significant change. People with higher education levels may have a broader perspective in related domains. They can gain a deeper level of knowledge and expertise in undergraduate and graduate education programs. The broad perspective they have gained can make it easier for them to generate new ideas by enabling them to make new connections. In addition, higher education level has a positive and significant effect on idea realization (Schmitz, Klink, Beausaert, Bijker & Segers, 2020).

Against this, results of the categories “Gender”, “Job band (positioning in organizational hierarchy)”, “Company Scale”, “Getting Training on Thinking Skills” have made significant difference in Innovative Work Behavior scores.

The evaluations for the results of the variables that show a significant difference are as follows:

4.2.3.1 Discussions for the Results of Innovative Work Behaviour and Gender

The problem is “How are the Innovative Work Behaviour scores of the employees in ICT sector differs with respect to “Gender” category.

Men scored higher than women in terms of demonstrating Innovative Work Behaviors. While mainstream innovation studies consider innovation as a gender-neutral process, women are still less visible in the field of innovation than men (Teruel & Segarra-Blasco, 2017).

Beyond the innovation behaviors of women and men, gender diversity in the workplace can lead to a more effective job performance due to the differences between men and women. According to several studies, the gender diversity is positively related to innovation. For example, Teruel and Segarra-Blasco (2017) emphasized that gender diversity has a positive impact on innovation. But this differs according to the type of innovation and company scale.

In the results of Na & Shin (2019)’s study about the roles of female participants on company innovation, one of the findings is that female ownership in emerging countries is positively related to innovation. Female top managers are more risk averse. Due to their

more sensitive and objective perspectives, female senior managers may demonstrate better innovation performance compared to male senior managers.

It can be the subject of more detailed further researches by taking into account the tendencies to show innovative behavior in the workplace by gender, demographic variables such as education status, age, and different variables such as the working climate of the companies, management styles, working domain.

In the business world, women's workforce should be supported in every field and their contribution to innovation should be increased.

4.2.3.2 Discussions for the Results of Innovative Work Behaviour Level with Respect to Job Band (positioning) in Organizational Hierarchy

The problem is “How are the Innovative Work Behaviour scores of the employees in ICT sector differs with respect to ‘Job Band’ category?”

The job band (positioning) in organizational hierarchy within the organization were discussed under 6 sub-categories. These are grouped according to the areas of responsibility and skills of the employees in the companies.

As a result of the study, it was found that Innovative Work Behaviour scores have significant difference on job band category. Scheffe Test results showed that Technical Professionals (mean =3.86) and Management (mean = 4.25) job bands have differences on scale averages.

In this study, it was revealed that employees at Management (mean = 4.25) and Senior Management (mean=4.29) job band showed more innovative work behaviour. This result may be due to the fact that managers bear more responsibility for needs such as business performance, profitability targets, development of new processes, and innovative solutions to problems. In addition, people at the management level are expected to be facilitators and supporters in the dissemination and implementation of the idea due to the powers they may have in the workplace. Various studies have been found in the literature on the effects of managerial behaviors and styles on innovation in the workplace. In the meantime, employees at Technical Professional job band showed less innovative work behaviour. Employees in this position are expected to put their expertise and knowledge into practice in current technical tasks. Usually the tasks and problems are clear and mostly there is no expectation that it will always bring a very creative solution, it is usually necessary to solve problems in the current order and ensure the sustainability of the work. Therefore, Technical Professionals may exhibit less innovative behavior. This result can be discussed in more details with more participants in further researches.

Önhon (2016) states that leaders catalyze the team in defining the goals, problems and solutions of the employees and shape the process by defining the scope of the work. Leaders reveal short and long-term visions and can lead employees to innovative business processes and achievements in line with this vision. Amabile (1988) states that influences such as work environment interactions and supportive managers have a positive effect on idea generation and idea realization processes. Scott and Bruce (1994), argue that when managers have innovative expectations, employees perceive their managers as more encouraging and facilitating innovation.

As a future research avenue, more detailed studies can be carried out in which workplace and leadership characteristics can be evaluated together to investigate the reasons for demonstrating innovative behavior related to manager roles in the field of ICT.

4.2.3.3 Discussions for the Results of Innovative Work Behaviour Level with Respect to Company Scale

The problem is “How are the Innovative Work Behaviour scores of the employees in ICT sector differs with respect to ‘Company Scale’ category?”

