Enhancement Effects of the Idea-Marathon System on Creativity

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Nulla Dies Sine Linea

By Apelles, Greek painter

(Not a day without a line drawn)

目次

List of Tables

Figure List

Abbreviations:

		Appearing
ANOVA	Analysis of Variance	5.1.6.5
Abstractness of Titles	TTCT Component	4.2.4
ABT	Abstractness of Titles (TTCT Component)	4.2.4
BBS.	Bulletin Board System	3.7.4.4.
BS.	Brainstorming	3.7.1.1.
BW.	Brainwriting	3.7.2
DF	Degree of Freedom	Table 5
D-IMS	Drawing Idea-Marathon	1.3.3.1
ELA	Elaborations	4.2.3
Elaborations	TTCT Component	4.2.3
ETS	e-Training System	5.1.3
EUA	European University Association	5.1.2
F	F Value	5.1.6.5
FLU	Fluency (TTCT Component)	4.2.1
Fluency	TTCT Component	4.2.1
IMS	Idea-Marathon System	1.1.(1)
L.	Low	5.1.6.7
M	Middle	5.1.6.7
M	Score Means	Table 5
MSE	Mean Square Error	5.1.6.5
N	Number of Persons	5.1.6.1
NCEE	National Center on Education and the Economy	5.1.2
n.s.	Non-significant	Table 5
ORI	Originality (TTCT Component)	4.2.2
Originality	TTCT Component	4.2.2
P	p-value	5.1.6.5
Post	Posttest	5.1.6.5
Posttest	TTCT test after 3 month IMS training	5.1.6.5
Pre	Pretest	5.1.6.5
Pretest	TTCT test before IMS training	5.1.6.5
Pre-Posttest	Pretest and Posttest	5.1.6.5
Resistance to Premature Closure	TTCT Component	4.2.5
RPC	Resistance to Premature Closure (TTCT Component)	4.2.5
Score Total	TTCT Component Total Score	4.2.6
SD	Standard Deviation	Table 5
Sig	Significant	Table 5
STL	Score Total (TTCT Component)	4.2.6
T-IMS	Topic Idea-Marathon	1.3.3.2

T-L	Top- and Low-Scoring Group	5.1.6.7
T-M	Top- and Middle-Scoring Groups	5.1.6.7
TML	Top, Middle and Low	5.1.6.7
TTA	Team Teaching Assistant	5.2.3.1
TTX	Team Teaching Expert	5.2.11.4
TTCT	Torrance Tests of Creative Thinking Figural	4.1
With IMS	With Idea-Marathon Training	5.1.6.5
With D-IMS	With Drawing Idea-Marathon	1.3.3.2
Without IMS	Without Idea-Marathon Training	5.1.6.5
Without D-IMS	Without Drawing Idea-Marathon	1.3.3.2

Chapter 1 Introduction

1.1 Why This Study Is Unique

(1) The Idea-Marathon System (the Idea-Marathon or the IMS) was created by the author of this dissertation in 1984.
(2) The author has been practicing the Idea-Marathon almost every day since 1984 until today.
(3) To measure the improvements in creativity stemming from the Idea-Marathon training, the author introduced the use of the TTCT (the Torrance Tests of Creative Thinking) Figural Pretests and Posttests to compare the pre- and post-training differences.
(4) This study covered various generations of Japanese subjects such as children in one kindergarten and two nursery schools, three groups of university students, one group of laboratory researchers and two groups of company staff, totaling 287 persons (which corresponded to 574 times TTCT Pre- and Post-tests).
(5) The same TTCT Figural Pre- and Post-tests were used for the children, students, businessmen and women, as well as for the researchers.
(6) The TTCT Figural Pretests and Posttests covered, not only the experimental groups receiving the Idea-Marathon training, but also the control groups who were not receiving the Idea-Marathon training in order to check the differences between the two groups.
(7) The contents of the statistical analyses of all the experimental interventions were adjusted to the following standard:
   a) t-Tests Analysis of the TTCT Pretests and Posttests Scores (in Experimental and Control Groups)
   b) Mann-Whitney and t-Test Analysis for 13-Item Creative Strength Criterion-Referenced Measures of TTCT Pretests and Posttests (in Experimental Group)
   c) ANOVA Analysis of TTCT Scores Pretests and Posttests (in Experimental and Control Groups)
   d) ANOVA Analysis of TTCT Scores Pretests and Posttests between Genders (in Experimental Groups)
   e) ANOVA Analysis of TTCT Scores Pretests and Posttests among Top, Middle and Low scores of TTCT results (in Experimental Group)

1.2 Acknowledgements

In this final stage of writing my dissertation, I realized that so many people and so many organizations have helped me with my study. Without these people and organizations, my dissertation could never have been completed.

Since I founded and started the Idea-Marathon in 1984, my intent has always been to expand the Idea-Marathon in order to demonstrate its creative and innovative effects in both organizational training and in terms of educational gains.

After I retired from business, I began, independently, teaching at universities and training at companies. I found that the Idea-Marathon was qualitatively effective for company staff, laboratory staff and university students, and I published several books on the Idea-Marathon.

Then, through activities with the Japan Creativity Society, Dr. Susumu Kunifuji became interested in the Idea-Marathon as a divergent part of his creative methodology and asked me to teach at the Japan Advanced Institute of Science and Technology (JAIST). Later, Dr. Kunifuji advised me to start studying creative methods, to start writing a paper for the Japan Creativity Society and for KICSS (Knowledge, Information Creativity Support Systems) and, finally, Dr. Kunifuji advised me to enroll in the PhD program of School of Knowledge Science at JAIST in 2011. Without Dr. Kunifuji, I could not have begun my academic study of the Idea-Marathon.

Before accepting me as a member of his research group, Dr. Kazunori Miyata adopted the Idea-Marathon in his own research with his students after attending my lectures at JAIST and utilized the Idea-Marathon in his own way for student competitions. He found that the Idea-Marathon is quite useful in groupwork. Dr. Miyata accepted me in his research group, and for this reason and more, I am very much obliged. Dr. Miyata is my academic supervisor.

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My study and experiments could never have started without my being able to teach at the University of Electro-Communications, where Prof. Toshiaki Takeuchi, Prof. Akitoshi Minagawa, Prof. Hirotaka Matsuzawa and all the members of the Team Teaching Assistants (TTA) supported the Idea-Marathon for many years.

Dr. Takahiro Kawaji of Ohtsuki City College has not only practiced the Idea-Marathon himself at the early stage but has extensively supported and advised me on my experiments as well. The cooperation of Dr. Masanori Okada of Kanazawa Gakuin University and Dr. Keizo Sakurai of the Economic Institute of Japan and Managing Director of the Japan Creativity Society was also so very valuable in

[1] SPSS: Very useful and powerful statistical analysis software designed by IBM which I could use on my PC installed in JAIST.

[2] ANOVA: Analysis of Variance, very useful statistical analysis method one can apply to, for example, two x two factors comparison.

my experiments. Dr. Kyoko Nakagawa of Seiwa Junior College recommended many valuable reference books and others about art education for preschoolers, which are referred to in this dissertation. I also agree with and appreciate the opinion of Dr. Shigekazu Sawaizumi of the Prefectural University of Toyama who insists that the Idea-Marathon "invites Serendipity." Mr. Shingo Tamura, lecturer at Keio University has been supporting and encouraging me for continuing the Idea-Marathon.

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1.3 Abstract

A core concept of the Idea-Marathon System (hereafter referred to as the Idea-Marathon, IMS) considers “Thinking and Writing” as inseparable and simultaneous. And the main hypothesis is that if anybody who can read and write tries to think ideas every day and immediately write them down into notebooks, he or she can improve his/her creativity.

To demonstrate the effects of the Idea-Marathon System quantitatively for various generation of people, such as children of kindergartens and nursery schools, university students, company staff and laboratory researchers, creativity figural tests were introduced in this dissertation. This dissertation includes various applications for different types of Idea-Marathon practitioners.

First, we discuss in detail the nature of creativity, and then both the origin of the Idea-Marathon and its role in enhancing creativity. At the same time, we discuss the importance of supporting systems for making the Idea-Marathon a habit in the Idea-Marathon Training in a group.

Next, we explain the Torrance Tests of Creative Thinking (TTCT) Figural Type and their role in measuring quantitatively the effects of creativity produced by the Idea-Marathon.

Then the following experiments follow with each statistical tests:

1.3.1 Undergraduate Students at Universities

Undergraduate students in three educational institutions were offered the Idea-Marathon training lectures with a Pretest and a Posttest of the TTCT. These three institutions are O College, D University, and K University. The score results of the Pretest and Posttest of the TTCT were analyzed using statistical tests.

AT O College, the Pretest took place on April 19, 2012, and the Posttest on July 26, 2012.

AT D University, the Pretest took place on October 10, 2012 and the Posttest on January 23, 2013.

At K University, the Pretest took place on May 24, 2012 and the Posttest on September 21, 2013.

At O College and K University, the TTCT tests were administered both to the With IMS[3] (experimental) group” and the Without IMS[4] (control) Group.”

All of these three institutions, where different kinds of pressure, specializations and fields (engineers and non engineers) prevail, have achieved affirmative TTCT scores.

With IMS (Experimental) training between Pretest and Posttest with statistically significant results regarding creativity at three institutions which showed improvement, while two universities Without IMS (Control Groups) have shown no change or negative results for the same period. The analysis using two factor factoral ANOVA was performed to With IMS (experimental) and Without IMS (control groups) in Pre-Posttest. The ANOVA analysis was performed according to Genders in Pre-Posttest. And also the ANOVA analysis was performed in the Top, Middle and Low groups in Pre-Posttest.

1.3.2 Companies and Laboratories

1.3.2.1 Laboratory A.

At the Laboratory A. of one major food manufacturer near Tokyo, the Idea-Marathon training was held in 2012 for six months. The first Pretest of the TTCT was given before the beginning of the first Idea-Marathon training lecture which took place on February 9, 2012 and then after three months of daily Idea-Marathon practice the second test, the Posttest, was given before the third lecture of the Idea-Marathon on May 14, 2012.In this laboratory, Without IMS (Control Group) was not arranged.

[3] With IMS: With Idea-Marathon training (experimental)
[4] Without IMS: Without Idea-Marathon training (Control)

The Pretest and the Posttest of With IMS (Experimental) have shown statistically significant changes during these three months of Idea-Marathon training. The same analysis using ANOVA was also applied in the same way at universities according to Gender and among Top, Middle and Low groups in Pre-Posttest.

1.3.2.2 IT Company P.

For a group of engineers at one IT company (Company P.), the same Pretest and Posttest of TTCT with three month Idea-Marathon training were given to the researchers at the laboratory. The Pretest was administered on November 1, 2013 and the Posttest on January 24, 2014. The results also show positive significant effects on their creativity. The ANOVA analysis was also applied to the Top, Middle and Low groups in Pre-Posttest of TTCT Scores.

1.3.2.3 IT Company N.

At another IT company (Company N.), for a group of recent graduates who became newly employed staff, the Pretest and Posttest of TTCT was performed with two months Idea-Marathon training, which showed the significant result of score improvement of creativity factors. The Pretest was administered on August 31, 2012 and the Posttest on October 24, 2012. The ANOVA analysis was also applied to the Genders in Pre-Posttest and with Top, Middle and Low groups in Pre-Posttest of TTCT Scores.

1.3.3 Kindergartens and Nurseries

1.3.3.1 With D-IMS[5](Drawing Idea-Marathon) at Kindergarten T.

(1) Drawing Idea-Marathon (D-IMS)

At kindergarten T., the Pretest and Posttest of the TTCT with a five months Drawing Idea-Marathon were performed for five years old preschoolers in two classes out of four, the rest revealing significant results in enhancing creativity. (Two more classes were reserved for TTCT Pretest and Posttest of the Topic Idea-Marathon which was started at the end of Drawing Idea-Marathon.)

The Pretest was given on July 17, 2012 and the Posttest on December 4, 2013. The Drawing Idea-Marathon is a new method of self-learning that includes daily sketches of different small objects on one small drawing paper. The results of these tests have shown significant effects on creativity.

And the ANOVA analysis was also applied to the Genders in Pre-Posttest and with Top, Middle and Low groups in Pre-Posttest of TTCT Scores.

(2) Topic Idea-Marathon (T-IMS)

At the same Kindergarten T, after a five month Drawing Idea-Marathon, the Topic Idea-Marathon was held for three months with the Pretest and Posttest for children of two other classes out of four. The Pretest was given on Dec 4, 2012 and the Posttest on March 7, 2013.

The Topic Idea-Marathon is another new method of daily drawing and writing of ideas in a notebook in response to one easy question given by the teacher. The results of these tests have shown once again significant effects on creativity. The ANOVA analysis was also applied to the Genders in Pre-Posttest and with Top, Middle and Low groups in Pre-Posttest of TTCT Scores.

1.3.3.2 With D-IMS at E. Nursery School and Without D-IMS[6] at F. Nursery School

In 1.3.3.1, the Drawing Idea-Marathon (D-IMS) was performed at Kindergarten T. without a control group.

Since these five years old preschoolers are growing and changing rapidly every day, With D-IMS (Experimental) group only, we were not sure whether the creativity improvement was due solely to D-IMS or whether some other causes maybe played a role.

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[5] With D-IMS: With Drawing Idea-Marathon for Preschoolers

[6] Without D-IMS: Without Drawing Idea-Marathon for Preschoolers

The effects of the D-IMS were to be re-checked with a Without D-IMS (control) group in addition to the usual With D-IMS (experimental) group.

Therefore, again, the Pretest and Posttest of TTCT for the Nursery School E.'s children for the With D-IMS (experimental) group and for the Nursery F. for the Without D-IMS (control) group were planned at the same time for the same three-months period.

At the Nursery School E., the Pretest was given on Aug 8, 2013 and the Posttest on November 21, 2013. At the Nursery School F., the Pretest was administered on August 6, 2013, and the Posttest on November 14, 2013.

The results for these With D-IMS (experimental) and Without D-IMS (control) groups have shown again that the With D-IMS (experimental) group achieved a significant improvement in terms of some factors of creativity which we use in our research, while the Without D-IMS (control) group did not improve and, instead, its score decreased.

The analysis using two factor factoral ANOVA was performed to With D-IMS (experimental) and Without D-IMS (control groups) in Pre-Posttest. The ANOVA analysis was performed according to Genders in Pre-Posttest. And also the ANOVA analysis was performed in the Top, Middle and Low groups in Pre-Posttest.

1.4 The Structure of All Experiments

Table 1 below is the Summary Table of all the Experiments included in this dissertation. The details are explained in each chapter.

Name	"O" College	"D" University	"K" University	A. Laboratory	P. Company	N. Company	T. Kindergarten	E. Nursery	F. Nursery	T. Kindergarten
Chapter	5-1	5-2	5-3	6-1	6-2	6-3	7-1	7-2		7-3
Idea-Marathon Lecture	Idea-Marathon in one Lecture	Idea-Marathon in Career Design Course	Idea-Marathon in one Lecture	Six Month Idea-Marathon Training Couse	Six Month Idea-Marathon Training Course	Two Month Idea-Marathon Training	Drawing Idea-Marathon	Drawing Idea-Marathon	Nil Control Group	Topic Idea-Marathon
Number of Idea-Marathon Participants	22	610	27	31	26	22	67	25	18 (Without Drawing Idea-Marathon)	66
Number of Idea-Marathon Lectures	2	2	1	4	4	2	1	1	Nil	1
Length of Idea-Marathon checked by Pre-test and Post-test	3 months	3 months	3months	3 months	3 months	2 months	5 months	3 months	3 months	3 months
ETS(1) (e-Training System) Rigidity	Strict	Team Teaching Assistant Administered	Soft	Training Office Administered and strict performance	Training Office Administered Strict performance	Training Office Administered Strict performance				
Supply of Thinking Hints	Yes	NO.	NO.	Yes	Yes	Yes				
Control Group participants	Yes		Yes							
TTCT(2) Pre-test Type	A	B	A	A	A	A	A	A	A	B
TTCT Post Test Type	B	A	B	B	B	B	B	B	B	A
TTCT Test Experimental Group participants for both PrePost tests	21	17	26	22	21	21	61	25	18	55
TTCT Test Control Group participants	19		16						18	
Male Numbers in TTCT (Experimental)	5	Unknown	14	13	19	10	29	12	9	24
Female Numbers in TTCT (Experimental)	16	Unknown	12	9	2	11	32	13	9	31
Questionnaires or Comment	NO	Yes	No	Yes	No	No	Parents Questionnaires	No	No	Parents Comments

(1) ETS: e-Training System which is the support system for Idea-Marathon using internet
(2) TTCT: Torrance Tests of Creative Thinking Figural Type
(3) Normal TTCT PrePost test order:: Type A as Pretest and Type B as Posttest. Reversed type of TTCT PrePost test: Type B as Pretest and Type A as Posttest
(4) At T. Kindergarten for five year children in four classes, Drawing Idea-Marathon is anually administered from May to Dec and Topic Idea-Marathon from Dec to March, next year.

Table 1 Structure of All Experiments for Idea-Marathon and TTCT Figural Test included in this Dissertation

1.5 Three Important Events

On Oct, 2010, we had three decisively important experiences that were crucial to our study.

In the first experience, at the annual conference of the Japan Creativity Society in 2010, we could see the presentation of Dr. Bonnie Cramond, Director of the Torrance Center for Creativity and Talent Development at the College of Education of the University of Georgia in the USA, on a report of a 50 years longitudinal study of the Torrance Tests of Creative Thinking (TTCT),.

Since Dr. E. Paul Torrance founded and started TTCT Figural testing in the 1950's, the follow-up research including a longitudinal report after 50 years was conducted by Runco, Cramond (2010) et al [1]. We thought that we also wanted to conduct a follow-up like the TTCT regarding the Idea-Marathon practitioners after many years, and to know how they are doing in their work and life.

We had heard of the name of the TTCT tests before the presentation, but we had no detailed knowledge of nor contact regarding how we could use the TTCT tests to determine the effects of the Idea-Marathon on creativity in various companies and laboratories training and university lectures. Thanks to Dr. Cramond's bright and interesting introduction, we became excited that we finally found a quantitative measurement method to determine the effects of the Idea-Marathon on creativity.

After the presentation, we explained to Dr. Cramond that we would like to contact her at the University of Georgia (UGA). We contacted her by e-mail and visited UGA half a year later. We gave our lectures and training of the Idea-Marathon using the TTCT analysis set. Since then, we have always been analyzing the Idea-Marathon with the TTCT.

The second experience was the presentation of Dr. Jonathan Feinstein (2006) of Yale University on

"Creative Interests."

The definitions of Creative Interest is:

"A topic or subject, typically of our own construction, that we find interesting, even fascinating, and are curious about and interested in exploring and learning more about, that we consider worthy to serve as a basis or center for creative activity and in fact would like and usually intend or at least hope to pursue oneself – to try to develop creatively, to employ as the basis or center for creative work."[2]

According to Feinstein, we are liable to think that a genius like Einstein can have a great idea or create a new theory overnight. But this is not the case.

Einstein formed an interest in Maxwell's theory of electromagnetic radiation as a youth [3].

Einstein was only sixteen when he became interested in the propagation of light. Feinstein pointed out and explained the creative interests of Thomas Edison, Isaac Newton and many other leading figures in his book. For 30 years, our Creative Interest has entirely been about the Idea-Marathon System. Since the Idea-Marathon has been our primary Creative Interest for 30 years, we could continue to pursue our Idea-Marathon. Feinstein encouraged our belief. And even from now on, we will devote our life to expanding the Idea-Marathon as our Creative Interest. Since this day, we have never thought about the Idea-Marathon and Creative Interest separately. Creative Interest became a ladder for our life.

The Third event on that day was the awarding of the top prize to the author for his presentation at the 2010 conference of the Japan Creativity Society.

1.6 Five Hypotheses Concerning the Idea-Marathon

The benefit of a habit of thinking every day and or writing every day in a notebook is not limited to self-improvement in creative ability, but it also contributes to reinforce curiosity, a feeling for study, resilience, continuity power, cognitive power, confidence in creating required ideas, and to invite serendipity.

In other words, I have Five Hypotheses concerning the Idea-Marathon System (the Idea-Marathon) to corroborate in the future:

1.6.1 Simple Activity and Deep Cognitive Impact

If we just keep thinking and writing our ideas in our notebooks every day for at least three months, we will be more creative, will love learning more and will develop more cognitive power.