When the analysis results in this category are examined, it is revealed that there is a significant differences in the Innovative Work Behavior scores according to company scale. This difference has been revealed especially for companies with 10 – 49 and 50 – 249 employees.

From the results, it is possible to say that the participants of the companies with 10 – 49 employees show more innovative behavior (mean = 4.19), while the company participants with 50 – 249 employees (mean = 3.88) exhibit the least innovative behavior. In addition, the highest average score of Innovative Work Behavior was found to be the company with 0 – 9 employees (mean = 4.26).

In the business world, companies with 0 – 9 or 10 – 49 employees are mostly considered as startups or small businesses. Startups or small businesses are generally more agile organizations than medium and large-sized companies, which are more creative with innovative ideas and can make quicker decisions to bring them to life.

These results are almost compatible with the ones obtained in Önhon (2016). He found in his study that the perceptions of positive innovation climate and implementation of innovative work behaviors of the employees in the companies with less than 250 employees are significantly higher than the companies with 250 or more employees. He bases this situation on the fact that competition and change are less perceived in small companies, and that initiatives and decisions are made quicker and easier to implement innovations.

4.2.3.4 Discussions for the Results of Innovative Work Behaviour Level with Respect to Getting Training on Thinking Skills

The problem is “How are the Innovative Work Behaviour scores of the employees in ICT sector differs with respect to ‘Getting Training on Thinking Skills’ category?”

Participants who got training about developing thinking skills also has higher Innovative Work Behaviour scores than those who did not.

According to Basadur (2004), organizational creativity is continual and circular process. It begins with finding problems, such as noticing and predicting opportunities for change, continues with conceptualization of solving the problem and implementation of the problem. He also mentioned that individuals can learn skills, attitudes and behaviors towards creative thinking, and even the creative thinking process itself. Basadur (2004) states that such thinking skills and attitudes can be learned and such trainings effectively improve creative performance.

Trainings that develop thinking skills may include approaches and methods for the idea generation, dissemination and implementation stages of Innovative Work Behavior. In this respect, it can enable employees to gain mental practice. What kind of trainings that are implemented in this context in the business world, program development studies of these trainings and the effects of such trainings on innovative work behaviors may be the subject of future researches.

4.2.4 Discussions for the Results of Third Sub Problem

The third sub problem of the study investigates the relationship between Metacognition and Innovative Work Behaviour Levels of ICT sector employees. As a result of the Correlations Analysis it was found that Metacognition and Innovative Work Behaviour are highly correlated

As similar result, Kim and Lee (2018) mention that metacognition strongly supports innovation behavior in their study which was applied on 171 university students.

Because metacognition involves the processes of planning, organizing and controlling actions related to the creation and promotion of new ideas.

Innovation behavior, on the other hand, engages a series of proactive actions to turn the idea into practice (Jansenn, 2000). In all this proactive process, innovative behavior in a systematic and stable direction takes place by means of metacognition.

De Jong & Hartog (2007) defined IWB as an individual's behaviour that aims to initiate and introduce new and useful ideas. Thus, it can be said that IWB begins with creativity. Creativity or idea generation is the first stage of innovation. But IWB is more

than just creativity. The new and creative ideas generated should be transformed to implementation of useful products, services or processes (Amabile, 1988).

As mentioned by Tang (1998) creativity is the ability to distinguish unusual situations and models, to notice the relationships among them and to produce new ideas and objects

Amabile (1988) defined the innovation as the successful implementation of creative ideas in an organization. King & Anderson (2002) cited in De Jong & Hartog (2007) supported the definition that innovativeness also includes the practical implementation of creative ideas. In this process from creative idea generation to idea implementation, innovative behavior can be seen as a multidimensional series of proactive actions of employees.

Jansenn (2000) also claimed that idea generation is the first step of IWB. It means that creating of new and useful ideas in any subjects, such as business-related problems, incompatibilities or new market trends. The second stage of IWB is the “idea promotion” that means promoting new idea to find the supporters and sponsors of the idea.

The last stage of the innovation process is idea realization which means experiencing the innovative idea as a model or prototype within a work role or organization level (Jansenn, 2000). In the implementation phase, employees demonstrate a set of behaviors aimed at realizing the idea. For instance, employees may try to convince others of the value of the idea. Employees

can also effort in developing, testing and commercializing the idea. A wide variety of problems to be solved can be encountered in these processes.

According to Basadur (2004), organizational creativity is continual and circular process. It begins with finding problems, such as noticing and predicting opportunities for change, continues with conceptualization of solving the problem and implementation of the problem.

In his approach, organizational creativity includes the stages of deliberately identifying the problem, developing a solution idea for the problem and implementing it, which we often use in daily life. Using divergent and convergent thinking skills is at the forefront. Every implemented solution also provides new and useful problems to explore. This effort is therefore a cyclical process.

Basadur (2004) also argues that leaders should assist employees in demonstrating their creative skills and eliminating deficiencies within the organization.

Individuals can learn skills, attitudes and behaviors towards creative thinking, and even the creative thinking process itself. Basadur (2004) states that such thinking skills-attitudes and behavior trainings effectively improve creative performance.

Since the concepts of creativity and innovation which can be considered as the transformation of creativity into practice, include processes such as conceptualization of the problems, solution development of the problems and solution implementations, are closely related to metacognition. By means of metacognition it is possible to identify the problem rationally and to implement the appropriate strategy.

Planning what to learn to solve a problem, determining what kind of information is related to the problem, accessing information, controlling and evaluating how to reach the goal are metacognitive features.

It is inevitable to encounter many new and unpredictable situations and problems in a rapidly changing environment. In order to give flexible answers to these problems beyond the existing ways of thinking, innovative behaviors that are different from the solutions offered by everyone should be demonstrated. For this, a lot of existing or newly discovered information must be used together. For this reason, the individual should be actively involved in the learning process in a systematic and planned way with his /her metacognitive competencies (Kim & Lee, 2018).

In the broad sense, metacognition means the conscious control of cognitive activity (Schunk, 2012, p.286).

The cognition is being aware of something and understanding it. On the other hand, metacognition is also being aware of how someone learns it in addition to understanding (Senemoğlu, 2015).

According to Flavell (1979), metacognition is the individuals' awareness of themselves as an active element in their environment while they are deliberately retrieving and storing information. Metacognition is based on thinking about his/ her own thoughts. Metacognition involves controlling whether cognitive goals are being met or not.

The skills, such as problem solving, self-reflection, self-assessment and goal setting are metacognitive skills and also, they are essential components of the learning process (Bland, 2005)

Cognitive strategies are used to help an individual achieve a specific goal. Metacognitive strategies enable this goal to be achieved. The function of cognition is problem solving. The function of metacognition is to regulate the cognitive processes of the individual in performing a task or solving a problem. An individual who has control and awareness over his own thinking can plan metacognitively, monitor and evaluate his/her thinking process. Metacognition provides the cognitive planning required for the solution of the problem, the monitoring and evaluation of the appropriateness of the actions (Turan, 2009).

While all these theoretical explanations provide a prediction that there is a relationship between metacognition and innovative work behaviour, the existence of such a relationship has been statistically demonstrated in this study.

4.3 Suggestions with Regard to the Study

- It was observed that both metacognitive skills and innovative work behavior skills were higher in participants who received training to develop their thinking skills. And also metacognition and innovative work behaviour are correlated highly. Developed metacognition skills enable individuals to exhibit more innovative behaviors at work. It is important to include such trainings in corporate training and development programs. Technical and professional development training programs should be designed with approaches and teaching

methods that will improve thinking skills. In addition, trainings to develop thinking skills should be offered as method trainings such as online or classroom trainings.

- Institutions should set the development of metacognitive awareness, metacognitive skills and innovative work behaviour skills as a goal of their training programs.

- Teaching methods and teaching strategies aimed at developing thinking skills and metacognitive skills should be included in education programs starting from primary schools to higher education programs.

- In this study, it was concluded that the metacognitive and innovative behaviors of the employees in managerial positions were higher. Managers should adopt a facilitating management style to improve their employees' skills in these areas.

- Institutions should adopt strategies that improve women's innovation performance, increase women's employment especially in the ICT sector, and institutions should take advantage of gender diversity

- Large enterprise organizations with a high number of employees should include agile management and decision-making mechanisms that support the innovative behaviors of employees .

4.4. Further Researches

- In institutions, training programs to develop thinking skills can be considered. Training evaluation studies can be conducted on how these training

programs affect the metacognitive and innovative work behavior skills of employees.