1.6.2 Enhanced Sensitivity to Ideas

If we keep thinking about and searching for new ideas and solutions, and writing them in notebooks, we are accumulating a large number of ideas in our notebooks, and then most likely find the best idea out of the increasing accumulation of ideas.

1.6.3 Feedback Power

If we review our notebooks and re-create the ideas to be written into our notebooks, after discussing them with our colleagues, friends and family members, the quality of our ideas will be refined. This is a kind of communication theory, and Allen (1978) pointed out the importance of communication and transfer inside the laboratories. [4]

1.6.4 Strength of Instant Cognitive Reaction

If we continue the Idea-Marathon for a long time, we can then better cope with instant requests for on-the-spot idea creation of the kind we are asked for in meetings or conferences.

1.6.5 Higher Possibility for Serendipity

We can sharpen our sensitivity to ideas, to chances or opportunities and make ourselves more ready for Invited Serendipity.

In this dissertation, Chapter 1 presents the introduction and my Five Hypotheses. Chapter 2 addresses Creativity, Chapter 3 describes the Idea-Marathon System (the Idea-Marathon) and its support systems. Chapter 4 discusses the Torrance Tests of Creative Thinking (TTCT). Chapter 5 presents our Idea-Marathon and TTCT experiments at university and colleges, (5.1: O College, 5.2: D University and 5.3 K University), Chapter 6 presents the Idea-Marathon-TTCT for three Companies (6.1: Laboratory A., 6.2: Company P. and 6.3: Company N.), Chapter 7 deals with Kindergarten and Nursery Schools Creativity education by Drawing Idea-Marathon (D-IMS) (7.1: Kindergarten T., 7.2: Nursery School E. (experimental group for 3 months D-IMS) and Nursery School F. (Control group without D-IMS, 7.3: The Topic Idea-Marathon in Kindergarten T.). Chapter 8 includes a Final Discussion, the Conclusion and Suggestions for Future Work. Chapter 9 is the Appendix tables for all ANOVA analysis data of all the experiments included in this dissertation. Then the Reference follows.

Chapter 2 Creativity

2.1 Nature of Creativity

Scholars define creativity in different ways. The Oxford Dictionary of Psychology defines creativity as

> "*the production of ideas and objects that are both novel or original and worthwhile or appropriate, that is, useful, attractive, meaningful, or correct.*" [5]

However, this definition may not apply to the creativity of kindergarten and grade school children or even to high school students. Their creativities are still growing. Most of the ideas, thoughts, images, or new concepts of young people are yet to be developed (although their present mode of creative thinking and imagination will form their future approach to said concepts).

E. Paul Torrance defined creativity more dynamically [6] as…

> "*a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; finally communicating the results.*"

Thus, when we talk about an effect on creativity, we must first discuss the definition and nature of creativity.

Metaphorically, creativity is like the ocean water in which so many things are dissolved - fluency, originality, elaborations, invention, innovation, education, experience and many other elements. Creativity is found in art, novels, products, huge projects, industrial commodities, and in everything else that human beings handle. In the globalized world, all products in any market could be manufactured involving some creativity.

2.2 The Big-C and Little-c Models of Creativity

Many scholars have tried to capture creativity in models:

2.2.1 The Big-C and Little-c Models of Creativity

The first models of creativity were proposed by D. Faska in 2006 [7] as Big-C and Little-c Models. The Big-C model represents "eminent creativity" as characterized by the works of great painters, novelists, or scientists. The Little-c model represents "the everyday creativity" of notions or activities.

Kaufman and Beghetto also proposed two more creativity models: Mini-c and Pro-c. According to them, the Little-c model is too broadly defined, making the Mini-c model a necessary sub-definition for the creativity involved in learning processes.

The Pro-c model is proposed as the representation of developmental and effortful progression such as that found in the professional level of creativity [8].

If we assume that one's creativity can grow and change through effort and training on a day-to-day basis, we must seek out training methods to develop Mini-c into Little-c and Little-c into Pro-c or Big-C.

One of the educational targets is to improve the creativity of the students and trainees. The creativity is captured as a dynamic model to change or to be changed, like changing or bringing up the creativity level from small to big, which is the creativity transfer.

The creativity transfer is the potential and growth model of creativity training, education and self-regulated training. This creativity growth process from Mini-c, from Little-c to Pro-c, and to

Big-C is considered to be of far greater importance than the older creativity models of confinement or static creativity.

In this dissertation, we focus on the transition aspects of creativity from preschoolers' Mini-c to researchers' Pro-c.

2.2.2 The 4P's Model of Creativity

After struggling with various approaches to creativity, the 4P model was proposed by Rhodes [9]. According to Rhodes, approaches are divided into four categories: Creative Product, Creative Process, Creative Person, Creative Press (environment). Later, Simonton added "Creative Persuasion" [10]. Finally, Runco proposed "Creative Potential" [11].

Now, from the Idea-Marathon point of view, three more possible P's are proposed here:

2.2.2.1 Creative Pondering

Pondering (thinking) is important. Without thinking, there is no creative activity. Creativity does not come from the sky; it only comes from the brain of a person who ponders.

2.2.2.2 Creative Persistence

In order to have any creative achievement, we need to continue something for a certain period of time, usually for quite a long time. Huge projects, such as the construction of particle accelerators by CERN, take a long time to complete. The power of continuity keeps our creativity active and leads such large international projects, great discoveries and inventions come into being.

2.2.2.3 Creative Partners

"Partners" (Teams) are so important that the creation of any product can only be accomplished by a group of people. Books cannot be published by authors. Those have to be edited, checked, and proofread by other people besides the authors. To bring any products to market, teamwork is essential.

2.3 How to Find Genius Creativity

The late Dr. Hideki Yukawa was awarded the Nobel Prize of physics in 1949, for his prediction of the existence of mesons on the basis of theoretical work on nuclear forces. Yukawa (1973) commented on two ways of approaching creativity. [12]:

The first way is to believe that every person has his or her own creativity in some aspects. That is, everybody can be more creative or can improve his or her creativity power if trained to do so.

The second way is to pay a special attention to the distinct accomplishment of geniuses.

As is explained in Big-C, usually being a genius can be confirmed or found only when the genius expresses his or her super ability, performance and products. We have to wait and can do almost nothing till the genius himself or herself provides the super creative evidence in the world. It is also most possible that we have been missing many of the hidden or unviable geniuses. Many of genius talents might have not recognized even by themselves due to lack of education, confidence or chance to exhibit their talents. If a person of genius ability was not given a proper or minimum education, food and living supports, there was no way for him or her to germinate his or her ability.

Nowadays, all of us are somehow given years of education. But still finding a genius before his or her ability has sprouted is difficult. How can we find genius in the seed?

Should we look for genius or genius-like talents aggressively, purposefully and positively? Yes, we need genius and genius talents, and we have to find them for progress, advancement and innovation of our society, or of our world.

But metaphorically, geniuses or genius talents are like eggs which have to be incubated for a certain period of time. Also, they are very fragile and can be broken if treated roughly.

So where are people of genius to be found, and how can we find them? Or how can we incubate a genius from his/her childhood through education? One way I propose in this dissertation is to let many or all the children "think every day into writing in notebooks everyday" or the Idea-Marathon method.

The Idea-Marathon Method is hypothetically proposing a new way to pay attention to a step-up process to find and identify geniuses. If many young people are trained to do Idea-Marathon, daily thinking into writing in their notebooks, giving possible chances to geniuses to express their super creativity, we can recognize the existence of such geniuses at earlier stages. If we can locate those young genius or genius talents, the e-learning using Internet may be the way to give special education programs. This may be found through their writing in their notebooks, or through TTCT (Torrance Tests of Creative Thinking) Figural tests.

After E. Paul Torrance founded his creativity test of TTCT[7] in the 1950's, Guilford also proposed similar tests in 1967 and many others like Getzels & Jackson in 1962 and Wallach & Kogan in 1965. But since 1950, TTCT has been the most successful among these tests [13].

In Japan, for a long time, education meant knowledge-memory biased education. During the economic development period that followed the Second World War, Japanese industries obtained a lot of new and advanced knowledge from the West and the voice from scholars for creativity was neglected. But after Japan's development hit the top in the 1990's, the Japanese government has started to understand the necessity of cultivating creativity in universities, schools, and in early childhood.

For example, in 2002, the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT) introduced a particular curriculum called "Comprehensive School Hour" for stimulating the creativity of students from elementary school to high school. Teachers and students were able to use the class hours for activities they considered appropriate: social studies, discussions, or problem solving for a better school life. It turned out, however, that not all teachers could prepare well for creativity training, as they did not understand the method or necessary curriculum to improve student creativity.

According to PISA (Program for International Student Assessment) of the OECD, the academic literary ranking of Japan decreased from 2000 to 2006. The MEXT decided to review the curriculum in 2007.

Now at this moment, the wind seems to be going back to knowledge-memory based education policy again while MEXT understands the necessity of creativity. Possibly MEXT or school teachers do not understand what to do now (Figure 1).

One of the final purposes of this experimental dissertation is to verify the creativity merits of the Thinking-Writing habit of the Idea-Marathon Method in schools and universities in Japan so that the creative ability of our population will be stimulated and expanded for our future.

However, in this dissertation, we could make our creativity test in laboratories, companies, universities and kindergartens/nursery schools. But we could not administer our tests in elementary schools, junior high schools and senior high schools, which we plan to accomplish in future research.

[7] Torrance Tests of Creative Thinking (1974, 1974 Rev, 2008)

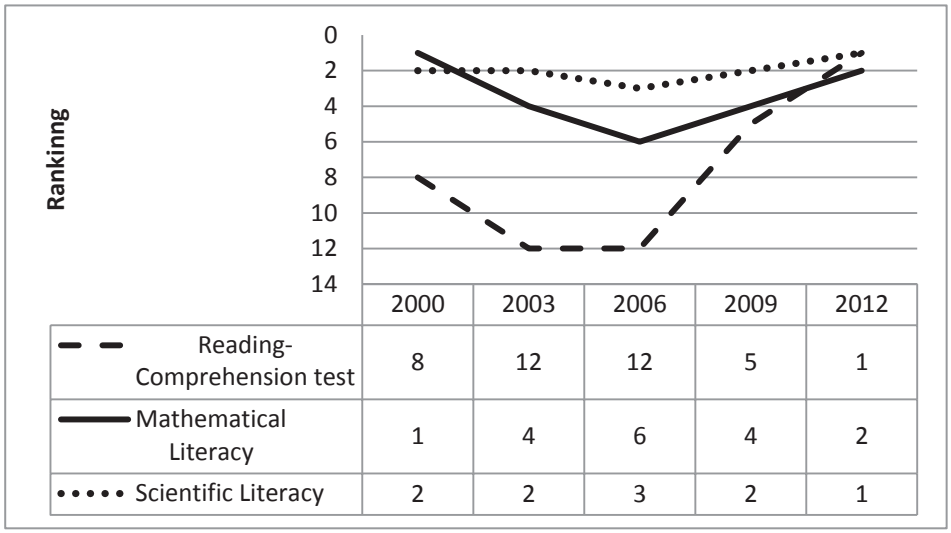


Figure 1 International Ranking of Academic Literary Ability by PISA of 15 year olds in OECD Countries – Japanese Students (MEXT)

2.4 Divergent Thinking or Convergent Thinking

Since “Brainstorming” was developed by Osborn (1939) [14], various creativity methods have been invented and applied. But no methods are aiming toward “practicing every day” or encouraging the practitioner to keep a record of his or her created ideas, or making the method for the daily habit.

Torrance insisted that divergent thinking is a gatekeeper [15]. Without divergent thinking, no convergent thinking can happen.

The Idea-Marathon is a method of writing any and all ideas that form in the mind, therefore, the method concentrates on and exercises divergent thinking. Ideas pertaining to work, private life, or family can all be recorded in notebooks in the Idea-Marathon method.

The Idea-Marathon maintains the "quantity over quality" mentality of self-brainstorming, but at the same time, it encourages the creation of as many ideas as possible.

For the Idea-Marathon, the self-pressure for “more ideas” to our own brain is important, and whenever we pick a subject, we can concentrate our mind on that subject, keeping a pen ready along with the Idea-Marathon notebook.

This method is convergent movement: thinking deeply on one subject, thinking auxiliary things, thinking variations on one subject, and thinking diverse ideas.

Divergent and convergent can be like tide and wave. It is difficult to decide whether an idea is a divergent or convergent one as ideas are all mutually connected somewhere. But while the aim of convergent ideas is to acquire shortlisted or decisive ideas from many ideas, divergent ideas must come first.

2.5 The Global Creativity Age

In the 21st century, creativity is a crucial key for companies and laboratories hoping to survive the globalization of business and technology.

The top management of enterprises and research centers are struggling in their attempts to make their staffs more creative. Today, there is no easy means to create new business in the world unless it is inspired by creativity.

Any company can enter into a new market only with some innovative products or innovation in technology, material, price, design, size, durability, delivery, service or some other innovation. Likewise, any company may be forced suddenly to leave the market for lack of creativity.

For example, in 1995, the Casio Electronic Company of Japan started to sell the QV-10, the world's first low priced digital camera. It was a big hit (Figure2).

Figure 2　The First Best Seller Digital Camera by Casio the QV-10

Prior to that, Sony, Canon, and many other companies had attempted selling digital cameras but were not successful. The Casio release was successful because it coincided with the rise of Personal Computers with a lower IC memory price.

Kodak, a giant photography and visuals company, had actually invented the first digital camera as early as 1975! According to the New York Times,

Steve Sasson, the Kodak engineer who invented the first digital camera in 1975, characterized the initial corporate response to his invention this way. But it was filmless photography, so management's reaction was, 'that's cute—but don't tell anyone about it.' [16]

Thus, Kodak withheld the digital camera technology in order to prevent any interference with their film sales, which nearly monopolized the world market at that time. Metaphorically, Kodak hid the supreme meal not to show to others, eating it later alone until the food got rotten in stock. Kodak did not read the creativity chain action for its future because of the short-sighted management.

Upon Casio's digital camera release in March 1995, the company had only planned the production of 3000 units of QV-10, but by the end of the year, Casio produced 30,000 units. Digital cameras sales hit the ceiling in 2010 (Figure 3).

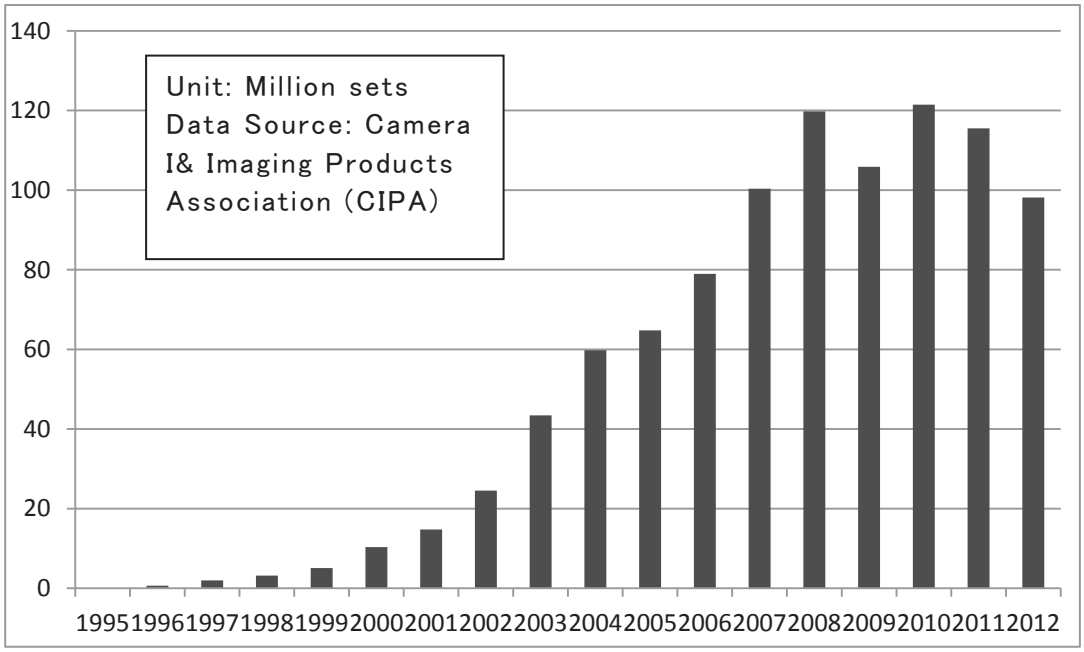


Figure 3　World Digital Camera Production

Many top IT manufacturers participated in the creativity warfare surrounding digital camera innovation in Japan (but currently many digital cameras have been and are now produced in China by EMS [17]).

Since 1995, digital cameras have developed so quickly that Japanese cameras have covered the entire world market through the conventional sales network, expelling analog film cameras and weaker digital camera manufacturers out of business. But no one thought Kodak would be put down out of business because of the digital camera. Kodak went into bankruptcy in 2012.

The digital camera market grew immensely, and Japan provided 70% of the supply until 2009. However, digital camera popularity dropped as iPhones and iPads entered the competition. (Figure 3)

Now compact digital cameras are facing difficult times as smartphones like the iPhones are replacing them in sales. Apple and Samsung have the major share in this emerging market. History repeats itself.

Since the summer of 2012, total sales of compact digital camera have decreased by 40%. [18]

It is said that smartphones will be replaced by Wearable PC's in several years. Nobody knows what will come next in the digital camera market.

This is the same rise and fall historical process that we saw with the pocket calculator. Sharp introduced the first pocket calculator in 1971. The next year Casio announced a cheaper model and the war started.

Many companies participated and quit from the calculator business but today Japanese manufacturers making calculators are only Sharp, Casio and Canon. The other billion sets of calculators are produced in China.

Likewise, many of these digital camera manufacturers will, sooner or later, go out of camera business, or decrease the production, or created extremely high quality equipment in the same way as was the case in calculator history. (Figure 4).

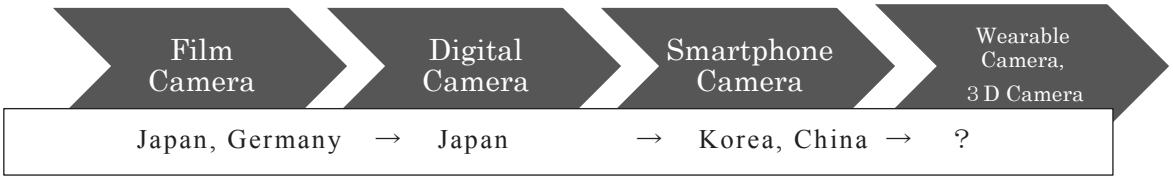


Figure 4 Vicissitudes of Photographing Method

And these digital camera manufacturers are supposed to create something completely new, something epoch-making, something which we could not imagine. It is the same with any other business or industrial field.

No global manufacturer can keep up with the rapid development of technology and better management without having a creativity strategy as its base. We are now engaged in the Olympic games of Creativity.

Japanese companies, who have been cornered by Chinese and Korean manufacturers in the global market for the past 10 years, are bitterly aware of the necessity of innovation.

There is one truth: Creativity is the energy for competition. Every company are trying to ride the wave of creativity. But how can they ride it?

They must have staff and research teams with creative and inventive minds and abilities starting of this creativity competition.

2.6 Personal Creativity

Everyone in companies and laboratories knows how important creativity is. The top management of various organizations agrees that the improvement of staff creativity is of the utmost importance as the staff is the base of creativity.

The staff has to be trained more creative before the company gets improvement in creativity. In this way, propose the “Process of Platform and Stepladder Effects” as a hypothesis.

If many staffs become more creative in total, the average level of creativity of the company will rise to a new level of the platform. As a consequence, those who had been known before as “creative staff” in the company will be pushed up the stepladder on that platform to an even higher creative level on the group creative platform.

The biggest problem is how we can make our creativity training program available for all the staff in the company. Even if the staff knows that it wants to be more creative, it does not believe that all of its members can be trained at once.

Many companies used to rely on the select few among the staff with certain specialties and talents, or even genius?

Though we owe the creativity of companies or laboratories to all the individuals on the staff, it is clear that all of the individuals are not considered to be equally creative.

The group training with the Idea-Marathon Method has a presupposed concept to raise the total level of creativity of the group, for that it is the most important to foster personal creativity.

Chapter 3 IMS and Its Support Systems

3.1 Writing: Use of a Notebook

When we were students at the Osaka University of Foreign Studies in the 1960's, we were interested in international politics. We started to use cards for collecting data, articles, news, references、books and my impressions after reading books. The cards were filed according to different categories (Figure 5).