- The effects of such trainings on innovation behaviors and innovation performance of employees can be examined considering the parameters such as working climate and leadership characteristics.
- In innovation subjects gender diversity and women participants can be further scrutinized
- In more detailed further researches women's innovative work behavior levels can be addressed in terms of various parameters

REFERENCES

Altındağ, M. (2008). *Hacettepe Üniversitesi Eğitim Fakültesi Öğrencilerinin Yürütücü Biliş Becerileri*.(Unpublished Dissertation).Ankara, Hacettepe University, Institute of Social Sciences

Altun, N. D. (2011). *Lise 1. Sınıfta Üstbiliş Stratejileri Öğretiminin; Canlıların Sınıflandırılmasını Kavramaya, Üstbiliş Stratejilerinin Kullanımının Gelişimine Ve Çevre Duyarlılığı Kazanımına Etkisi*.(Unpublished Dissertation).Ankara, Gazi University, Educational Sciences Institute

Amabile, T.M. (1988).A model of creativity and innovation in organizations. In B. M. Staw & L. L. Cummings (Eds.).*Research in organizational behavior*, vol. 10: 123-167. Greenwich, CT: JAI Press.

Anderson, N.J.(2002). The role of metacognition in second language teaching and learning. *Educational Resources Information Center (ERIC)*,ED463659. Access address: <https://eric.ed.gov/?id=ED463659>

Basadur, M. (2004).Leading others to think innovatively together: creative leadership.*The Leadership Quarterly* 15, 103–121

Blakey, E. & Spence, S. (1990).Developing Metacognition.*Educational Resources Information Center (ERIC)*,ED327218. Access address: <https://eric.ed.gov/?id=ED327218>

Bland, L. S. (2005). *The Effects of a Self-Reflective Learning Process on Student Art Performance*. (Unpublished Dissertation). Florida State University, USA.

Büyüköztürk, Ş. (2018). *Sosyal bilimler için veri analizi el kitabı: İstatistik, araştırma deseni, SPSS uygulamaları ve yorum*. Ankara: Pegem.

Büyüköztürk, Ş., Çakmak, E.Ç., Akgün, Ö.E., Karadeniz, Ş., Demirel, F. (2018). *Bilimsel Araştırma Yöntemleri*. Ankara: PEGEM AKADEMİ

Crick, R. D., Broadfoot, P. & Claxton, G. (2004). Developing an effective lifelong learning inventory: the ELLI project. *Assessment in Education: Principles, Policy & Practice*, 11(3), 247-272. doi:10.1080/0969594042000304582

De Jong, J.P.J. & Den Hartog, D.N. (2007). How leaders influence employees' innovative behaviour. *European Journal of Innovation Management* Vol. 10 No. 1, 41-64.

De Jong, J.P.J. (2007). *Individual innovation. The connection between leadership and employees' innovative work behavior*. (Unpublished Dissertation). University of Amsterdam, Netherland.

Demircioğlu, H. (2008). *Matematik öğretmen adaylarının üstbilişsel davranışlarının gelişimine yönelik tasarlanan eğitim durumlarının etkililiği*. (Unpublished Dissertation). Ankara, Gazi University, Institute of Educational Sciences.

Diker Coşkun, Y. (2009).*Üniversite öğrencilerinin yaşam boyu öğrenme eğilimlerinin bazı değişkenler açısından incelenmesi*. Published Dissertation: Ankara, Hacettepe University, Institute of Social Sciences.

Dunlap, J. C. (2008). Changes in students' use of lifelong learning skills during a problem-based learning project. *Performance Improvement Quarterly*, 18(1), 5-33.

Elçi, Ş.(2006).*İnovasyon: kalkınmanın ve rekabetin anahtarı*. Ankara, Meteksan Press.

Eren, H. (2010). *Üniversite öğrencilerinin sosyal yenilikçilik kapasitelerinin teknolojik yenilikçilik eğilimlerine etkisini ölçmeye yönelik bir model önerisi*. (Unpublished Dissertation).Ankara, Kara Harp Okulu, Institute Of Defense Sciences

Flavell, J. (1979).Metacognition and cognitive monitoring a new area of cognitive- developmental inquiry. *American Psychologist*, 34(10), 906 - 911.

Fraenkel, J.R., Wallen, N. E.& Hyun, H. H. (2012).*How to design and evaluate research in education*.NewYork, NY: McGraw-Hill Press.

Galunic, D. C. & Rodan, S.(1998).Resource recombinations in the firm: knowledge structures and the potential for schumpeterian innovation.*Strategic Management Journal*, 19: 1193–1201

Gama, C.A. (2004). *Integrating Metacognition Instruction in Interactive Learning Environments*. (Unpublished Dissertation).University of Sussex.

Goldsmith, R. E. ve Foxall, G. P. (2003). The measurement of innovativeness. L.V.

Shavinina (Ed.), *The international handbook of innovation* (p.321 - 330). Oxford: Elsevier Sciences Ltd.

Güldamlaşı, G. (2016). Türkiye'deki kurumsal akademilerin süreçlerinin ve yapılarının karşılaştırılması. (Unpublished dissertation).Bahçeşehir University, Turkey.

Hamman, L. A., & Stevens, R. J. (1998). Metacognitive Awareness Assessment in Self-Regulated Learning and Performance Measures in an Introductory Educational Psychology Course. *Annual Meeting of the American Educational Research Association, April 13 - 18, San Diego, CA, 4(24)*, 249. Accessed address <https://eric.ed.gov/?id=ED424249>.

Hıdıroğlu, Ç. N. (2018). Üstbiliş Kavrama ve Problem Çözme Sürecinde Üstbilişin Rolüne Eleştirel Bakış. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 32, 87-103.doi:10.30794/pausbed.424862

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness, and innovative work behavior. *Journal of Occupational and organizational psychology*, 73, 287-302.

Janssen, O. (2005). The joint impact of perceived influence and supervisor supportiveness on employee innovative behaviour. *Journal of occupational and organizational psychology*, 78 (4), 573-580.

Jegede, O., Taplin, M., Fan, R.Y.K., Chan, M.S.C. & Yum, J. (1999). Differences between Low and High Achieving Distance Learners in Locus of Control and Metacognition. *Distance Education*. 20 (2). 255-273.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, vol39, 31–36 (1974). Access address: <https://link.springer.com/article/10.1007%2F02291575>

Kılıçer, K. (2011). *Bilgisayar ve öğretim teknolojileri eğitimi öğretmen adaylarının bireysel yenilikçilik profilleri*. (Unpublished Dissertation). Eskişehir, Anadolu University, Institute of Educational Sciences.

Kim, D. & Lee, D. (2018). Impacts of metacognition on innovative behaviors: Focus on the mediating effects of entrepreneurship. *Journal of Open Innovation Technology Market and Complexity*, May 2018. DOI: 10.3390/joitmc4020018

Lebow, D. (1993). Constructivist values for instructional systems design: Five principles toward a new mindset. *Educational Technology Research and Development*, 41(3), 4-16.

Livingston, J.A. (2003).Metacognition: An Overview. *Educational Resources Information Center (ERIC)*, ED 474 273. Access address: <https://eric.ed.gov/?id=ED474273>.

Lyons, P. R. & Bandura, R. P. (2019). Exploring linkages of performance with metacognition. *Journal of Management Development*,38:3,195-207. DOI 10.1108/JMD-07-2018-0192

McKinsey (2020). *İşimizin Geleceği Raporu*. Access Address <https://www.mckinsey.com/tr/our-insights/future-of-work-turkey>

Munby,H., Hutchinson, L. & Chin, P. (2009).Workplace learning: Metacognitive strategies for learning in the knowledge economy.*In Maclean R, Wilson D (Eds.) International Handbook of Education for the Changing World of Work*. Springer, Netherlands.DOI: 10.1007/978-1-4020-5281-1_119

Na, K. & Shin, K. (2019).The gender effect on a firm’s innovative activities in the emerging economies. *Sustainability* 2019, 11, 1992. DOI:10.3390/su11071992

Orij, A. & Uzoagu, I. F.(2019). Lifelong learning in a technology- driven society:the needs, the benefits, and the challenges. *European Journal of Education Studies*. doi: 10.5281/zenodo.3595250

Ornstein, A. C., & Hunkins, F. P.(2018). *Curriculum: Foundations, Principles and Issues*. England:Pearson Press.