Figure 5 Data Cards

However, as the number of cards increased rapidly, I began to feel anxious and pressured by the task of managing the cards. How could I maintain an orderly, but still useable, card collection when already innumerable cards kept piling up? When the cards exceeded several hundred, they were already out of my control. And with the cards once used outside the box, they all became mixed up! I finally gave up the idea of adding more cards to the existing card system and just kept all the cards in a box until my graduation. I just returned to concentrate on using notebooks.

After I entered Mitsui & Co. Ltd., I was assigned to an export sales department with various telecommunication projects. For those projects I assigned one notebook per one project.

In reality, although many projects were planned and pursued, many of them quickly disappeared or failed. Soon I stopped using many of the notebooks for those projects that were unsuccessful. Many empty notebooks were discarded into the trash.

3.2 The Idea-Marathon and Its Origin

In 1984, I started the Idea-Marathon.

The Idea-Marathon is a process which involves daily idea creation and the immediate writing down of these ideas in one's notebook in chronological order. The recorded ideas are not limited to any specific area or topic.

The concept is that if the Idea-Marathon becomes a daily habit, the person will probably experience the power of continuity and self-confidence that comes from one's increased creativity. When practiced as a group, a synergistic effect could be expected since members of the group start to discuss their ideas with one another.

The Idea-Marathon is a simple everyday process, a habit of daily thinking and writing. It offers a stable, primary way of self-training for personal creativity. It can be practiced in schools, universities, laboratories and companies. The Idea-Marathon can also be conducted in groups. The effects on creativity are empirically demonstrated through the experiments described in the following chapters.

Since the starting time of the Idea-Marathon, Higuchi has continued to practice the Idea-Marathon almost every day for the last 30 years. Higuchi published the first book on the Idea-Marathon in Japanese in 1992 [19]. The Idea-Marathon books have also been translated and published in Chinese [20] [21], in Korean [22] and in English [23].

3.2.1 The Origins of the Idea-Marathon

The Idea-Marathon method was originally developed overseas for invention and business application purposes.

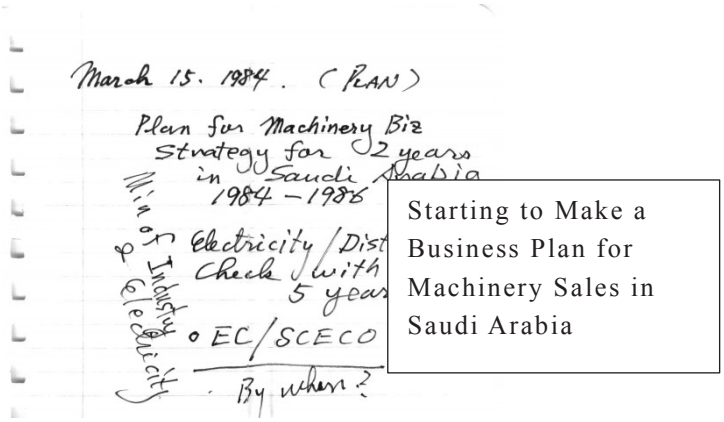


Figure 6 Handwritten Idea of Business Plan in Saudi Arabia

The Idea-Marathon was started during my struggle to survive in business competition while staying in Riyadh, Saudi Arabia, as a company's sales representative.

Business conditions overseas were so competitive that business proposals without uniqueness or originality could not succeed in gaining contracts.

For various projects, it was critical to detect and foresee a customer's future request for new technology and services (Figure 6). We needed to know how soon the customer wanted the project delivered and completed.

In Saudi Arabia, there was plenty of time available while waiting in the customer's office and at the airport. During these times, before I started the Idea-Marathon, I was just reading my favorite novels, and I sometimes felt restless from wasting a lot of time.

However, after I started thinking about writing with the Idea-Marathon method, I found that, for me, this became the finest thinking and recording time. All I needed was a notebook and a pen. Since the waiting time changed into the best thinking time, I could wait well, which made my business a little bit smooth in a long run. This was quite a revolution in my life.

Since then, I have never felt that I am wasting my time during any waiting time spent at customers' offices, the airport and on long flights. I eliminated my wasted time by thinking and writing. If I find any time, I would always write my plans, thoughts and ideas into my notebooks along with the date and the continuous numbering of the ideas in numerical order. This notebook system was later named the Idea-Marathon method.

At the start of the Idea-Marathon in 1984, only one idea was written every day. Except for several days without idea entries during the first three months, I have continued to use the Idea-Marathon method for 30 years almost without interruption. The number of Idea-Marathon Notebooks in my possession is now 424, and the total number of ideas reaches now more than 380,000 as of Feb 10, 2014 (Figure 7, 8).

Figure 7　The Idea-Marathon Notebooks filled over 30 Years

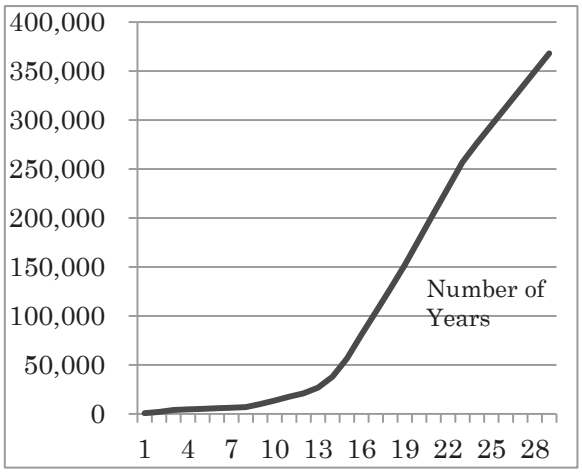


Figure 8　Total Number of Ideas over 30 years from 1984 to 2013

I wrote many business plans and strategies in my notebooks. Before we submitted our proposal to our customers for selling our equipment, I checked my notebooks thoroughly to select the best ideas for the strategy I needed.

New ideas for the project were selected and proposed to our head office for approval. A new service and newly added value for customers were often included in our offers.

All of these services were proposed to attract the customer's interest. In this way, we kept securing new contracts. However, these new ideas often became known to other competitors who wanted to copy us. As a result, I looked for more and newer ideas for the next project.

3.2.2　Laboratory Notebooks

One day in Riyadh, in Saudi Arabia, I saw a video of an NHK (Japan Broadcasting Corporation) TV program entitled "Research Notebooks of Watson Laboratory, IBM" where all the researchers were supposed to keep a notebook with them at all times.

Any ideas or notions they had were supposed to be written down in their Research Notebooks. Even if the idea was an initial finding or notion of an invention or discovery, the dated and numbered idea would form evidence of the person's intellectual right if this idea was applied and approved for patents once the idea was undersigned by any colleagues in the laboratory (Figure 9).

Figure 9 Example of an A4 Size Research Lab Notebook, Kanazawa University

Since then, I decided to integrate all my notebooks into one notebook instead of writing in several notebooks simultaneously.

3.3 The Idea-Marathon Rules

3.3.1 Think of At Least One Idea Daily.

The Idea-Marathon is performed based on the two principles of "Thinking to Writing" and "Everyday Practice."

Normally, in any other idea creation method or process, one will write ideas only when the ideas come to one's mind. This sounds reasonable and logical at first sight, but the emergence of ideas could occur only once a month or once a year, almost dependent on coincidence or chance. One will not use his/her own creative power in this way.

Nobody knows when, how and where ideas are coming and are relying upon other circumstances by chance. This form of idea creation is not constant nor a self-training stimulus for our brains.

But in the case of the Idea-Marathon, the creation of ideas is a daily activity, in which one makes or consciously forces one's brain, to create something every day by using one's brain. This sounds very hard to do for almost anybody but actually, if we try to create ideas every day, our brain will get used to this situation and will start to "cooperate" with us. So it is very important for us to find subjects or categories to think about every day.

The importance of "Everyday creativity" is strongly supported by Ruth Richards (2010),

"Everyday creativity thus defined appears to offer value for human beings over time and culture."[24]

In the Idea-Marathon rules, there is no limit of idea subjects or categories. It is quite possible for the practitioners to freely select any subjects out of our brain, regardless of categories. If the subjects of thought are limited to our specialty or work category only, we might put our brain in a higher stress corner, which will not allow us to create ideas naturally.

The Idea-Marathon allows the freedom to think about any area within one's field of interests, including work-related categories. Free thinking and writing constructs the flexibility of the Idea-Marathon that helps the practitioner increase curiosity, analogical encounters, and even serendipity.

Richards says,

"E*veryone can do everyday creativity as it is not just about <u>what</u> one does, but also <u>how</u>, creative process as well as product are observed.*" [24]

In schools, any student's best strategy for a cumulative educational exam is to prepare for it in advance every day and not to cram the night before, and the same principle of "Everyday Thinking" and "Everyday Writing" applies to the Idea-Marathon Method.

Likewise, we created better business proposals by writing also business ideas down as they appeared in our minds immediately without fail in a notebook.

Once having experienced the business success of obtaining an order by utilizing the creative wisdom, we became more and more motivated and had higher expectations for success. It is no doubt that our top priority could be to create business ideas if any appropriate business ideas can naturally be obtained through the Idea-Marathon."

3.3.2 Write Your Ideas Down Immediately in a Notebook

You may lose ideas quickly if you do not write them down on the spot, whether they are good ideas or not.

Ebbinghaus measured the memory retained and forgotten using meaningless combinations of three letters. After 20 minutes, 42% will be forgotten (or 58% will be retained) [25]. These combinations of three letters are made to have no meaning so that no associations or imagination from these "words" can be expected. Thus, the 58% retention of the memory level seems to be far too high. This will seriously mislead the teaching effect in schools.

As usual, even if students hear their teacher lecturing once or twice, or they watch the sentence written on the blackboard, it is quite difficult for students to remember without writing those.

Among these meaningless words, possibly less than 10% might be retained in 20 minutes although the testing is so delicate and difficult. If students can keep 58% of what they learn in the class with meanings by just listening, students will not be bothered to study again and again by themselves.

In our private time, we believe that we are free from our own work-related ideas, but our subconscious still thinks about our work and its related issues, searching for keys, subjects, cues of solutions.

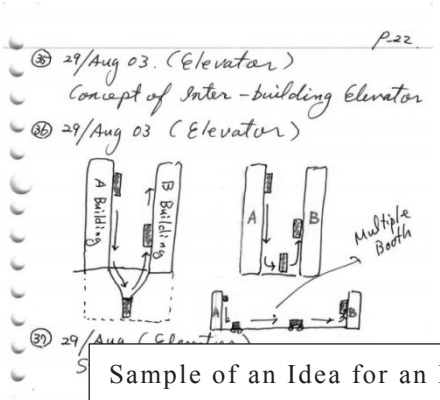
Even if there is a rule that allows ideas of any kind in the Idea-Marathon, our subconscious tends to focus on work ideas if it is a current priority. And that is fine if these work ideas from our sub-consciousness are to be written in our notebooks without fail.

In this way, business ideas were accumulated in my notebooks over a certain period of time through my practice of the Idea-Marathon. I often selected the good ideas and proposed them to the head office or the engineering departments of manufacturers. This process turned out to be very important.

When the head office and engineering departments sent me revised responses, I wrote them down again in my notebook. In this way, my ideas were refined.

3.3.3 Illustrate Ideas Whenever Possible

Add as many drawings as possible to the ideas in the notebooks. Sketched and drawn ideas are not only easier for me and others to understand, but we can find the idea quickly by looking at the drawings (Figure 10, 11).



Sample of an Idea for an Inter-Skyscraper Elevator (by T. Higuchi, 29/August, 2003)

Figure 10 Sample of an idea written in the author's notebook

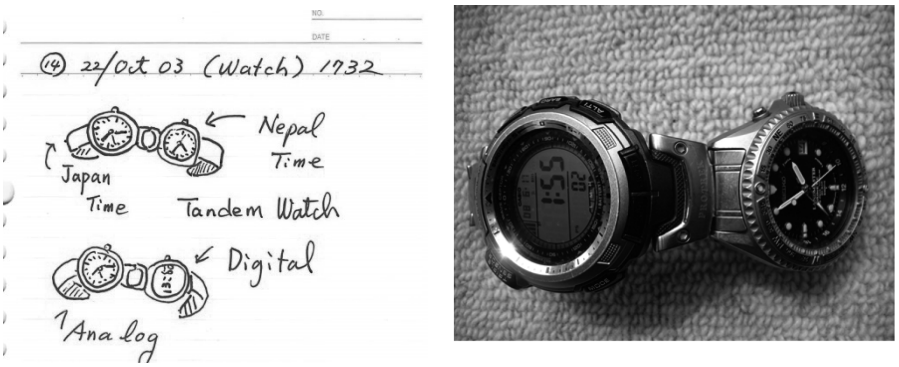


Figure 11 Tandem Watch Designed and Combined by T. Higuchi

Figure 12 is an example of an expatriate practitioner of the Idea-Marathon living in Japan.

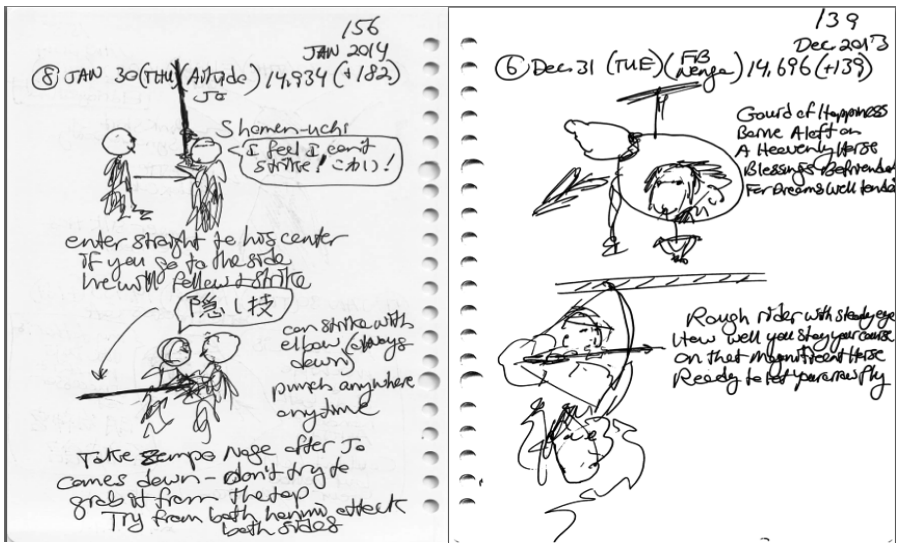


Figure 12 Sample Pages of an Idea-Marathon Notebook by Mr. William Reed [26]

3.3.4 Talk About Your Ideas with Your Colleagues, Friends and Family.

After writing down your ideas, discuss the best ideas with your colleagues, friends and family members. The ideas can be about anything: life, hobbies, family matters, travel plans, and private goals as well as work-related issues.

(1) Colleagues

This thinking-writing pattern and ideas discussion not only can work well within colleagues in companies or laboratories as among colleagues of the same organization, we are fully able to utilize the ideas, knowledge, experience and networks, which might turn out be a serendipity impact.

To survive in the global business competition, R&D plans of companies or new inventions in laboratories are normally promoted by forming project teams so that the period for realizing the plans and inventions can be minimized or shortest by utilizing the human resources inside.

(2) Friends

Though of course, we cannot talk with our friends about our secrecies of our business or our research, other ideas in our Idea-Marathon can be expanded and diversified analogically if we talk and discuss with our friends. Our friends might be interested creatively in the ideas which we tell them from our notebooks.

(3) Family Members

Talking our Idea-Marathon ideas with our family interactively, including the children, will be a great communication and home education for our children. The Idea-Marathon can become a common discussion platform within your family and can forge closer connections. If one family member starts talking about his/her new idea and other members comment on it, you might have more associated ideas from the feedback. Then you can add and increase your ideas in your notebook while your family members will have their own notebooks in which to write down their own additional ideas. In this way, the Idea-Marathon expands to other family members.

3.3.5 Review Your Ideas.

Ideas in the notebooks must be constantly reviewed; otherwise, they might become useless. At any time, if we check our notebooks, we can make more associations that may help us to create more ideas.

Reviewing our notebooks keeps our memories clearer and makes the retrieval of any ideas quicker and easier. We can also retrieve our old ideas analogically when we are in a meeting or thinking at our desk.

Therefore, the notebooks have to be written chronologically, itemized, and/or visually ordered so that we can find our ideas more easily.

3.3.6 Put your best ideas into practice.

Choose one of your best ideas to implement. When you find that some of your ideas are exceptionally good, it is time for you to consider taking action. Put your idea into practice. Materialize it if it is a product. Practice it if it is a process.

M/S Endo of Takara Tomy A.R.T.S, Japan, participated six month Group Idea-Marathon training course held in her company. After the course, she has been continuing her Idea-Marathon in her notebook.

On Feb 11, 2009, she wrote down one idea of “Dial-less and hands-less Cuckoo Clock” in her Idea-Marathon notebook (Figure 13, left).

On March 19, 2009, she got additional idea one month later (Figure 13 right). Later, she made an official hand-written colored pictorial proposal (Figure 14) for real production which she gave to her

company. It was approved for production and sales. This toy “Cuckoo Clock Anywhere” turned out to be one of the best sales toy in the market (Figure 15).

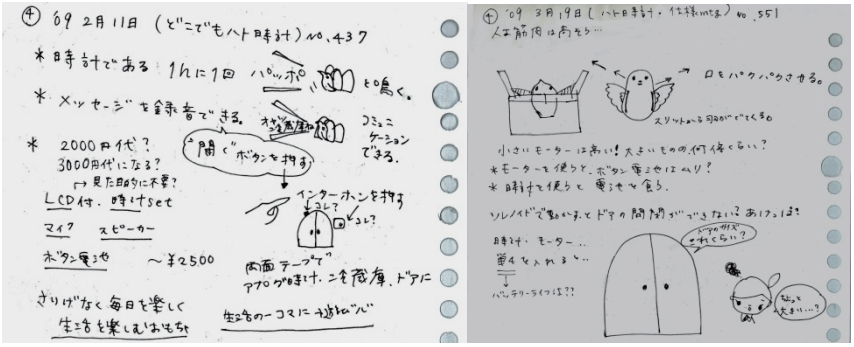


Figure 13　Original Idea of a Cuckoo Clock in the Idea-Marathon Notebook (Left) and Additional Ideas (Right) by one Idea-Marathon Training Participant, Chisaki Endo in Takara-Tomy A.R.T.S.

Figure 14　Pictorial Proposal of a Cuckoo Clock to Management to Proceed to Production and Sales

Figure 15　Actual e-Cuckoo Clock without Dial nor Hands by Takara-Tomy A.R.T.S

3.4 The Merits of the Idea-Marathon Practice

3.4.1 Anybody Can Start and Continue the Idea-Marathon.

The tools needed for the Idea-Marathon activities are only a notebook and a pen. Any person of any age can perform the Idea-Marathon, including kindergarten and elementary school children, high school students, university students, teachers, housewives, businessmen and elders, regardless of age, sex, or nationality.

3.4.2 Simple and Easy with Minimum Rules

The Idea-Marathon Method is simple and easy with few rules. The method does not need complex equipment, a high-power PC, nor special stationary equipment or furniture. Just a pen and a paper notebook are sufficient.

3.4.3 Individual Everyday Training

The Idea-Marathon Method can be started and continued spontaneously as an everyday practice. If an individual can train creativity by him/herself, it would be easy and economical for companies and laboratories to adopt this method.

A boot camp, training being done all day from early morning until late in the evening, may not be suitable for creativity training. Conversely, if each trainee was given a customized program according to their specialty, group training would still be difficult.

Group training of the Idea-Marathon tends to be brief but concentrated. In the Idea-Marathon training, it is programed that all the participants are geared up quickly to the highest and most active level of creativity.

3.4.4 Creative Thinking Everywhere: In or Out of the Office

This method can be started and applied anywhere, both inside and outside the office and home. One of the most mysterious characteristics of creativity is the fact that ideas come into our minds all of a sudden, anywhere and anytime with a complete disregard for the surrounding circumstances. They pop up when we are walking, showering, or just before we go to sleep.

In offices or laboratories, people are required to produce new ideas and plans during meetings, but good ideas may not always appear at work. Often they come to mind during leisure time or when one is relaxed.

If the staffs in meeting are not trained to create the ideas on the spot and put it down in notebook, it may take some time before they are ready to be in a creative mode, and crucial meeting time may be lost before their peak moment of creativity arrives.

It is a possible hypothesis to corroborate in the future that, after being trained using the Idea-Marathon Method, a person will be quickly geared up to top speed of creativity quickly on the spot, in a meeting or in an emergency.

3.4.5 All the Notebooks Must be Safely Conserved.

Before I started the Idea-Marathon, I often lost my notebooks in the office or in my house, or between any other documents that were thrown away. However, after starting the Idea-Marathon Method, the serial number of the notebooks gives impressive importance and attention not to lose any of these notebooks. Consequently, I never lost any of my 424 volumes of Idea-Marathon notebooks over 30 years.

3.4.6 Accumulation of Personal Ideas in all Categories

If we continue the Idea-Marathon for a year according to the rules, there should be a stock of ideas written in the notebooks forming more than 400 pieces. The longer we do the Idea-Marathon, the

larger the number of accumulated ideas we get. Ideas in the notebooks are ever increasing unless we lose the notebook. Each idea in the notebooks has its serial idea number.

Once written in the notebooks, all the ideas can be reviewed and revised. If any drawing has been attached to the idea, the idea is easy to understand and to find out.

3.4.7 Merits of Writing

In the book of changes (YiJing, Section Keiji-joden), Confucius[8] said,

> *"Written words cannot convey more messages than spoken words. Nor spoken words cannot convey more messages than written words. There is such a big gap between written and spoken words* [27]."

When we have any ideas and then write them into notebooks, we are processing, changing, arranging, replacing, rounding, completing, simplifying and expanding ideas.

Once we write down ideas, we are not losing nor forgetting them any more. In other words, we can safely forget the ideas in our brain. While we are writing ideas, we are thinking more and more ideas through our association. When we are writing ideas, we often get more ideas on the way.

Furthermore, when we read our notebooks, we get more ideas out of the pages like feedback and then we write the new ideas and think more. This is the positive feedback "virtuous circle" effect of thinking and writing.

3.5 The Group Idea-Marathon

The Idea-Marathon Training has as its sole purpose enabling participants to establish a habit of "Thinking into Writing" and "Everyday Writing."

To achieve this effect, the trainer explains in detail the method of writing, the various merits and effects of the Idea-Marathon, and also the basic rules. In the actual workshop, how to continue the Idea-Marathon and create ideas is demonstrated in various ways.

The lecturer also assures the participants regarding the effects of the Idea-Marathon on creativity if they continue the Idea-Marathon by "Thinking into Writing" and "Everyday Writing" for at least three to six months.

The Idea-Marathon training seminars are repeated four times in six months, i.e. on the 1st, 2nd, 4th and 7th months. This habit takes time to form. Each individual has a different timing.

Thus, since the Idea-Marathon is a daily activity, it is effective in forming a habit in the brain. To acquire an automatic habit, Lally (2009) says that it takes a person from 18 to 250 days to form a habit [28].

In 2004, when the Group Idea-Marathon seminars were carried out for the first time for one IT company in Tokyo with three seminars within three months, the result was not satisfactory.

Habit acquisition using the Idea-Marathon requires at least three to six months using the notion of "Thinking into Writing Every Day." There was a one-month interval between the first and second seminars, and about 30% of the participants dropped out of the Idea-Marathon practice.

After three months, by the third seminar, about half of the participants had dropped out. There were various elements inhibiting their continuing of the Idea-Marathon practice.

Because of this discouraging result, the whole content of the Group Idea-Marathon was re-considered so that all participants would be able to continue the Idea-Marathon up to the end of the six months of seminars.

There were combinations of elements that inhibited participants in being able to continue the Idea-Marathon practice.

---

[8] BC552~BC479 Chinese Scholar

3.5.1 Inhibition Elements

3.5.1.1 Forgetting

There were three kinds of "Forgetting" manifested by the participants:

(1) Simply Forgetting by Mistake

In the early period when the Idea-Marathon started, any participant can forget to practice the Idea-Marathon and can forget to engage in "Thinking into Writing" every day, since the Idea-Marathon does not come to mind easily or automatically every day.

This can happen to anybody. Even Higuchi who founded the Idea-Marathon in 1984, forgot to do it on a daily basis at the early period after he started Idea-Marathon. So, we decided to distribute five Post-It slips to each participant on which the words "Idea-Marathon" is stamped in bold letters. We asked the participants to post them in five different places of lifeline in their offices or homes so that they could remember to engage in the daily activity of the Idea-Marathon.

If a participant misses the Idea-Marathon for one or two days, a subconscious feeling of guilt gradually sets in.

After about one week of stopping, it is painful for the participant to even glance at the Idea-Marathon notebook. Then the person will put the notebook on a shelf or in a drawer and start justifying the reasons for his/her quitting the practice.

The same thing often happens to someone who quits writing in their diary at the beginning of the year. This phenomenon is called the **"Sudden Mind Change Due to a Trivial Reasons Syndrome."**

(2) Forgetting to Carry a Notebook

Some people might forget to carry their notebooks with them when they go home or to their office. Without notebooks, most probably ideas will not be written down except for those people who have already established their habit and write their ideas down on memo paper first. One must also remember to carry a pen.

After several days of forgetting to carry a notebook around with a pen, the same phenomenon of simply forgetting to practice occurs again in the Idea-Marathon.

As a hypothesis, human beings are liable to justify forgetting by saying, "This is not valuable," or "It is impossible to continue." In the case of a daily activity, the higher the total number of days during which one forgets to practice the Idea-Marathon, the more those participants feel increasingly stressed. They become choked and deadlocked with an ever higher wall of stress.

If they repeat this "Stress-by-Forgetting", they will establish a habit of either "**Learned Forgetting**," or "**Immunity from Stress-by-Forgetting**" which are liable to be repeated in any training or study.

(3) Forgetting to Write Ideas Into a Notebook Immediately When They Come to Mind (Hypothesis)

When a nice or important idea comes into one's mind, a person thinks that this fresh idea can be remembered easily later for writing it down into a notebook from memory because this idea is so nice, important, and impossible to pass up.

But, this is in vain, because this memory will be wiped out completely from root to branch after 20 seconds which is a far shorter time than in Ebbinghaus (1885) experiments [25].

The person loses the whole memory of that nice important idea. The person not only forgets the contents of the idea itself, but also he or she forgets the fact of having created this nice or important idea at all, which means that nothing remains in the mind at all.

It may take some time, months or years later, for the person to regain the same idea again all of a sudden. But the same nice or important idea is re-born as a completely new idea because he/she does not remember this idea in their old memory at all.

The person will find once again that this idea is nice or important, then after 20 seconds, the whole fact of having the idea and the creation of one idea will be wiped out once again.

This forgetting occurs quite often, especially when life is very stable, monotonous and lacks changes.

Many self-described Idea-men are suffering from this type of repeating Creation and Forgetting the same idea many times. He remembers he frequently getting ideas (of the same contents).

This person often tells family and friends the same idea, joke and episode many times. When one's spouse says, "You have told me the same story 4 times already," this person still believes this is the first time.

This phenomenon is called the **"Loop Idea Creation Syndrome,"** through which many people are enjoying and re-cycling the creation of the same idea many times during their life time, repeating the same idea to their family and colleagues. They, however, have confidence in their idea creation ability since they create (and forget) the same idea many times in their life.

(Countermeasure: Make a habit of "Thinking into Writing" into a notebook to cut off this endless loop, this vicious circle)

3.5.1.2 Boredom

Svendsen (2005) tells us that anybody can be bored with anything without any reasons. Boredom is a part of human nature.

> *Meaninglessness is boring...Boredom can be understood as a discomfort which communicates that the need for meaning is not being satisfied. In order to remove this discomfort, we attack the symptoms rather than the disease itself, and search for all sorts of meaning-surrogates* [29].

Writing down one's own ideas can apparently be useful for work, research, life and study. But after several days of practicing in the Idea-Marathon, one suddenly gets bored with the Idea-Marathon. Of course, one understands that making a habit of the Idea-Marathon takes time, from three to six months.

But one is bored now, as one has been before with so many things and so many times. So the Idea-Marathon is stopped, because "This is not interesting." This is called "**Learned Boredom Syndrome.**"

3.5.1.3 Stress Free Life

Whatever the purpose of the training in companies and laboratories is, once a person feels any stress about continuing something, the person will think that somebody is forcing him or her to continue, and so a feeling of resistance arises in the mind. Even if the contents and purpose of the training are beneficial to the person, the benefit does not prevent the person from deciding to stop the training.

This person believes that to force somebody to do something is an evil against freedom. So the person will stand to protect his/her individual independence and the Idea-Marathon is stopped (or not started).

3.5.1.4 No Self-Confidence in Creativity

Some people have no or less self-confidence in their own creativity. Although they are well educated and experienced, they believe that they cannot create good ideas at all since they know that they

have not created good ideas before. They tried several methods of idea creation, but in vain. All the ideas they proposed before were flatly rejected. At a planning meeting, these people have only contributed ordinary, disappointing ideas suiting the occasion while some of their colleagues easily contributed very good ideas. This situation has been going on for a long time and they have lost self-confidence.

Therefore, when they start "Thinking into Writing," they jump to the conclusion that all of these ideas are just ordinary, dusty or even useless. They firmly understand that the Idea-Marathon is a time consuming, useless effort. So they stop doing the Idea-Marathon. This is called "**Symptom of Chronic Loss of Self-Confidence in Creativity."**

By encouraging such pessimistic participants to think and write more in their notebook, they will find reasonable ideas emerging within three to six months. They can then strengthen those good ideas into better ideas for proposing and implementing them. The influence of the Idea-Marathon training can be most powerful for this type of person. Upon acquiring the habit of the Idea-Marathon, or in "Thinking into Writing every day", they feel so confident in creativity that they can start creating and writing down into their notebooks a great number of ideas.

3.5.1.5 Learned Helplessness

Seligman (1967) stated that once a person is trapped in helplessness for a long time, the person cannot or will not escape from the helplessness even if the environment changes. Seligman calls this syndrome "**Learned Helplessness"**. He experimented with dogs [30].

If this learned helplessness is combined with "Symptom of Chronic Loss of Self-Confidence in Creativity." or "Boredom," a person will not try to start thinking of any ideas easily even if that person is free from any stress because his/her Idea-Marathon notebooks are not checked by supervisors.

3.6 Support System for the Idea-Marathons

One month after the first Idea-Marathon training session, the second training lecture and workshop is held. During this one-month interval, if participants are left alone by themselves, about 30 % will quit the Idea-Marathon practice due to the above mentioned reasons. Thus, an effort is made to assist participants in their continuation of the Idea-Marathon via follow-ups before the second lecture and workshop.

Considering all of the above-mentioned inhibition elements and their possible countermeasures, the support system for Idea-Marathon training seminars was developed. The support system consists of two activities: Thinking Hints and the e-Training System (ETS).

3.6.1 Supply of Weekly Thinking Hints

In the early stages of the Idea-Marathon training, the beginners often feel at a loss regarding finding themes to think every day for their ideas. "What shall I think and what ideas shall I create today?"

This phenomenon continues for about three months. If a participant finds it too difficult to find his or her thinking theme, he or she might stop his or her Idea-Marathon at this early stage. Therefore, we decided to send participants a weekly supply of thinking hints via the internet.

Example of a Thinking Hints E-mail:

Hello Everybody!
Higuchi of the Idea-Marathon here.
Today I will talk about the Idea-Marathon Invention method.
When one famous novelist was asked how he wrote his novels, he replied, "Think and think and think… almost jumping out of a window." This is really great but it is so stressful and painful!

The Idea-Marathon Method is slightly different.
Suppose you think about one big subject K.
"Think and write what you can think of now about K.
Think of something else and write it down.
Think again about K and write it, a little later.
Think and write something else.
In a café, again start to think and write about K. ...and travelling, think again about K. All of sudden, a beam light or lightning comes down. "
This is a stress-free method of invention and discovery through a change of place and a lapse of time.
Here are Thinking Hints of this week
(1)Create a new kind of stuffing for cream puffs.
(2)How can one acquire one more good habit?
(3)Think of a new kind of lighting using a new kind of energy.
Takeo Higuchi

The weekly supply of "Thinking Hints" continues until the end of the final training six months later by internet. This e-mail newsletter also carries various information about the latest Idea-Marathon concept and activities in an attempt to encourage the participants and to maintain their motivation. Sending "Thinking Hints" for a period of three to six months encourages beginners to form an Idea-Marathon Method habit.

3.6.2 The e-Training System (ETS)

As explained in 3.5.1, "Inhibiting Elements", participants might drop out of long term training before the final training schedule is completed. Even though the Thinking Hints are supplied every week, some people do not utilize them, and, therefore, they stop practicing the Idea-Marathon.

This kind of inhibition can happen, not only in the Idea-Marathon training, but also in any kind of company training. In usual company training, it is not rare or surprising to see low rates of participation unless management forces all members to participate without fail.

However, we do not want to force participants to continue the Idea-Marathon practices since the core of this training is self-discipline. In order to make "Thinking into Writing" a new habit, we have to avoid any compulsory pressure.

To satisfy this condition, to prevent inhibitions from arising and to have all of the initial participants achieve the final goal of the training, we developed the e-Training System (ETS), through which all participants are requested to inform the Idea-Marathon training lecturer regularly by internet only the total number of ideas he or she has generated. If a participant does not do so on the due date, then we start attempting persuasion to that participant through the internet.

Upon receiving the total list of ideas sent by each participant, the training lecturer judges how each participant is doing by analyzing past progress, and sends to each participant a personal comment tailored to that person's particular situation.

We have a rule that the feedback given to each participant has to be somehow different or original and suited to each participant in particular.

Even if this ETS support system is using the internet, it is not an automatic reply system that sends the same reply to everyone with just one part of the overall comment altered to fit each participant.

This point is very important in eradicating the participants' inhibitions while he/she participates in the training. If the ETS were a fully automatic response system using computer software, we know that the participants would not listen to a machine's advice. Even if we use the internet, we believe that all

the participants check if ETS comments are handled and answered by human. They might cross-check with other participants to compare the comments they have received.

The ETS is a very human system that, though it takes time and pain, appeals to all participants to continue their habit-making effort. The problem is that in the case of a large number of participants, such as 250 participants simultaneously, it is quite daunting and time consuming to provide so much personal feedback to each of them.

Thus, we are planning to train in-house ETS Experts in laboratories and companies so that in the future, ETS can be carried out inside organizations.

This highly personalized ETS is the major reason for the success of the continuation of the Idea-Marathon, that is, for accomplishing the goal of full participation in a six-month program.

This highly personalized feedback to each participant, which is the core feature of the ETS, can be applied to many other internet programs and e-Learning systems.

3.6.2.1 Process of ETS

A sample of this ETS Excel process written in Japanese is shown in Figure 12. All of the Idea-Marathon participants are supposed to give this feedback of (A) and (B) only every two weeks. This is just the total number of ideas, not the information about their idea contents. Later, we send back comments and advice directly to each participant.

(A) The Idea-Marathon starting date
(B) The total number of accumulated ideas
(C) The ETS date
(D) The Number of days from the starting date
(E) Comment Cell (Folded)
(F) Opened Comment at the top of the Excel sheet (Content of (E))

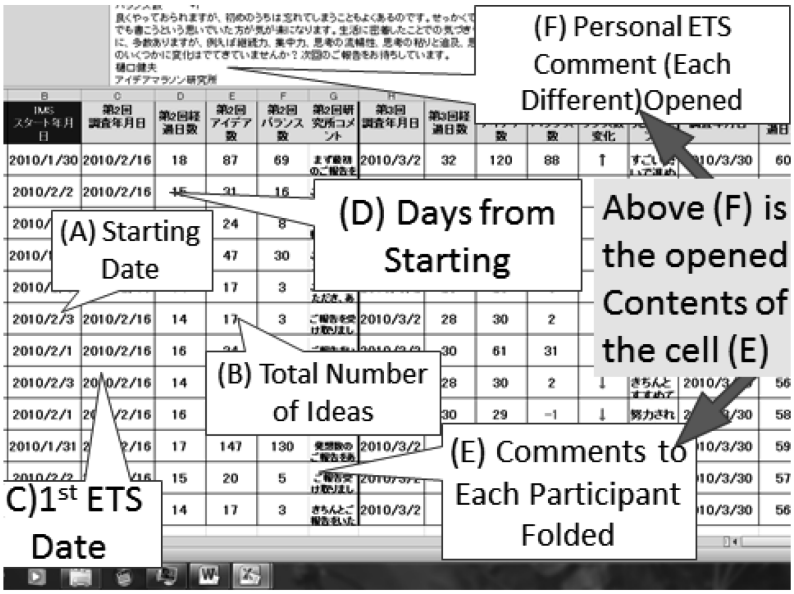


Figure 16 Example of the ETS Process in Japanese

Each comment makes the participants aware of their position and progress, as well as informs them on how to increase the number of their ideas and how to remember to practice the Idea-Marathon. This entire internet interaction is called ETS, and it includes the total numbers of ideas reported by participants along with the replies and comments from the Idea-Marathon lecturers (Figure 16).

ETS is an essential aspect of the Idea-Marathon training course. In the event that someone stops engaging in the Idea-Marathon for an extended period during the training course, we can detect the stoppage within two or three weeks time and encourage the person to resume the Idea-Marathon by supplying extra emergency-hints for ideas.

These direct comments, which are different for each participant, are appreciated by the participants since they understand that these comments take time to create.

We provide eight to nine ETS communication sessions within the first six months of the Idea-Marathon training.

After the first Idea-Marathon training session, the second training is provided one month later, and the third one after three months, and the fourth one after six months (Figure17).

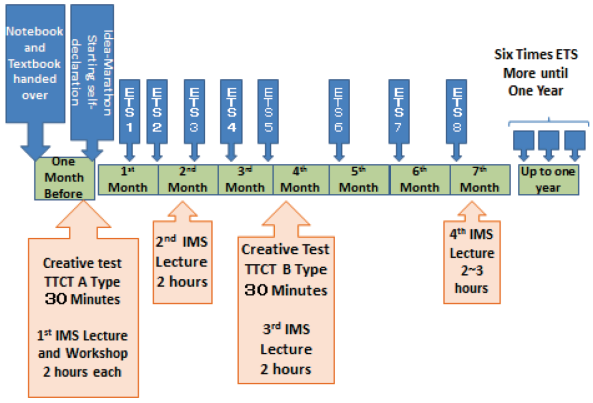


Figure 17 Idea-Marathon 6 Month Training Schedule (Concerning TTCT tests cf. Chapter 4)

3.6.2.2 An Example of ETS in O College

Referring to the ETS of the Idea-Marathon at O College, the freshmen students participating in the experiment were requested to report the number of their ideas to their professor every week. The professor then provided feedback in the form of advice, a kind of creative encouragement, to each student depending on the change in the number of his or her ideas over the previous weeks.

If any students were found to be moving more slowly or to have stopped creating and writing ideas down in their notebooks, they were individually encouraged to restart or accelerate their idea description.

On April 12, 2012, With IMS (experimental) students" started the Idea-Marathon after an explanation of the Idea-Marathon was given by their teacher. During a three months period, the teacher checked the notebooks of the Idea-Marathon (experimental) group every week to obtain updated number of ideas. The ETS was conducted 12 times.

3.6.3 Comparison of the Idea-Marathon With ETS and Without ETS

3.6.3.1 In the event that the ETS is applied for 3 months [2013]

In the event that the ETS was fully applied (Figure 18, Table 2), every two weeks checking took place in the number of ideas, returning comments.

In Tokyo, in May 23, 2013, participants started the Idea-Marathon in a school for working students. After three months, all 23 participants were still continuing the Idea-Marathon since they had been backed up by the ETS and by a weekly supply of thinking hints.

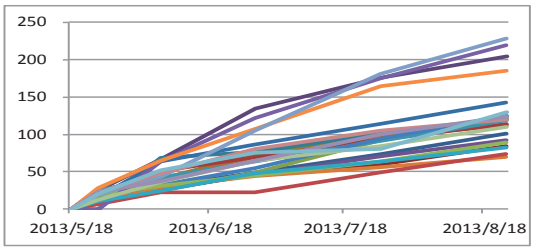


Figure 18　In the case where the ETS was fully applied

	2013/6/28	2013/7/26	2013/8/23
1	49	73	101
2	47	60	84
3	73	96	124
4	135	176	204
5	76	101	121
6	69	97	112
7	86	114	142
8	70	93	114
9	49	92	121
10	46	71	92
11	64	91	119
12	44	56	70
13	55	94	125
14	22	49	73
15	45	64	89
16	122	175	219
17	48	64	82
18	107	164	185
19	105	181	228
20	80	105	120
21	65	84	110
22	65	100	124
23	75	80	130

Table 2　In the case where the ETS was fully applied

3.6.3.2　In the case where the ETS was <u>not</u> applied [2011]

In the case where the ETS was not applied and the Idea-Marathon participants were only asked to report the number of their ideas without returning comments, many participants stopped practicing the Idea-Marathon before the end of the first three months (Figure 19, Table 3).