OSLO Guide TR (2005).Yenilik verilerinin toplanması ve yorumlanması için ilkeler. Ekonomik İşbirliği ve Kalkınma Örgütü Avrupa Birliği İstatistik Ofisi, Third Edition. Accessed address: [https://www.tubitak.gov.tr > kilavuzlar > Oslo_3_TR](https://www.tubitak.gov.tr/kilavuzlar/Oslo_3_TR)

Önhon, Ö. (2016).*The relationship between organizational climate for innovation and employees' innovative work behavior; the moderating effects of leadership behavior; ICT sector in Turkey*. (Unpublished Dissertation).İstanbul, Marmara University, Institute of Social Sciences.

Panaoura,A., Philippou, G. & Christou, C. (2003).The Development of Students' Metacognitive Ability In Mathematics. *Cognitive Development* 22(2), June.149-164

Pintrich, P. R. (2002). The Role of Metacognitive Knowledge in Learning.*Teaching, and Assessing, Theory Into Practice*, 41:4, 219-225. DOI: 10.1207/s15430421tip4104_3

Popadiuka,S. & Choo, C. W. (2006).Innovation and knowledge creation: How are these concepts related?.*International Journal of Information Management* 26, 302–312

Price Waterhouse Coopers. (2017). Workforce of the future: The competing forces shaping 2030. Access address <https://www.pwc.com/gx/en/services/people-organisation/publications/workforce-of-the-future.html>

Rogers, E. M. (1983). *Diffusion of innovations*. USA, Macmillan Publishing.

Schmitz, P.L., Klink, M.R., Beusaert, S., Bijker, M., & Segers, M. (2020). Towards successful innovations in education: Development and validation of a multi-dimensional Innovative Work Behaviour Instrument. *Vocations and Learning* (2020) 13:313–340. doi: <https://doi.org/10.1007/s12186-020-09242-4>

Schunk, D., H. (2012). *Learning Theories: An Educational Perspective*. North Caroline, MA: Pearson Press.

Scott, S. G. & Bruce, R. A. (1994). Determinants of innovative behavior: a path model of individual innovation in the workplace. *The Academy of Management Journal*, Jun., 1994, Vol. 37, No. 3 (Jun., 1994), 580-607

Senemoğlu, N. (2015). *Gelişim, Öğrenme ve Öğretim Kuramdan Uygulamaya*. Ankara: Yargı Press.

Sevinç, M. (2014). *Innovativeness: an analysis based on innovation taxonomy and data envelopment analysis*. (Unpublished Dissertation). İstanbul, Sabancı University, Graduate School of Engineering.

Siswati, B. H. & Corebima, A.D. (2017). The Effect of Education Level and Gender on Students' Metacognitive Skills in Malang, Indonesia. *Advances in Social Sciences Research Journal*, 4(4) 163-168.

Şahin, M. (2014). *Eğitimsel bir bakışla Öğrenme Teorileri*. Ankara: Nobel Press.

Tang, H.K. (1998). An integrative model of innovation in organizations. *Technovation*:18 (5) 297-309.

Teruel, M., Segarra-Blasco, A. (2017). The link between gender diversity and innovation: What is the role of firm size. *International Review of Entrepreneurship*, 2017, 15 (3), 319–340.

Tidd, J. & Bessant, J. (2015). *Innovation and Entrepreneurship*. Wiley Press. Access address: https://www.researchgate.net/publication/285734411_Innovation_and_Entrepreneurship

Turan, S. (2009). *Probleme dayalı öğrenmeye ilişkin tutumlar, öğrenme becerileri ve başarı arasındaki ilişkiler*. Published Dissertation: Ankara, Hacettepe University, Institute of Social Sciences.

Turner Walker, E. (2016). *The application of metacognition to business decision making*. (Unpublished Dissertation). Victoria University of Wellington, New Zeland.

Türkiye İşveren Sendikaları Konfederasyonu. (2019). İşin Geleceğindeki Odak:İnsan. *Türkiye İşveren Sendikaları Konfederasyonu*, 2019,57(4). Access Adres <https://www.tisk.org.tr/yayin/1402604983-isveren-dergisi--temmuz---agustos--2019.pdf>

Yurdakul, B. & Demirel, Ö.(2011).Yapılandırmacı Öğrenme Yaklaşımının Öğrenenlerin Üstbiliş Farkındalıklarına Katkısı.*Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi, 1(1)*, 71-85.