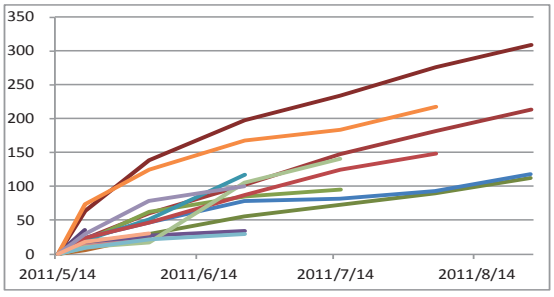


Figure 19　In the case where the ETS was not applied and only the number of ideas was checked

2011/5/14	2011/5/20	2011/6/3	2011/6/24	2011/7/15	2011/8/5	2011/8/28
0	10	24				
0	63	138	197	234	275	308
0	17	30	56	72	90	112
0	35					
0	22	22				
0	6	26				
0		19				
0	23	60	102	147	181	213
0	19	62	85	95		
0	12	27	34			
0	20	51	117			
0	10					
0	24	47	78	82	93	118
0	24	47	87	125	149	
0	9					
0						
0						
0	74	125	168	184	218	
0						
0	12	20				
0	10	17	105	140		
0	29	78	100			
0	9	22	30			
0	18	31				

Table 3　In the case where the ETS was not applied and idea details

On May 14, 2011, 24 participants started the Idea-Marathon in the same school for working students without back up using the ETS. Within three months' time, 20 persons had stopped practicing the Idea-Marathon. They were only requested to report the number of their ideas every two weeks but no comment was returned or they were not pushed or encouraged to inform their idea numbers. Gradually most of them dropped out. (Figure 20) Compare Figure 18 with Figure 19.

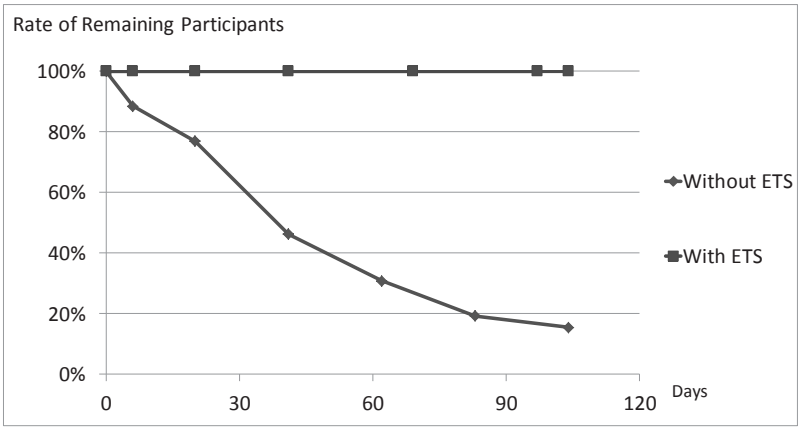


Figure 20　Comparative Survival Rate of the Idea-Marathon Participants between With ETS" and Without ETS"

3.7　Comparison of Earlier Idea Creation Methods with the Idea-Marathon

3.7.1　Brainstorming

Since the Idea-Marathon is for creating ideas on various timings and at various places, it can be called a kind of Brainstorming. At the same time, since the Idea-Marathon involves writing one's ideas down, it is also a kind of Brainwriting.

Brainstorming was created in 1939 by Alex. F. Osborn, one of the founders of Batten Barton Durstine and Osborne (BBDO) [31].

The rules of Brainstorming are:

・criticism is ruled out
・freewheeling is welcomed
・hitchhike (improve) on ideas
・aim for quantity

Osborn founded the Creative Education Foundation (CEF) in Buffalo, New York, in 1954. Osborn and Parnes started to expand Brainstorming with the Parnes-Osborn model all over the United States and the world. Brainstorming became one of the most popular and successful methods for generating ideas. But at the same time, Brainstorming has undergone strong criticism in academic and business circles [31].

In the 1960s, discussions were raised about the idea productivity between the Nominal Group Brainstorming (NGB) and the Interactive Group Brainstorming (IGB). According to Rickards, experiments were performed, and the Nominal Group Brainstorming (NGB), in which members do not discuss ideas with others in the Brainstorming meeting, was found to be more efficient in creating ideas than the Interactive Group Brainstorming (IGB) [32].

3.7.1.1 Controlling Brainstorming (BS)

Van Gundy (1981) said that Brainstorming can often be controlled by the person with the loudest voice, by the most active person, or by a senior ranking person. Shy or quiet persons cannot express their ideas well. There is a potential for conflict with and domination by a few persons [33].

3.7.1.2 Without Idling and Warm-Up, and Boredom

Just like an old-type automobile engine needs idling in the morning for a certain time before driving out, so warming up for creating ideas, or Brainstorming, in a meeting is necessary for all the participants.

In Brainstorming, it also sometimes takes too much time before the participants get relaxed or get used to the atmosphere of free discussion for idea creation, which shows that the idea production rate is often not so high at the starting time. And participants often find it monotonous and get tired if Brainstorming on the same issue is repeated.

Even if the repeated Brainstorming is on a different subject, the participants might be bored with the same way of thinking and of creating ideas.

3.7.1.3 Intellectual Rights Neglected

In Brainstorming, it is not clearly pointed out that all the ideas suggested in the meeting are simply collected and carried away by the chair-person. All the ideas or fruits of the Brainstorming meeting mercilessly become the property of the host organization. And the origin of those ideas, that is, "Who created or suggested the important ideas," is not recorded.

3.7.2 Brainwriting (BW)

To avoid the disadvantages of Brainstorming, such as the influence of the person with the louder voice, the active person, the senior ranking person, and the lack of influence of shy or quiet persons, the Brainwriting method was developed, mainly in northern Europe, with which the participants write down their ideas on circulating fill-in sheets or cards within time limits.

There are several types of Brainwriting. The typical type of Brainwriting is called [**Method 635]** since **Six** people write down **Three** ideas each in **Five** minutes, turning and turning the sheet until it is filled up with 18 ideas in 30 minutes.

Brainwriting is said to produce more ideas than Brainstorming with a five minutes time limit. Geschka said that Brainwriting is suitable for slightly more complex problems than Brainstorming [34]. But being silent or without conversation, participants do not all need to be in one place. This can be done through the internet. However, this method kills the awareness that arises from face to face conversation or talking.

3.7.3 Brainstorming (or Brainwriting) in the Idea-Marathon Method

The Idea-Marathon rules for thinking and writing are similar to the Brainstorming rules. All of the Brainstorming rules exactly match the Idea-Marathon rules. Moreover, since it is a purely personal

activity, there is no one else to criticize the Idea-Marathon practitioner's written ideas. One can feel free to freewheel or hitchhike on other ideas and aim for quantity.

The Idea-Marathon is the self-training method for better creativity for all the participants. These participants who have been trained with the Idea-Marathon for six months can play a positive role by participating in Brainstorming and Brainwriting.

The most particular point of Idea-Marathon Brainstorming is that, before the participants speak out any idea, they have been supposed to write down the idea in their notebook first, and then propose it. In this way, later, it is easy to identify who proposed the idea.

After the completion of the training program of the Idea-Marathon at one media company, an opinion was voiced by a general manager that, when his department held the Idea-Marathon Brainstorming, he was happy since he could later appreciate the specific persons who originated the precious opinions.

This is a very important point, as any good idea or proposal made in Brainstorming takes a great deal of time before its realization. And by that time, the person who created and suggested their good ideas is forgotten. But at an Idea-Marathon Brainstorming meeting, the notebook backs up the record of an idea's origins.

In the Idea-Marathon, it is usually recommended to write down one's opinions into a notebook first before speaking up at any meeting, conference, or in front of customers since this action can decrease careless mistakes in speech and can decrease careless omissions of basic or important items.

The same goes with Brainwriting. Writing ideas down in the Idea-Marathon notebook can be the first step before writing them on the Brainwriting fill-in sheets or cards.

At any important meeting or at a critical meeting in front of important people, one might suffer nervous stage fright, make a simple omission of important items or make easy mistakes which leave irrevocably bad impressions.

3.7.4 Various Idea-Marathon Creation Methods

The Idea-Marathon can suggest four idea creation methods:

3.7.4.1 The Three Weeks Preparation Method

Prior to a meeting, all the participants (all are Idea-Marathon practitioners) are given certain themes or problems to solve with a certain period for, such as, three weeks, two weeks, one week or even one weekend. During this preparation period, all the participants create five to ten ideas per day using the Idea-Marathon method and write them down in their Idea-Marathon notebooks. In this way, all the participants generate many ideas. They then organize their ideas into a list.

They participate in the brainstorming meeting with this list, as usual. In this case, their brains have already rehearsed and are familiar with the given themes and problems. They start to make their presentations according to their selections from the list. Because of their preparation through the self-brainstorming activity written down in their notebooks, the best ideas of all the member are proposed at the early stage of the meeting and the quantity and quality of their ideas are much higher.

This method is extraordinarily effective with regard to the works with regular planning meetings per month or even per week. If one belongs to the editing department of a magazine published monthly, there are a monthly new plan meeting for the next month's issue, a meeting for the issue published two months later, and of course this month's articles.

If all the editors are just engaging in brainstorming in each meeting without any preparation, or if the instruction from their Editor-in-Chief is "Think a good idea for the next issue," the quality of the new plans is difficult to maintain. The editors without a stock of ideas for these meetings are having their nightmares.

On the contrary, if all the members keep thinking, collecting and writing every day in their notebook, they can pick up the best plan out of their stock of vast ideas in their notebooks.

3.7.4.2 The Short-listing Method

The participants are given a theme and a certain period of preparing days, and they then concentrate on creating relevant ideas as much as possible, which is the same as in (**3.7.4.1**). Before the meeting, however, all the participants submit all of their ideas to the chairperson. The chairperson and a selected committee (or in case, all the members of the meeting participants) then make a shortlist out of all the data. The shortlist is then distributed at the meeting for discussion.

3.7.4.3 The Comment and Voting Method

All the participating members submit ideas to the chair-person who makes a list in the office network, deleting duplicate ideas. The participants are requested to comment and vote ranking on all the items in the office IT network. The chairperson asks the participants to judge the ideas individually on a scale from A (Best) to E (Not to be considered).

This method has actually been adopted by an electric appliance manufacturer in Tokyo. The list started with 500 ideas before being winnowed down to solely ideas judged A by the participants' poll. Afterwards, the participants had a brainstorming session using this selected list.

3.7.4.4 The BBS Discussion Method

All the participating members think and write down ideas about the given themes and problems every day according to the Idea-Marathon rules, and they put either all their ideas or solely their best ideas into an electronic Bulletin Board System (BBS) site in the office network.

On this site, a discussion is held to comment on these ideas before a brainstorming session takes place to select and shortlist the best ideas. This method was adopted many times by Professor K. Miyata and his Research Office Members to prepare the original proposal to the IVRC (International Collegiate Virtual Reality Contest), hosted by The Virtual Reality Society of Japan)[35].

3.8 Comments on Excerpts of Feedback by Participant Students about the Idea-Marathon Training

When one practices the Idea-Marathon for a certain period, the longer the Idea-Marathon is practiced, the stronger one's motivation will be growing. Here are excerpts from the feedback we have received from students:

(1) It is just a wonderful new experience to create ideas and to write them in my notebook every day.
(2) We can get ideas from anything we can see and imagine. Not having to limit our ideas to any single concern is very attractive for our life style.
(3) We can concentrate in order to obtain new ideas about our work, and as a result of these new strategies and tactics, business results improve.
(4) After starting, we feel very relaxed by creating, writing, and reviewing the ideas in our notebooks. We find that the Idea-Marathon activity has a healing effect.
(5) Furthermore, after repeatedly taking the notebook out of my bag, I feel the brain begins searching for ideas. This is a kind of conditioned response.
(6) We can start thinking of ideas for our family, such as travel ideas or education plans.
(7) If we practice thinking every day and writing every day in a notebook, we may be able to expand our business power, to increase our curiosity and our life's value for us and for our families, and to be happy with our lives.
(8) Finally, after we experience these attractive points of the Idea-Marathon, we can have stronger confidence that the Idea-Marathon will increase our creativity. We can improve individual creativity, so that our companies and laboratories can become more innovative.

3.9 Case Evidences for the Practical Use of the Idea-Marathon in Academic Studies

Ideas written in Idea-Marathon notebooks by scholars are shown here as those ideas were already realized in the invention of new chemical materials and new IT systems.

3.9.1 Research Field: Chemistry

As case example 1, Dr. T. Mochida of Kobe University has kept using his Idea-Marathon notebooks since 2006. He had an idea for a new chemical material called “Functional Liquid” on Feb 15, 2011, and he wrote down the idea [36] in his notebook (Idea No.1882). Dr. Mochida started to develop this idea the following month and produced the material. His invention was published in a chemistry journal [37] (Figure 21).

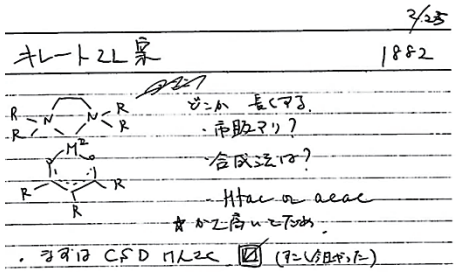
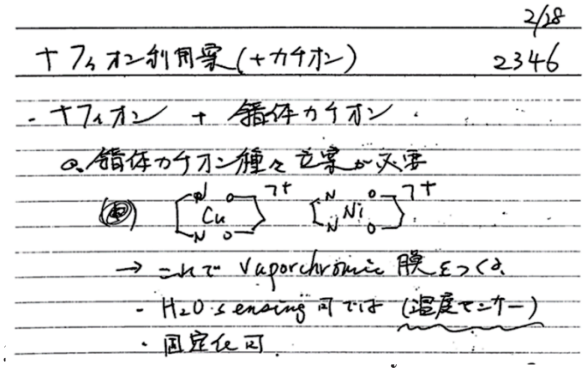


Figure 21 Development of Functional Liquids

Dr. Mochida had another idea for “Functional Films” on Feb 28, 2012 and wrote the idea in his notebook (Idea No. 2346) and started to develop this idea the following month. Dr. Mochida succeeded in producing this material as in Example 2, and his paper was published in a chemistry journal in April 2013[38](Figure 22).



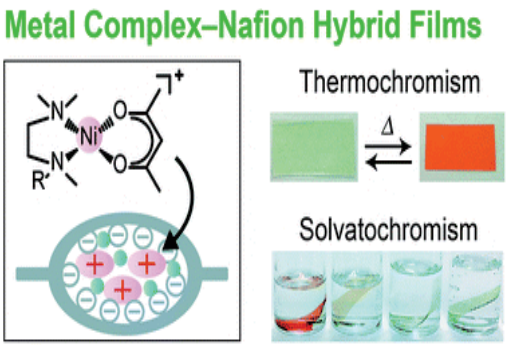


Figure 22 Development of Functional Films

3.9.2 Research Field: IT Systems 1

Dr. T. Yoshino, a Professor at Wakayama University, got his initial concept, the “Development of a Cultural Differences Visualization Web Service Using Wikipedia” on January 16, 2012, as case Example 3, and he wrote down the idea in his Idea-Marathon notebook. Later, Dr. Yoshino contributed a paper on this topic to the DICOMO2012 (Multimedia, Distributed, Cooperative, and Mobile Symposium) conference [39] (Figure23).

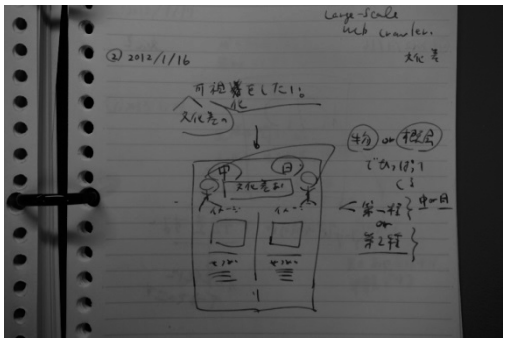


Figure 23　Development of Cultural Differences Visualization Web Service Using Wikipedia

3.9.3　Research Field :IT Systems 2

Dr. T. Kawaji, Associate Professor at Ohtsuki City College, had his idea of "**Effectiveness for the Social Telepresence on Videos with Virtual Motion Parallax Moving Back and Forth**" on February 18, 2010, and an additional idea on the same theme on March 6, 2010. Later, he contributed his paper to IPSJ (International Processing Society of Japan) in 2013 [40] (Figure 24).

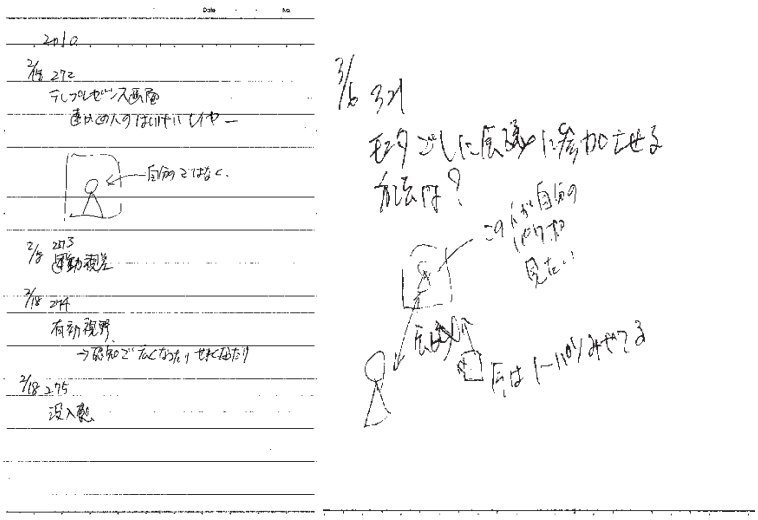


Figure 24　Effectiveness for the Social Telepresence on Videos with Virtual Motion Parallax Moving Back and Forth

Chapter 4 The Torrance Tests of Creative Thinking (TTCT)

4.1 TTCT Figural Tests

To empirically demonstrate the creativity developed by the Idea-Marathon in a detailed fashion, we used a creativity test. After researching various creativity tests in Japan and overseas, we decided to use the TTCT (Torrance Tests of Creative Thinking) to evaluate the effect of the Idea-Marathon training.

Two times of TTCT Figural tests (Pretest and Posttest) were prepared for the three-month Idea-Marathon creativity training.

4.1.1 History

Since the TTCT tests were first developed by Dr. E. Paul Torrance in the late 1950s, millions of tests have been administered up to today in the United States and in the world. TTCT test is the most famous creativity test in the world.

The longitudinal study of the tests has continued for more than 50 years by Runco (2010) et al. Just as the practitioners of the Idea-Marathon are encouraged to continue the practice for years, so the TTCT tests have been updated for longitudinal analyses.

> *"Longitudinal studies may be the most useful kind of investigation for the study of creativity and its fulfillment*" [41]

4.1.2 Various Aspects of TTCT

As a large quantity of test data has been accumulated since the 1950's, Chase (1989) and Saeki (2001) explained that the TTCT are said to be among the most reliable creativity tests [42, 43].

Hunsaker & Callahan (1995) said that

> "*TTCT have continued to be the most popular creativity tests*" [44]

Even today, in the USA, more than 90,000 students take the TTCT test annually [45]. TTCT tests are widely used internationally in India, Hong Kong, Turkey, etc.

4.1.3 The Same TTCT test sheet were provided for all examinees of all generation

The same TTCT (Figural A and B) can be used to evaluate anyone, from kindergarten children and elementary school children to university/post-graduate students, researchers, businessmen and others.

As Dr. Torrance points out in the TTCT Figural test manual, examinees are able to write the TTCT Figural tests in their preferred language. On the answer sheet of TTCT Figural tests, the titles of their hand-drawings must be written.

Little children like those attending kindergartens and nursery schools may not be able to write the words of the title they want. In such a case, an increased number of TTCT test supervisors will assist the children.

There are two types of TTCT tests, the "Figural Tests" and "Verbal Tests." The TTCT Figural Tests are more famous than Verbal Tests. The TTCT Figural Tests do not limit people in terms of age, gender, or nationality, although a minor linguistic translation must be provided to conduct the TTCT in Japan.

4.1.4 The TTCT are divergent thinking tests.

The TTCT are regarded as a divergent-type creativity test. The importance of the TTCT Figural Tests is based on "Fluency" as the gatekeeper of all other evaluation criteria.

Basically, the Idea-Marathon is also a divergent system of thinking and writing without any categorical limits. The basic purpose of continuing the Idea-Marathon is to create a fluency of thought via everyday practice. The Idea-Marathon is about thinking longitudinally for many months and years.

Therefore, TTCT and Idea-Marathon are compatible. A single TTCT Figural test requires 30 minutes, thus a relatively short concentration period.

4.1.5 Criticism made against the TTCT tests

Though TTCT has been given long lasting fame of the best creativity test, it is also important to note that there are criticisms made against the TTCT:

Heausler (1988) said,

"Scoring procedures for interpreting scores are not backed up by factor analysis" [46].

Dixon (1979) said,

"Overly strong relationship between fluency and originality scores" [47].

Clapham (2004) said,

"Question of whether a test of divergent thinking can measure all of creativity" [48].

4.2 Analytical Contents of the TTCT Figural Tests

The effect of the three-month training period of the Idea-Marathon on creativity is measured by comparing results obtained before(Pretest) and after(Posttest) the training period. The difference in the creativity scores between two tests is measured and analyzed.

The TTCT tests are comprised of the following five Norm Referenced Measures (Fluency, Originality, Elaborations, Abstractness of Titles and Resistance to Premature Closure) [49]:

4.2.1 Fluency (FLU)

The number of expressed ideas that meaningfully utilize the stimulus. Fluency is the gatekeeper of TTCT analysis.

4.2.2 Originality (ORI)

The unusualness of the ideas in terms of statistical infrequency.

4.2.3 Elaborations (ELA)

The imagination and exposition of detail in the pictures.

4.2.4 Abstractness of Titles (ABT)

The level of synthesis and organization evidenced by the titles in order to express the essence of the pictures.

4.2.5 Resistance to Premature Closure (RPC)

The ability to consider all relevant information and to resist impulsive, premature conclusions.

4.2.6 Score Total (STL)

The Score Total is the total of the Five Norm-Referenced Measures (Fluency, Originality, Elaborations, Abstractness of Titles and Resistance to Premature Closure).

4.2.7 13 Item Creative Strength Criterion-Referenced Measures

In addition to the above-mentioned five Norm-referenced indicators, there are 13 more Creative Strengths as Criterion–referenced measures in TTCT analysis, such as 1) Emotional Expressiveness, 2) Storytelling Articulateness, 3) Movement and Action, 4) Expressiveness of Titles, 5) Synthesis of Incomplete Figures, 6) Synthesis of Lines and Circles, 7) Unusual Visualization, 8) Internal Visualization, 9) Extending or Breaking Boundaries, 10) Humor, 11) Richness of Imagery, 12) Colorfulness of Imagery, 13) Fantasy and 14) the Score Total.

4.3 TTCT Test Scoring

To create inter-rater reliability in scoring, we obtained official certificates for scoring TTCT tests Figural A and B by attending a scoring seminar held by the TTCT Center of the University of Georgia on 1-3 October, 2012.

Chapter 5 Experiments at Universities and Colleges

5.1 O College

5.1.1 O College Summary

This chapter presents an analysis conducted at O College to quantitatively measure creativity in college students before and after a three month Idea-Marathon training.

Two groups of students were prepared for the test:

The first group was With IMS (experimental) Group freshmen students who practiced the Idea-Marathon for three months every day.

The second group was Without IMS (control) Group sophomore students who did not practice the Idea-Marathon during the same three months.

The TTCT (Torrance Tests of Creative Thinking) Figural Pre-Posttest were used to quantitatively measure the creativity effects on both groups of students. The freshmen students in the With IMS (experimental) group with three months of Idea-Marathon tested by TTCT Figural Pre-Posttest showed significant increases in "Total Score," "Fluency," "Originality" and "Resistance to Premature Closure (RPC)."

However, the sophomore students in the Without IMS (control) group did not show significant increases except in "RPC."

The 13 Item Creative Strength in the With IMS (experimental) group showed significant increases in "Synthesis of Lines or Circles", "Internal Visualization" and "Colorfulness of Imagery".

The ANOVA analysis among the With IMS (experimental) group, Without IMS (control) Group and Pretest/Posttest showed the significant improvement of the With IMS (experimental) group over the Without IMS (control) group with the interaction and the simple main test except Resistance to Premature Closure.

Male and Female students in the With IMS (experimental) group were measured by the ANOVA test. There were no interactions at all among the five Norm Referenced Measures and Score Total.

In addition, the participants of the With IMS (experimental) group were divided by Cluster Analysis into Top, Middle and Low groups. The Low group showed significant improvement in Fluency and Abstractness of Titles through participating in the three month Idea-Marathon.

5.1.2 Preceding Studies

Universities and colleges throughout the world are in the process of revising their curricula for creativity education since today's world is becoming borderless and globalized and creatively competitive.

Starko (2012) discussed the importance of creativity in class. Starko said creative students can learn more in class [50]. The National Center on Education and the Economy (NCEE) USA (2007) made a strong appeal for a future curriculum in higher education emphasizing the importance of creativity and innovation [51].

The European University Association (EUA) announced the keywords for creativity,

"*Diversity, Value and Ethical Principles, Human Potential, Future Orientation and Quality Mechanisms."*

Moreover, the EUA (2006-2007) proposed ten key recommendations to European higher education institutions, governments, etc. including the fact that

"universities should look towards the future in all their activities, rather than being grounded in the past.…should work towards developing internal quality processes that support the creativity agenda by being geared towards the future" [52].

Livingston (2010) of the University of Southern California insists strongly on reforming university curricula for teaching creativity [53]. Bonnie Cramond (1999) also predicts that, in the future, the

world will continue to become increasingly complex with problems requiring novel and elegant solutions [54].

However, it is quite difficult to propose a specific, stable, effective creativity education system for students, as many kinds of creativity education, including brainstorming, cannot be repeated or practiced every day by an individual student or a group. Under these circumstances, it has been proposed that the Idea-Marathon System (Idea-Marathon) can be one of the innovative methodological breakthroughs for building a creative infrastructure for college and university students in Japan.

5.1.3 Idea-Marathon at O College

O College adopted the Idea-Marathon in 2011 and has evaluated qualitatively its effects on creativity. To make wider use of Idea-Marathon lectures in universities in Japan, the Idea-Marathon must be studied quantitatively for its potential to enhance the creativity of students. The TTCT Figural tests were used to study the effects of the Idea-Marathon on creativity in detail.

One of the important aspects of the Idea-Marathon process is that there are support systems in place from the beginning to help participants develop the consistent habit of thinking and writing about their own ideas every day, such as the e-Training System (ETS) (Table 4), and the distribution of weekly "Thinking e-Hints" described in Chapter 3.

Student ID	IMS started	1st Report day	Number of ideas	Teacher's commen +	2nd Report day	Number of ideas	Teacher's commen +				8th Report day	Number of ideas	Teachers' comment				12th Report day	Number of ideas	Teacher's commen +
1	2012/4/12	2012/4/18	16	Your IMS Position is	2012/5/2	42	Well done				2012/6/21	95					2012/7/19	138	Hard working
2	2012/4/12	2012/4/18	6	Your IMS Position is	2012/5/2	25	Hard working				2012/6/21	82	Reviewing your idea				2012/7/19	115	Quite good
3	2012/4/12	2012/4/18	1	Your IMS Position is	2012/5/2	22	Hard working				2012/6/21	90	Reviewing your idea				2012/7/19	132	Reviewing your
4	2012/4/12	2012/4/18	6	Your IMS Position is	2012/5/2	28	Try harder	From 3rd to7th Reports data			2012/6/21	93	Reviewing your idea	From 9th to11th Reports data			2012/7/19	125	Quite good
5	2012/4/12	2012/4/18	10	Your IMS Position is	2012/5/2	23	Quite good				2012/6/21	86	Reviewing your idea				2012/7/19	98	Hard working
6	2012/4/12	2012/4/18	7	Your IMS Position is	2012/5/2	48	Hard working	Abbreviated due to Space			2012/6/21	181	Reviewing your idea	Abbreviated due to Space			2012/7/19	254	Try harder
7	2012/4/12	2012/4/18	7	Your IMS Position is	2012/5/2	19	Going on well				2012/6/21	170	Reviewing your idea				2012/7/19	270	Hard working
8	2012/4/12	2012/4/18	16	Your IMS Position is	2012/5/2	80	Reviewing your				2012/6/21	119	Reviewing your idea				2012/7/19	152	Very high
9	2012/4/12	2012/4/18	7	Your IMS Position is	2012/5/2	43	Very high				2012/6/21	119	Reviewing your idea				2012/7/19	140	Hard working
10	2012/4/12	2012/4/18	12	Your IMS Position is	2012/5/2	44	Hard working				2012/6/21	107	Reviewing your idea				2012/7/19	139	Quite good
11	2012/4/12	2012/4/18	10	Your IMS Position is	2012/5/2	33	Try harder				2012/6/21	97	Reviewing your idea				2012/7/19	111	Good!
12	2012/4/12	2012/4/18	8	Your IMS Position is	2012/5/2	39	Quite good				2012/6/21	116	Reviewing your idea				2012/7/19	146	Very high
13	2012/4/12	2012/4/18	12	Your IMS Position is	2012/5/2	77	Hard working				2012/6/21	224	Reviewing your idea				2012/7/19	276	Very high
14	2012/4/12	2012/4/18	17	Your IMS Position is	2012/5/2	50	Hard working				2012/6/21	90	Reviewing your idea				2012/7/19	118	Hard working
15	2012/4/12	2012/4/18	9	Your IMS Position is	2012/5/2	50	Hard working				2012/6/21	178	Reviewing your idea				2012/7/19	277	Very high
16	2012/4/12	2012/4/18	42	Your IMS Position is	2012/5/2	104	Going on well				2012/6/21	200	Reviewing your idea				2012/7/19	248	Very high
17	2012/4/12	2012/4/18	8	Your IMS Position is	2012/5/2	64	Going on well				2012/6/21	96	Reviewing your idea				2012/7/19	127	Hard working
18	2012/4/12	2012/4/18	9	Your IMS Position is	2012/5/2	74	Hard working				2012/6/21	169	Reviewing your idea				2012/7/19	229	Hard working
19	2012/4/12	2012/4/18	7	Your IMS Position is	2012/5/2	33	Hard working				2012/6/21	90	Reviewing your idea				2012/7/19	124	Quite good
20	2012/4/12	2012/4/18	16	Your IMS Position is	2012/5/2	43	Quite good				2012/6/21	87	Reviewing your idea				2012/7/19	117	Reviewing your
21	2012/4/12	2012/4/18	3	Your IMS Position is	2012/5/2	25	Going on well				2012/6/21	74	Reviewing your idea				2012/7/19	102	Try harder
22	2012/4/12	2012/4/18	7	Your IMS Position is	2012/5/2	57	Hard working				2012/6/21	116	Reviewing your idea				2012/7/19	165	Hard working
			236			1,023						2,679						3,603	
			1.60			2.32						1.79						1.62	

Table 4 12 times ETS (e-Training System) data of With IMS (experimental) Group Students and Comments Given to Students

5.1.4 Idea-Marathon Training Procedure

Before starting the Idea-Marathon training at the college, all students were requested to obtain one new notebook. To start the Idea-Marathon in a class or group, a one-hour presentation on the Idea-Marathon was given so that the participating students had an adequate understanding and motivation for starting and continuing the Idea-Marathon. The Idea-Marathon presentation covered the

origin of the Idea-Marathon, its merits, the use of notebooks, the application of the Idea-Marathon and its notebooks, and examples of ideas generated by the Idea-Marathon.

5.1.5 The Idea-Marathon Notebook

An Example of a student's Idea-Marathon notebook is shown here from the O College Student (Figure 25)

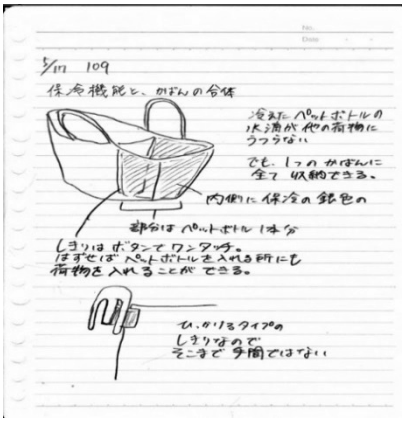


Figure 25 A Sample Idea of Idea-Marathon in Japanese from an O College Student's Notebook

5.1.6 Creativity Measurement by TTCT

To quantitatively evaluate the effects of creativity developed by the Idea-Marathon education on O College students, we used the TTCT Figural tests. There are two types of TTCT Figural tests, Type A as the Pretest and Type B as the Posttest, which were used to measure the creativity effects of continuous training of the Idea-Marathon for the three month period [55].

5.1.6.1 The TTCT Figural Pretest and Posttest in O College

Two TTCT Figural tests of the Pretest on April 19, 2012, and Posttest on July 26, 2012 were administered to two groups (Experimental and Control) of O College students at once. One group of freshmen With IMS (experimental) group students (N=21) had completed three months of Idea-Marathon training, and another group of sophomore students were Without IMS (control) group students (N=19). Both groups had TTCT Figural Test Pretest and Posttest on the same day.

5.1.6.2 t-Test Analysis of the TTCT Figural tests Pre-Posttest for With IMS (experimental) Group

For With IMS (experimental) group, a statistically significant difference was found for the Norm Reference Measures: Total Score (t (20)=4.400, p<.01), Fluency (t(20)=5.468, p<.01), Originality (t(20)=3.261, p<.01) and Resistance to Premature Closure (t(20)=2.878, p<.01) (Table 5).

No significant difference was found for the component of Elaborations and Abstractness of Titles.

Measurement	All perticipants Change of Scores Pre-test M(SD)	Post-test M(SD)	*t* value	Sig
Total Score	518(87)	590(68)	4.400	*p<.01*
Fluency	85(17)	111(19)	5.468	*p<.01*
Originality	100(27)	120(22)	3.261	*p<.01*
Elaborations	141(20)	150(18)	2.053	*n.s.*
Abstractness of Titles	109(26)	110(22)	0.190	*n.s.*
RPC	82(25)	99(17)	2.878	*p<.01*

M=Score Means SD=Standard Deviation
df=20(All) *p*<.05 *p*<.01 (Two sided t-test)

Table 5 t-Test Result of TTCT Scores Pre-Posttest of Students With IMS (Experimental) Group with three Month of Idea-Marathon training at O College in 2012

5.1.6.3 13 Item Creative Strength Criterion-Referenced Measures of With IMS (Experimental) Group

	Criterion Reference Measure	Pre-test Mean Average	Post-test Mean Average	*t* Value	*sig.*
1	Emotional Expressiveness	23	20		*n.s.*
2	Story-telling Articulateness	21	22		*n.s.*
3	Movement and action	24	19		*n.s.*
4	Expressiveness of Titles	21	22		*n.s.*
5	Synthesis of Incomplete Figures	22	21		*n.s.*
6	Synthesis of Lines or Circles	16	27		*p*<.01
7	Unusual Visualization	18	27		*n.s.*
8	Internal Visualization	26	17		*p*<.01
9	Extending or Breaking Boundaries	23	20		*n.s.*
10	Humor	21	23		*n.s.*
11	Richness of Imagery	21	22		*n.s.*
12	Colorfulness of Imagery	26	17		*p*<.01
13	Fantasy	23	20		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	13(5)	12(5)	0.799	*n.s.*

Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided)
df=20 *n.s.*:no significant, p<.01,p<.05

Table 6 13 Item Creative Strength—Criterion Referenced Measures of With IMS Group at O College.

In addition to the significant improvement (p<.01)observed in Five Norms Referenced Measures, three items out of 13 items Creative Strength Criterion Reference Measures, ”Synthesis of Lines or

Circles", "Internal Visualization" and "Colorfulness of Imagery" were found to be significant (Table 6).

5.1.6.4 *t*-Test Analysis of the TTCT Figural Test Pre-Posttest for Without IMS (Control) Group

On the TTCT Figural Tests for control group students without the Idea-Marathon, a statistically significant difference was found only for Resistance to Premature Closure ($t(18)=3.412$, $p<.01$) among the five Norm Referenced Measures, and no significant difference was found for the measures, Total Score, Fluency, Originality, Elaborations, and Abstractness of Titles (Table 7). The numbers in Table 7 are all average scores.

	Change of Scores between Pre-& Post test			
	Pre-test	Post-test	*t* value	*sig.*
Measurement	M(SD)	M(SD)		
Total Score	571(58)	578(99)	0.414	*n.s.*
Fluency	103(18)	106(26)	0.597	*n.s.*
Originality	118(16)	112(23)	1.035	*n.s.*
Elaborations	153(10)	146(24)	1.576	*n.s.*
Abstractness of Titles	106(28)	104(34)	0.296	*n.s.*
RPC	92(14)	110(21)	3.412	$p<.01$
M=Score Means SD=Standard Deviation				
df=18, $p<.05$, $p<.01$ (Two sided t-test)				

Table 7 *t*-Test Result of TTCT Scores of Without IMS (Control) for three month at O College in 2012

5.1.6.5 The Two Factor ANOVA Analysis for Comparison of TTCT Test Norm Referenced Measures Pre-Posttest Between With IMS (Experimental) and Without IMS (Control) Groups at O College

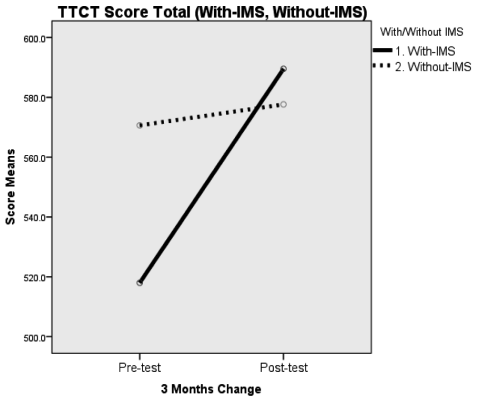
Abbreviations and Acronyms

IMS: Idea Marathon System
With IMS: The experimental group of students who are practicing Idea Marathon
Without IMS: The control group of students who are not practicing Idea Marathon
Pre-Posttest: Pretest and Posttest tests
MSE: Mean Square Error

(1) Score Total

Analysis of Score Total by two-factor factorial ANOVA between Pre-Posttest and With IMS (experimental) and Without IMS (control) groups indicated a significant main effect for Pre-Posttest ($F(1,38) = 11.189, p < .01$), which was confirmed by Bonferroni multiple comparison (Pretest<Posttest, $p < .05$).

An interaction was found between Pre-Posttest and With IMS and Without IMS groups ($F(1,38) = 7.555$, $p < .01$, $\mathrm{MSE} = 2748.411$). The Bonferroni multiple comparison test confirmed significant results for a simple main effect of With IMS within Pre-Posttest (Posttest > Pretest, $p < .05$). At Pretest it was significant between With IMS and Without IMS groups (Without IMS > With IMS, $p < .05$), but there was no significant result between With IMS and Without IMS (Without IMS < With IMS) at Posttest (Figure 26).



Descriptive Statistics

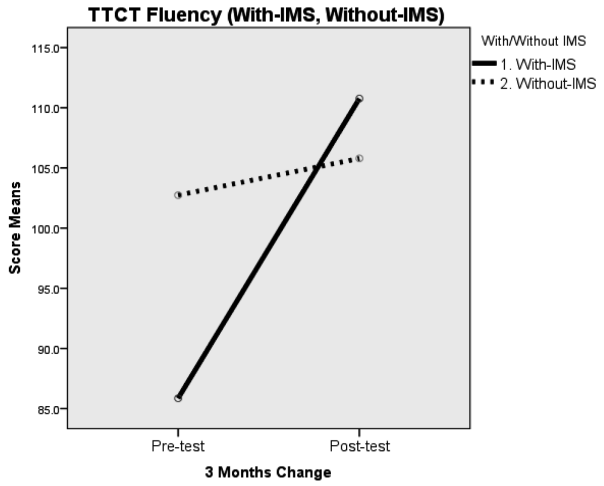
With/Without IMS		Mean	Std. Deviation	N
STL-Pre	With	518.000	86.6562	21
	Without	570.632	58.0557	19
	Total	543.000	78.1986	40
STL-Post	With	589.524	68.4278	21
	Without	577.632	98.6769	19
	Total	583.875	83.2553	40

Figure 26　O College Score Total Pre-Posttest X With/Without IMS

(2)　Fluency

Concerning Fluency, there was a significant effect for Pre-Posttest ($F(1,38) = 16.774,\ p < .01$), which was confirmed as significant by the Bonferroni multiple comparison test (Pretest<Posttest, $p < .05$).