Yurdakul, B. (2004). *Yapılandırmacı öğrenme yaklaşımının öğrenenlerin problem çözme becerilerine, bilişötesi farkındalık ve derse yönelik tutum düzeylerine etkisi ile öğrenme sürecine katkıları*.Published Dissertation:Ankara, Hacettepe University, Institute of Social Sciences.

APPENDIX

Appendix A: Demographic Form

BİLGİLENDİRME

Bu ölçek (anket), Yeditepe Üniversitesi, Eğitim Bilimleri Enstitüsü, Eğitim Programları ve Öğretim bölümündeki yüksek lisans bitirme tezime veri toplama amacıyla yapılmaktadır. Çalışmanın amacı, üstbiliş ve iş yerinde yenilikçilik davranışları gösterme becerileri arasında bir ilişkinin olup olmadığını araştırmaktır.

Araştırma kapsamında toplanan verilerin tamamı gizli tutulacak olup cevaplar sadece bilimsel araştırma kapsamında kullanılacaktır.

Soruların tamamını eksiksiz, doğru ve samimiyetle cevaplandıracağınıza inanıyorum.

Yardımlarınız için şimdiden çok teşekkür ederim.

Umman Öncan

Yeditepe Üniversitesi

Eğitim Bilimleri Enstitüsü

Eğitim Programları ve Öğretim Bölümü

Yüksek Lisans Öğrencisi

1	Cinsiyetiniz (gender)	() Kadın () Erkek
2	Eğitim durumunuz (Education Level)	(1) Lise (2) Ön Lisans (3) Lisans (4) Yüksek Lisans (5) Doktora
3	İngilizce Seviyeniz (English Proficiency Level)	(1) Başlangıç (2) Orta (3) İleri
4	Bilişim sektöründe toplam çalışma süreniz ne kadardır? (Working Years in ICT Sector)	
5	Organizasyonel hiyerarşi içindeki pozisyonunuz nedir ? (Job Band - positioning in organizational hierarchy)	(1) Teknisyen, stajyer – asistan, administrator (Technician, Trainee, Administrator) (2) Teknik Uzman (Technical Professional) (3) Kıdemli Uzman (Senior Professional) (4) Yönetim (Management) (5) Kıdemli Yönetim (Senior Management) (6) Üst Düzey Yönetim (Executive Management)
6	Firmanızın çalışan sayısı (Employees number – Company Scale)	(1) 0 – 9 (2) 10 – 49 (3) 50 – 249 (4) >=250
7	Çalışma yaşamınızda düşünme becerilerinizi geliştirmeye yönelik herhangi bir eğitim aldınız mı? (Getting any training to develop thinking skills)	(1) Evet (2) Hayır