An interaction was found within Pre-Posttest and between With IMS and Without IMS ($F(1,38) = 10.248,\ p < .01,\ MSE = 232.405$). A simple main effect was confirmed as significant by Bonferroni multiple comparison for With IMS within Pre-Posttest (Pretest < Posttest, $p < .05$), and also between With IMS and Without IMS at Pretest (Without IMS > With IMS, $p < .05$), but the effect disappeared at Posttest (Without IMS < With IMS)(Figure 27).



Descriptive Statistics

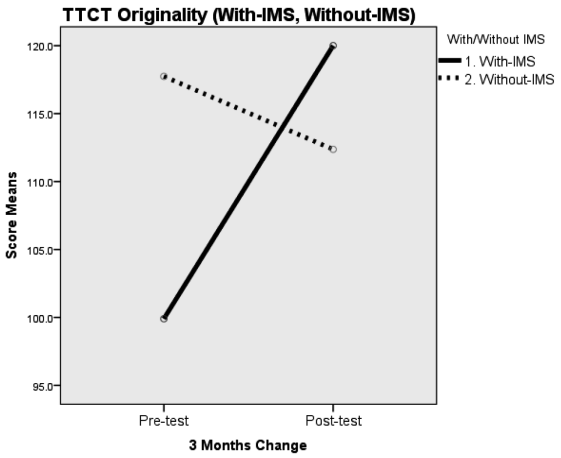
With/Without IMS		Mean	Std. Deviation	N
FLU-Pre	With	85.857	17.3242	21
	Without	102.737	18.4838	19
	Total	93.875	19.6079	40
FLU-Post	With	110.762	19.2793	21
	Without	105.789	26.2310	19
	Total	108.400	22.6826	40

Figure 27　O College Fluency With/Without IMS

(3)　Originality

Concerning Originality, there was no significant main effect within Pre-Posttest or between With IMS and Without IMS.

An interaction was found within Pre-Posttest and between With IMS and Without IMS. The Bonferroni multiple comparison test confirmed significant effects ($p < .05$) for With IMS within Pre-Posttest, and at Pretest between With IMS and Without IMS (With IMS < Without IMS, $p < .05$), but the effect disappeared at Post-level (With IMS > Without IMS) (Figure 28) .



Descriptive Statistics

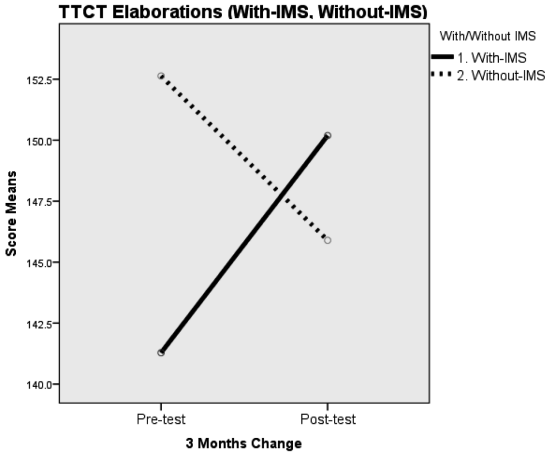
With/Without IMS		Mean	Std. Deviation	N
ORI-Pre	With	99.905	26.9813	21
	Without	117.737	16.4953	19
	Total	108.375	24.0882	40
ORI-Post	With	120.000	21.8586	21
	Without	112.368	23.0126	19
	Total	116.375	22.4576	40

Figure 28 O College Originality With/Without IMS

(4) Elaborations

Concerning Elaborations, there was no significant main effect within Pre-Posttest or between With IMS and Without IMS.

An interaction was found within Pre-Posttest and With IMS and Without IMS ($F(1,38) = 6.554$, $p < .05$, $MSE = 186.178$). The Bonferroni multiple comparison test confirmed significant results for a simple main effect for With IMS within Pre-Posttest (Pretest < Posttest, $p < .05$), and at Pretest it was significant between With IMS and Without IMS (With IMS < Without IMS, $p < .05$), but the effect disappeared at Posttest (With IMS > Without IMS)(Figure 29).



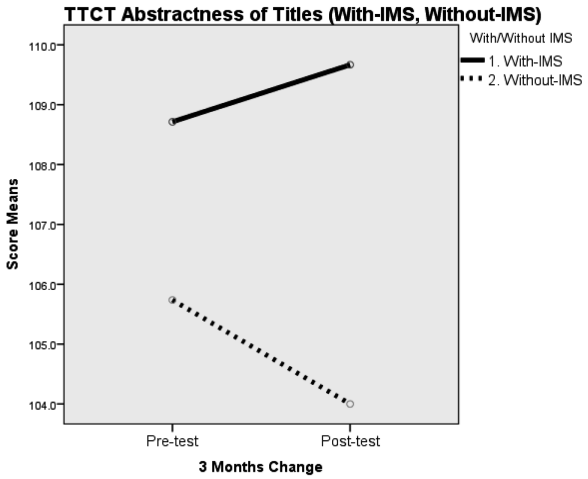
Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
ELA-Pre	With	141.286	19.9503	21
	Without	152.632	10.4361	19
	Total	146.675	16.9500	40
ELA-Post	With	150.190	18.0959	21
	Without	145.895	24.4924	19
	Total	148.150	21.2018	40

Figure 29 O College Elaborations With/Without IMS

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or between With IMS and Without IMS (Figure 30).

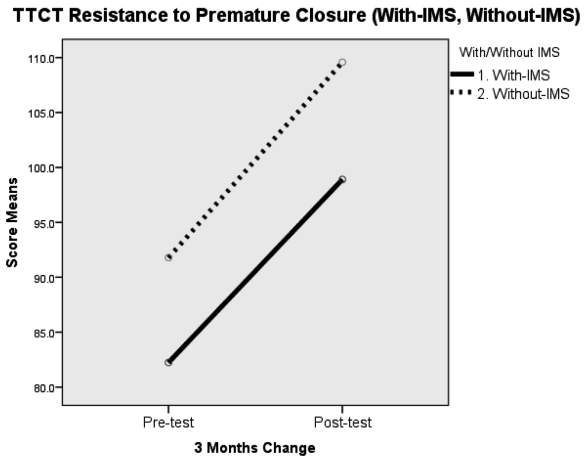


Descriptive Statistics				
With/Without IMS		Mean	Std. Deviation	N
ABT-Pre	With	108.714	26.3062	21
	Without	105.737	28.0829	19
	Total	107.300	26.8540	40
ABT-Post	With	109.667	22.3032	21
	Without	104.000	33.7589	19
	Total	106.975	28.0946	40

Figure 30 O College Abstractness of Titles With/Without IMS

(6) Resistance to Premature Closure

Score Analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,38) = 19.251,\ p < .01$) , and the Bonferroni multiple comparison test confirmed significant results(Pretest<Posttest, p<.05) And between With IMS and Without IMS there were also main effects ($F(1,38) = 4.325,\ p < .05$) and the Bonferroni multiple comparison test confirmed significant results of between With IMS and Without IMS (Without IMS>With IMS, $p < .05$). No interaction was found (Figure 31).



Descriptive Statistics				
With/Without IMS		Mean	Std. Deviation	N
RPC-Pre	With	82.238	24.6291	21
	Without	91.789	14.3123	19
	Total	86.775	20.7111	40
RPC-Post	With	98.905	16.9850	21
	Without	109.579	21.1143	19
	Total	103.975	19.5664	40

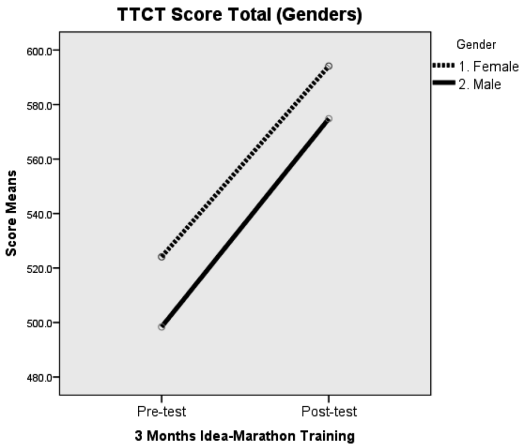
Figure 31 O College Resistance to Premature Closure With/Without IMS

5.1.6.6 ANOVA Analysis for Comparison of TTCT Test Norm Referenced Measures Pre-Posttest Between Genders at O College

As the longitudinal report of Fifty-Year Follow-up, 2010 by Runco et al (2010) mentions about the result of research on Genders' Differences about the difference of less social participation and contribution by females, it is important for us to check if there is any creative difference between genders [41, pp365].

(1) Score Total

Analysis of Score Total by two-factor factorial ANOVA within Pre-Posttest and between Genders in O College indicated a significant main effect between Pre-Posttest ($F(1,19) = 13.996,\ p < .01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest < Posttest, $p < .05$). No interaction was found. (Figure 32).

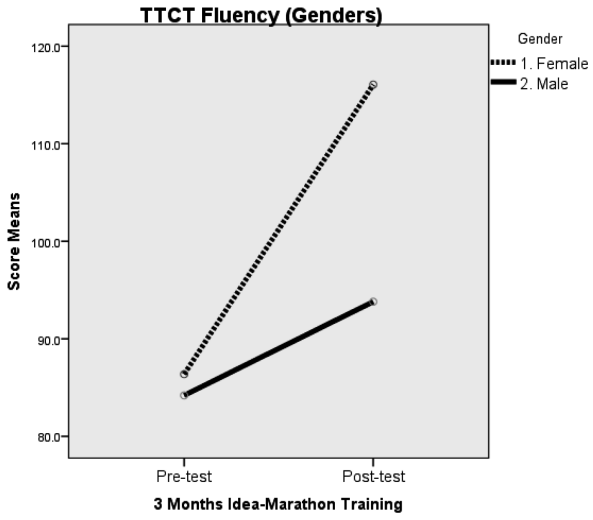


Descriptive Statistics				
Male Female		Mean	Std. Deviation	N
STL_A	F	524.125	72.9309	16
	M	498.400	130.2701	5
	Total	518.000	86.6562	21
STL_B	F	594.125	57.6436	16
	M	574.800	102.9354	5
	Total	589.524	68.4278	21

Figure 32 O College Score Total in Genders

(2) Fluency

Concerning Fluency, there was a significant main effect within Pre-Posttest ($F(1,19) = 15.572$, $p < .01$), confirmed as significant by the Bonferroni multiple comparison test (Pretest < Posttest, $p < .05$). No interaction was found between Pre-Posttest and Genders (Figure 33).

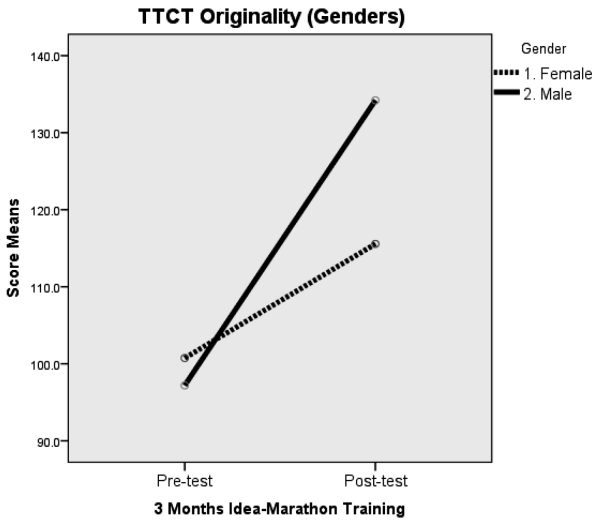


Descriptive Statistics				
Male Female		Mean	Std. Deviation	N
FLU_A	F	86.375	16.8162	16
	M	84.200	20.8734	5
	Total	85.857	17.3242	21
FLU_B	F	116.063	18.7206	16
	M	93.800	8.4971	5
	Total	110.762	19.2793	21

Figure 33 O College Fluency in Genders

(3) Originality

Concerning Originality, there was a significant main effect within Pre-Posttest ($F(1,19) = 13.808$, $p < .01$), confirmed as significant by the Bonferroni multiple comparison test (Pretest < Posttest, $p < .05$). No interaction was found between Pre-Posttest and Genders (Figure 34).



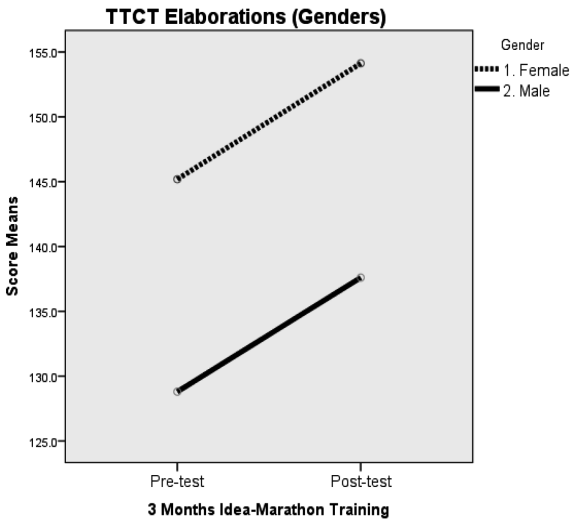
Descriptive Statistics

Male Female		Mean	Std. Deviation	N
ORI_A	F	100.750	23.9263	16
	M	97.200	38.4864	5
	Total	99.905	26.9813	21
ORI_B	F	115.563	18.6903	16
	M	134.200	27.3532	5
	Total	120.000	21.8586	21

Figure 34 O College Originality in Genders

(4) Elaborations

Score Analysis of Elaborations indicated significant results for main effects between Genders ($F(1,19) = 4.614,\ p < .05$), and the Bonferroni multiple comparison test confirmed significant results (Female > Male, $p < .05$). There was no interaction between Pre-Posttest and Genders (Figure 35).



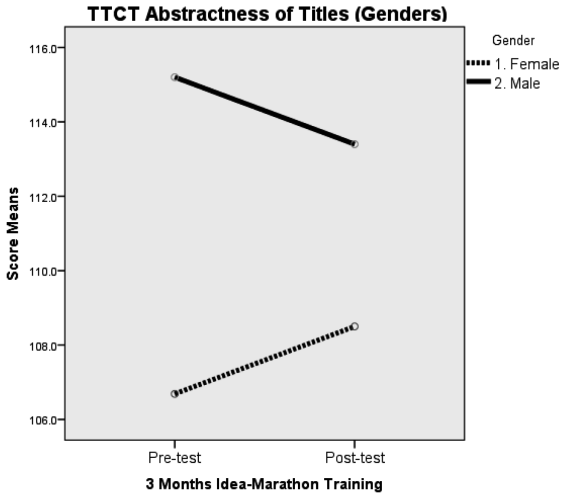
Descriptive Statistics

Male Female		Mean	Std. Deviation	N
ELA_A	F	145.188	16.4366	16
	M	128.800	26.8552	5
	Total	141.286	19.9503	21
ELA_B	F	154.125	8.5000	16
	M	137.600	33.2611	5
	Total	150.190	18.0959	21

Figure 35 O College Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no significant result for a main effect within Pre-Posttest nor interaction with Pre-Posttest and Genders (Figure 36).

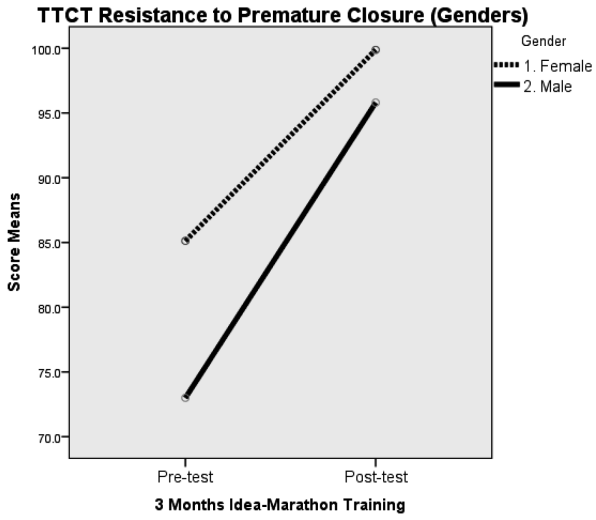


Descriptive Statistics				
Male Female		Mean	Std. Deviation	N
ABT_A	F	106.688	26.0684	16
	M	115.200	29.0293	5
	Total	108.714	26.3062	21
ABT_B	F	108.500	20.9476	16
	M	113.400	28.6147	5
	Total	109.667	22.3032	21

Figure 36 O College Abstractness of Titles in Genders

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there was a significant effect for Pre-Posttest ($F(1,19) = 7.377,\ p < .05$), confirmed as significant by the Bonferroni multiple comparison test (Pretest < Posttest, $p < .05$). No interaction was found between Pre-Posttest and Genders (Figure 37).



Descriptive Statistics				
Male Female		Mean	Std. Deviation	N
RPC_A	F	85.125	15.1696	16
	M	73.000	45.0555	5
	Total	82.238	24.6291	21
RPC_B	F	99.875	15.8614	16
	M	95.800	21.9818	5
	Total	98.905	16.9850	21

Figure 37 O College Resistance to Premature Closure in Genders

5.1.6.7 ANOVA Analysis for Comparison of TTCT Norm Referenced Measures Pre-Posttest among Top, Middle, Low Groups

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest tests

TML: Top-, Middle-, and Low-scoring groups

T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group

T–M: Top- and Middle-scoring groups

M–L: Middle- and Low-scoring groups

T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

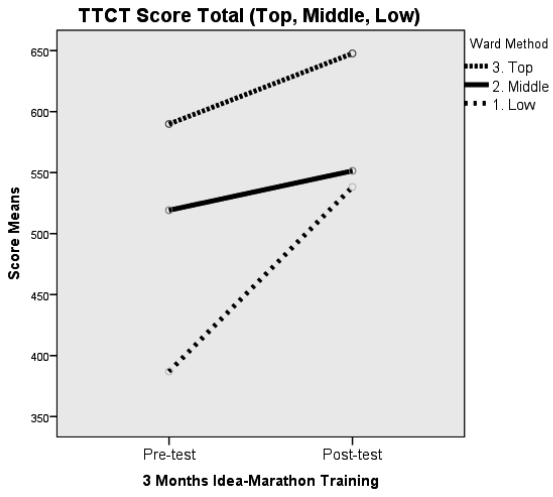
Top	9 students
Middle	7 students
Low	5 students
Total	21 students

(1) Score Total

Analysis of Score Total by two-factor factorial ANOVA within Pre-Posttest and among TML in "O" College indicated significant results for a main effect within Pre-Posttest ($F(1,18) = 34.561$, $p < .01$) (Pretest < Posttest, $p < .05$), and among TML ($F(1.18) = 60.575$, $p < .01$), and the Bonferroni multiple comparison test confirmed significant results for TML ($p < .05$).

An interaction was found within Pre-Posttest and between TML Groups ($F(2,18) = 5.96$, $p < .05$, $MSE = 1854.994$). The Bonferroni multiple comparison test confirmed significant results for Top within Pre-Posttest (Pretest < Posttest, $p < .05$) and for Low within Pre-Posttest (Pretest < Posttest $p <$ .05), but there was no significant result for the Middle group within Pre-Posttest (Pretest < Posttest).