Appendix B: Metacognition Scale

Üstbilis Ölçeği					
Aşağıda çalışma ve öğrenme yollarınız (stratejileriniz) ile ilgili önermeler bulunmaktadır. Cevaplarda doğru ya da yanlış yoktur; mümkün olduğunca sizin için doğru olduğu şekilde yanıtlayınız.					
Önermeler	Kesinlikle Katılmıyorum	Katılmıyorum	Emin Değilim	Katılıyorum	Kesinlikle Katılıyorum
	1	2	3	4	5
1. Bir çalışmaya başlamadan önce kendime çalışma materyali ile ilgili sorular yöneltirim	☐	☐	☐	☐	☐
2. Bir problemi çözmek için farklı yollar düşünürüm ve en iyi olanını seçerim	☐	☐	☐	☐	☐
3. Bir probleme yanıt vermeden önce farklı çözümleri gözden geçiririm	☐	☐	☐	☐	☐
4. Duruma bağlı olarak farklı öğrenme stratejileri kullanırım	☐	☐	☐	☐	☐
5. Bir çalışmayı bitirdikten sonra bu işi yapmanın daha kolay bir yolu olup olmadığını kendime sorarım	☐	☐	☐	☐	☐
6. Kendime, amaçlarımı karşılayıp karşılamadığımı düzenli olarak sorarım	☐	☐	☐	☐	☐
7. Önemli ilişkileri anlamama yardımcı olması için düzenli aralıklarla öğrendiklerimi gözden geçiririm	☐	☐	☐	☐	☐
8. İhtiyacım olduğunda, öğrenmek için kendimi güdüleyebilirim	☐	☐	☐	☐	☐
9. Çalışırken hangi stratejiyi kullandığımı farkında olurum	☐	☐	☐	☐	☐
10. Yeni bilginin önemine ve anlamına odaklanırım	☐	☐	☐	☐	☐
11. Zihinsel olarak güçlü yönlerimi, zayıflıklarımı telafi etmek için kullanırım	☐	☐	☐	☐	☐
12. İyi öğrenip öğrenmediğimi bilirim	☐	☐	☐	☐	☐
13. Hangi çeşit bilginin öğrenilmesinin daha önemli olduğunu bilirim	☐	☐	☐	☐	☐
14. Bilgiyi örgütleme/sınıflandırma işinde iyiyimdir	☐	☐	☐	☐	☐
15. Eğiticinin neyi öğrenmemi beklediğini bilirim	☐	☐	☐	☐	☐
16. Dikkatimi farkında olarak önemli bilgiye odaklarım	☐	☐	☐	☐	☐
17. Bilgiyi hatırlamada belleğim iyidir	☐	☐	☐	☐	☐
18. Bir problemi çözerken tüm seçenekleri düşünüp düşünmediğimi kendime sorarım	☐	☐	☐	☐	☐
19. Kafam karıştığında ara verip düşünürüm	☐	☐	☐	☐	☐
20. Yeni bilgi açık değilse, başa döner üzerine düşünürüm	☐	☐	☐	☐	☐

21. Kafam karıştığında varsayımlarımı yeniden değerlendiririm	☐	☐	☐	☐	☐
22. Bildiklerimle yeni öğrendiklerimin ilişkili olup olmadığını kendime sorarım	☐	☐	☐	☐	☐
23. Anladıklarımı kontrol etmek için düzenli olarak ara veririm	☐	☐	☐	☐	☐
24. Kullandığım her stratejinin hangi durumda etkili olduğunu bilirim	☐	☐	☐	☐	☐
25. Çalışmayı bitirdiğimde amaçlarıma ulaşmada ne kadar başarılı olduğumu kendime sorarım	☐	☐	☐	☐	☐
26. Öğrenirken anlamama yardımcı olması için resim ve diyagram (çizelgeler) çizerim	☐	☐	☐	☐	☐
27. Çalışmayı küçük parçalara ayırmaya çalışırım	☐	☐	☐	☐	☐
28. Özel anlamdan çok genel anlama odaklanırım	☐	☐	☐	☐	☐

Appendix C: Innovative Work Behaviour Scale

İş Yerinde Yenilikçilik Ölçeği					
Aşağıdaki bölümde, çalışanların iş yerinde sergiledikleri bir takım davranışları ifade eden cümleler verilmiştir. Cümlelerde geçen davranışları, şu anda çalışmakta olduğunuz iş yerinizde hangi sıklıkta sergilemekte olduğunuzu sağ tarafta bulunan puan cetveline göre değerlendiriniz.					
Önermeler	Hiçbir zaman	Nadiren	Bazen	Sıklıkla	Her zaman
	1	2	3	4	5
1. İşin geliştirilmesi için yeni fikirler üretirim	☐	☐	☐	☐	☐
2. Yeni çalışma yöntemlerini, tekniklerini ve araçlarını araştırırım	☐	☐	☐	☐	☐
3. Sorunların çözümü için daha önce denememiş fikirler üretirim	☐	☐	☐	☐	☐
4. Yenilik getiren fikirleri desteklemeleri için diğer çalışanları harekete geçiririm	☐	☐	☐	☐	☐
5. Yenilik getiren fikirlerim için takdir edilirim	☐	☐	☐	☐	☐
6. Firmamızda kilit rollerde bulunan kişileri yenilikçi fikirler üretmeleri için heveslendiririm	☐	☐	☐	☐	☐
7. Yenilik getiren fikirleri faydalı uygulamalara dönüştürürüm	☐	☐	☐	☐	☐
8. Yenilik getiren fikirleri sistematik bir şekilde iş ortamına uygularım	☐	☐	☐	☐	☐
9. Yenilik getiren fikirlerin yararlarını gözden geçiririm	☐	☐	☐	☐	☐

Appendix D: Permissions