At Pretest, comparisons between T–M, M–L, and T–L showed that all were significant (T > M, M > L, T > L, $p < .05$) and at Posttest it was significant between T–M and T–L (T > M, T > L, $p < .05$). M–L was not significant (M > L). This means that although there was significant difference in Pretest between M–L, at Posttest there was no difference between Middle and Low. The Low group got closer to Middle (M > L) (Figure 38).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL_A	1	387.000	32.5346	5
	2	519.143	23.3269	7
	3	589.889	35.9877	9
	Total	518.000	86.6562	21
STL_B	1	538.200	82.3329	5
	2	551.429	20.6870	7
	3	647.667	35.7246	9
	Total	589.524	68.4278	21

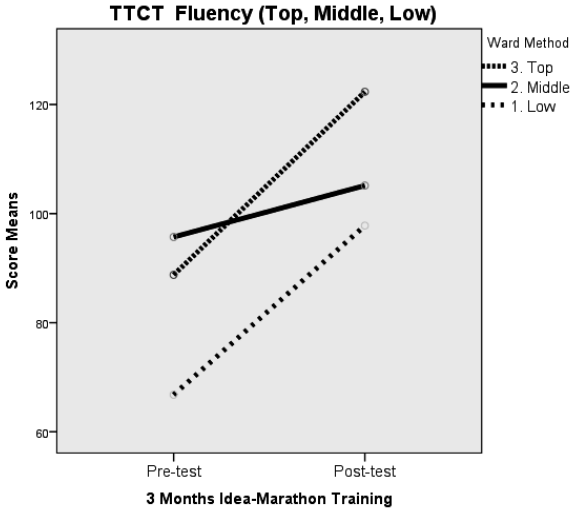
Figure 38 O College Score Total among TML

(2) Fluency

Concerning Fluency, there was a significant main effect within Pre-Posttest ($F(1,18) = 35.142$, $p < .01$) and among TML ($F(1,18) = 5.833$, $p < .05$). The Bonferroni multiple comparison test confirmed significant results within the Pre-Posttest (Pretest < Posttest, $p < .05$) and between T–L ($p < .05$), but there was no significance between T–M or M–L.

An interaction was found within Pre-Posttest and between TML Groups ($F(2,18) = 3.695,\ p < .05$, $MSE = 171.554$). The Bonferroni multiple comparison test confirmed significant results for the Top group within Pre-Posttest (Pretest < Posttest,$p < .05$) and the Low group within Pre-Posttest (Pre-test < Posttest,$p < .05$), while the Middle group within Pre-Posttest was not significant.

At Pretest, there was significance between M–L and between T–L (M > L and T > L, $p < .05$) but not between T–M. There was also no significance at Posttest between M–L and T–L, which means there was no difference between M–L and T–L. The Low group got closer to the Top and the Middle (Figure 39).



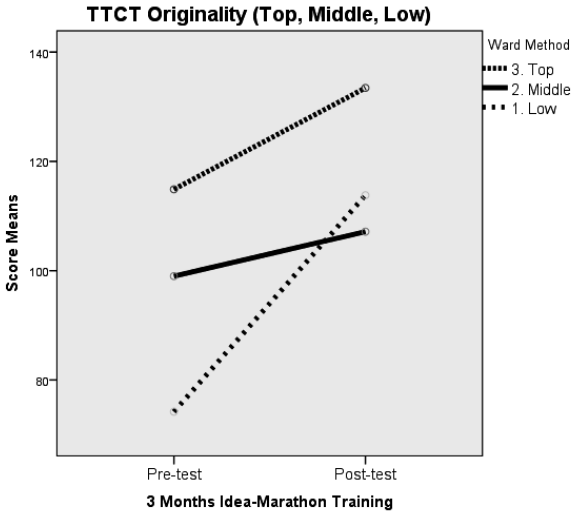
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU_A	1	66.800	13.7550	5
	2	95.714	10.4357	7
	3	88.778	15.8885	9
	Total	85.857	17.3242	21
FLU_B	1	97.800	15.3036	5
	2	105.143	10.1066	7
	3	122.333	21.2662	9
	Total	110.762	19.2793	21

Figure 39 O College Fluency among TML

(3) Originality

Concerning Originality, there was a significant main effect within Pre-Posttest ($F(1,18) = 13.381$, $p < .01$), confirmed by the Bonferroni multiple comparison test (Pretest < Posttest,$p < .05$). There was also a significant effect among TML ($F(1,18) = 6.626,\ p < .01$), and the Bonferroni multiple comparison test confirmed significant results between T–L ($p < .05$), but there was no significant effect between T–M or M–L. No interaction was found between Pre-Posttest and TML (Figure 40).



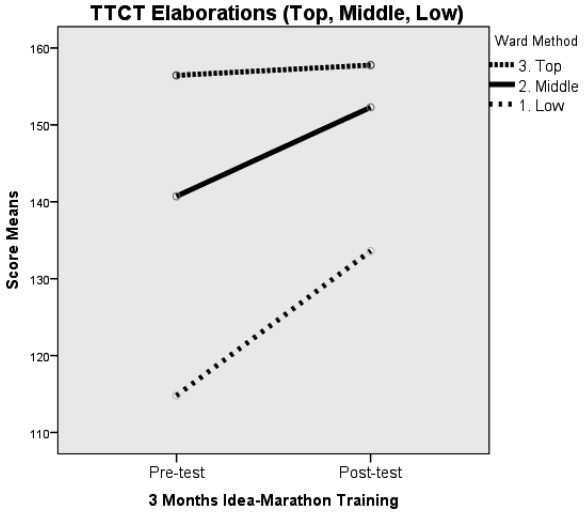
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI_A	1	74.200	13.7550	5
	2	99.000	18.6190	7
	3	114.889	28.2686	9
	Total	99.905	26.9813	21
ORI_B	1	113.800	26.0519	5
	2	107.143	19.1000	7
	3	133.444	14.4751	9
	Total	120.000	21.8586	21

Figure 40 O College Originality among TML

(4) Elaborations

Concerning Elaborations, there were significant results for a main effect within Pre-Posttest ($F(1,18) = 5.825,\ p < .05$) and among TML ($F(1,18) = 17.509,\ p < .01$). The Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest < Posttest, $p < .05$) and between T-L, M-L (T > L,M>L,p<.05), while there were no significant effects between T-M. No interaction was found within Pre-Posttest or TML (Figure 41).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA_A	1	114.800	12.0499	5
	2	140.714	16.5501	7
	3	156.444	4.4472	9
	Total	141.286	19.9503	21
ELA_B	1	133.600	31.2938	5
	2	152.286	10.0119	7
	3	157.778	3.6324	9
	Total	150.190	18.0959	21

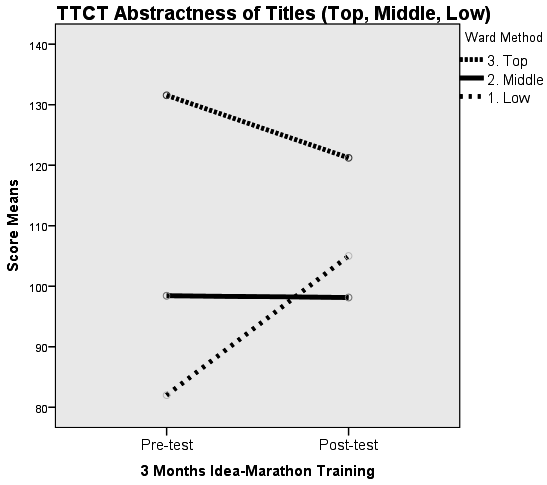
Figure 41 O College Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,18) = 9.410$, $p < .01$), and the Bonferroni multiple comparison test confirmed significant results between T–M and T–L (T>M, T>L, $p < .05$), but there were no significant effects in M–L.

An interaction was found within Pre-Posttest and among TML ($F(2,18) = 4.605,\ p < .05,\ MSE = 194.762$). The Bonferroni multiple comparison test confirmed a significant main effect for the Low group within Pre-Posttest (Pretest < Posttest, $p < .05$), while there were no significant results for Top or Middle within the Pre–Post group.

At Pretest, there was significance between M–L and T–L (M > L, T > L, $p < .05$), but none between T–M (T > M). At Posttest, however, neither M–L (M < L) nor T–L (T > L) were significant, indicating no difference between M–L or T–L at Posttest. Low got closer to the Top and the Middle (Figure 42).



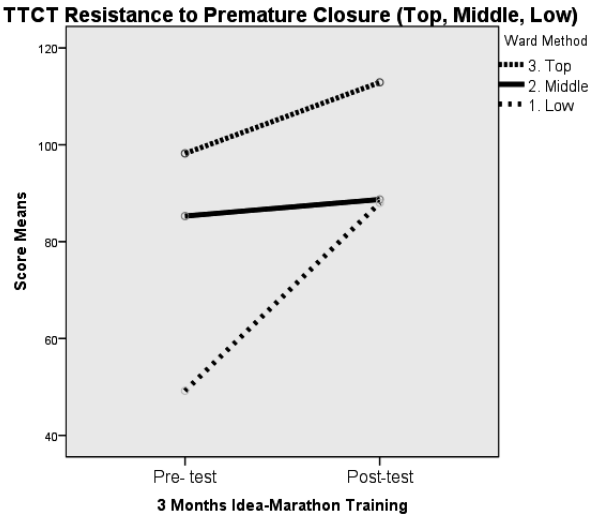
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT_A	1	82.000	17.2047	5
	2	98.429	13.6487	7
	3	131.556	17.7983	9
	Total	108.714	26.3062	21
ABT_B	1	105.000	23.4201	5
	2	98.143	15.0159	7
	3	121.222	22.8078	9
	Total	109.667	22.3032	21

Figure 42 O College Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, the test results indicate a significant main effect within Pre-Posttest ($F(1,18) = 12.379,\ \ p < .01$) confirmed by the Bonferroni multiple comparison test (Pretest < Posttest, $p < .05$). Among TML there was a significant main effect ($F(1,18) = 44.892,\ p < .01$), confirmed by the Bonferroni multiple comparison test (T > M > L, $p < .05$). No interaction was found between Pre-Posttest and TML (Figure 43).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC_A	1	49.200	28.1283	5
	2	85.286	8.6162	7
	3	98.222	9.3512	9
	Total	82.238	24.6291	21
RPC_B	1	88.000	16.0468	5
	2	88.714	9.6560	7
	3	112.889	11.7201	9
	Total	98.905	16.9850	21

Figure 43 O College Resistance to Premature Closure among TML

5.1.7 Influence of the ETS on Creativity

The increase in the total number of ideas during these three months of the Idea-Marathon is shown in Figure 44.

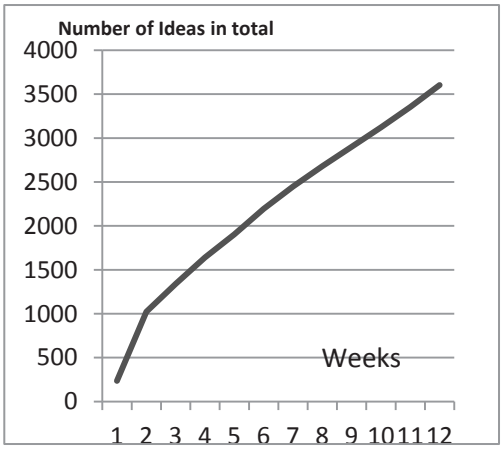


Figure 44 Accumulated Total Numbers of Ideas at O College, 2012

The average daily number of ideas per person are shown in Figure 45, in which the students produced 1.6-1.7 ideas per day per person on average.

The average daily number of ideas per person can vary by not only the willpower of the participating students, but also the teachers' enthusiasm to check students' notebooks and encourage students every week.

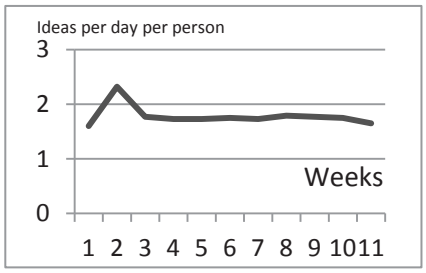


Figure 45 Average Number of Ideas Per Day Per Student at O College in 2012

The correlation of the numbers of idea recorded in the ETS was tested for each of six TTCT Norm Referenced Measures, including Total Score, Fluency, Originality, Elaborations, Abstractness of Titles and Resistance to Premature Closure. It was found that the ETS data was moderately correlated in Fluency, with r=0.419, while the scores for all the other Norms were not positively correlated with the ETS.

5.1.8 O College Study Discussion

The following is a discussion of the results described above.

5.1.8.1 ETS

The results of ETS (Figure 38) at O College students showed that over a three month period students recorded 3,803 ideas in their notebooks, which averages to 1.6 ideas per day per student(Figure 22). This indicates that O College students largely abided by the Idea-Marathon rules defined in section 3.3.

Daily adherence to the practice of thinking and journaling is the basis for improving creativity in the Idea-Marathon system, and is important for maintaining long-term motivation. If students continue with the Idea-Marathon, and if ideas are continually compiled in their notebooks, they will get more self-satisfaction from the accumulated idea stock.

5.1.8.2 ETS and Fluency

There was a moderate correlation between the number of ETS ideas and TTCT Fluency scores, indicating that an increased number of ideas in student notebooks might improve their TTCT Fluency scores. As Torrance (1974) said, "Fluency is the gatekeeper of creativity" [56].

5.1.8.3 Support System and Norms Referenced Measures

The With Idea-Marathon (experimental) group was supported for three months by ETS and a weekly supply of Thinking Hints, and this positively influenced Total Score, Fluency, Originality, and RPC. All TTCT scoring processes start by scoring Fluency, so increased Fluency is directly related to Originality and to the other Norm Referenced Measures of the TTCT figural tests. Without the Fluency score, other Norm Referenced Measures cannot be calculated [57]. In this experimental group, Elaborations and Abstractness of Titles were not found to be significant.

5.1.8.4 ANOVA Analysis of With IMS, Without IMS and Pre-Posttest Scores

In ANOVA analysis of With IMS, Without IMS, and Pre-Posttest, With IMS scores were lower than Without IMS in the pretest for Score Total, Fluency, Originality, and Elaborations, which resulted in With IMS being higher in posttest with interactions.

Without the Idea-Marathon training, the control group students over the three-month interval showed no statistically significant improvement on Fluency, Originality, Elaborations, Abstractness of Titles, or Total Scores. They only showed improvement for Resistance to Premature Closure (RPC). So the creativity level of the control group remained the same as before.

5.1.8.5 Sophomore Without IMS (control) Students

The control group were sophomore students. Their scores for Score Total and Fluency did not change over the three-month period, while Originality, Elaborations, and Abstractness of Titles decreased. This indicates the possibility that creative power can decrease if not continually supported, regardless of age. Regarding this point, future studies should examine how fast creative power decreases after continuous support is removed.

5.1.8.6 ANOVA Analysis of Genders and Pre-Posttest Scores

ANOVA analysis comparing genders in the With IMS group showed interactions for no items, indicating no difference between males and females.

5.1.8.7 ANOVA Analysis of Pre-Posttest among Top, Middle and Low Scores

ANOVA analysis of the Top, Middle, and Low groups as established by cluster analysis indicated interactions in Score Total, Fluency, and Abstractness of Titles, particularly interactions and significant improvement for Low group score effects. The Low group scores approached those of the Middle and Top groups, suggesting that three months of Idea-Marathon training is highly effective for low scorers. Future studies should investigate the effects of extending Idea-Marathon Training, for example to six or ten months, on the creative improvement of low scorers. Another interesting inquiry would be why the Middle With IMS group showed little score movement over the three months.

5.1.8.8 Future Studies

We plan to check whether creativity scores can be further improved if students continue to practice the Idea-Marathon beyond three months, with and without ETS and Thinking Hints. For this, experimental periods of six and nine months of Idea-Marathon with TTCT Figural tests are suggested. We also want to investigate if students continue daily practice and notebook checking after continual promotion is ceased, and how their creativity scores change. Furthermore, we want to investigate the effects of not providing students with support systems like ETS and supplied Thinking Hints.

5.2 D University

5.2.1 D University Summary

D University, Tokyo, Japan, has included the Idea-Marathon in its curriculum for the Career Design Course for sophomore students since 2007.

Since 2007, more than 1200 students have experienced the Idea-Marathon in D University. In 2012, just less than 600 sophomore students practiced the Idea-Marathon, which is more than 90% of the total sophomore students of the same year at D University.

This chapter presents another quantitative analysis of an experiment measuring the effect on creativity before and after the Idea-Marathon training for about a three month period for sophomore students at D University. To confirm the Idea-Marathon's positive influence on creativity, the TTCT Figural tests were used as usual.

We requested the students planning to matriculate from the Career Design Course to participate in this TTCT experiment. There are two TTCT Figural tests, i.e., the Pretest and the Posttest.

This chapter describes the statistical analysis of the results of the both the Pretest and the Posttest. The Idea-Marathon was found significantly to improve the creative factors of Norm Referenced Measures proposed by the TTCT tests.

5.2.2 History

In 2006, the author requested D University, Tokyo, Japan, for the first time to try the Idea-Marathon in their Career Design B Course of sophomores to find out its effect on students' creativity.

D University adopted the Idea-Marathon in the curriculum of the Career Design Course B for sophomore students in 2007. Since 2007 until now, the Idea-Marathon has been an essential part of the Career Design Course B to foster students' creativity. The number of students who have participated in this course has increased year by year.

From now on the Idea-Marathon is going to be adopted in D University even further so that almost all the graduate students in this university are going to experience the Idea-Marathon during their studies at D University.

Since all the students participating to this Career Design B Course are practicing the Idea-Marathon during this course, we found it necessary to analyze its effects, not only qualitatively, but also quantitatively, at the beginning and the end of the Idea-Marathon three-month practice period, using the two TTCT tests.

5.2.3 The Idea-Marathon Lecture for D University

5.2.3.1 D University's Career Design B Course

The syllabus of the Career Design Course (2010) at D University stated:

"*Through this class, students will be able to visualize their own life vision, to think about how to live their total life, including their future occupation. The students can also understand the importance of the Career Design course and they can obtain initial guidance and develop originality from a personal view. They can also continue to expand their challenge of creative development with better motivation to study in the university. The students will improve their thinking powers as citizens through this class.*"[58]

D University's Career Design (2010) class is headed by two professors and a lecturer along with 14 TTAs (Team Teaching Assistants) for 87 sophomore students (in the 2010 class).

Since there are 15 times lectures in six months for Career Design Course, the participating students have two time Idea-Marathon training lectures at the first of the term and 14th lecture after 5 months.

5.2.3.2 The Idea-Marathon Textbook and a Notebook

All the students are requested to read the designated book “Group Idea-Marathon System” in Japanese before the first Idea-Marathon lecture. Students are also recommended to get one new notebook.

5.2.3.3 First Idea-Marathon lecture and the Initiation

The Idea-Marathon lecture consists of:

(1) The history and origin of the Idea-Marathon

(2) Why was the Idea-Marathon needed for international business?

(3) The principles and rules of the Idea-Marathon

(4) How should notebooks be managed and kept?

(5) Recommendations for the Idea-Marathon

(6) What are the possible effects and merits of the Idea-Marathon for university students if they keep at the Idea-Marathon for about 6 months?

(7) The author asked participating students to declare their starting of the Idea-Marathon by themselves and to write their declaration in their notebooks as the first idea.

(8) The author tried to give maximum motivation to all the students so that every one of the students declared and initiates the Idea-Marathon on the first day of class.

5.2.3.4 Important Factors for Success of the Idea-Marathon in the Career Design Course

There are several important key factors in the Idea-Marathon lecture in the Career Design Course:

(1) Confirming the existence of a strong motivation and willpower in the students to be more creative and innovative, which is a prerequisite for beginning the lecture.

(2) A high motivation lecture is given by the author in the first Idea-Marathon lecture

(3) The author is fully able to convey to the students both his experience with and his conviction of its effectiveness through his continuous implementation of the Idea-Marathon System since 1984.

5.2.4 Team Teaching Assistants (TTAs)

D University uses TTAs (Team Teaching Assistants) in this Career Design Course. They are well-experienced seniors. Many of them are retired management and engineering members of various companies. Each of these TTAs also participates and has continued with the Idea-Marathon from the first Idea-Marathon lecture in 2007. They also participate in the ETS feedback. I send Thinking Hints also to the TTAs. And so far all of the TTAs have been quite positive and enthusiastic about continuing with the Idea-Marathon. One TTA took care of half a dozen to 20 students in 2010. As all the TTAs are positively supporting the Idea-Marathon, and they meet students every week, sometimes checking students’ number of ideas, they are able to encourage the students very well.

The TTA system is also quite a powerful support of the Idea-Marathon performance in addition to the ETS system.

In 2007, the year the TTAs started the Idea-Marathon, almost all the TTAs moved ahead with the Idea-Marathon with enthusiasm. It was quite impressive to see those TTA members advancing so quickly in the recording of their thoughts into their notebooks.

TTAs take care of the group of students in their charge, meeting with them every week and asking them how they are keeping up with their Idea-Marathon.

Almost all of the students started their own Idea-Marathon upon receiving their first lecture on the Idea-Marathon. Some students well advanced in their number of ideas, while some students within these days at first declined or got slow down within 3 days.

These students did not report their number of ideas upon requests from は their TTAs. This was actually expected before starting the Idea-Marathon in Career Design course. We especially focused on these slower students, who were actually a little bit embarrassed to attempt free creative thinking and writing every day. We sent e-mails through the lecturer to encourage them.

Some students misunderstood the concept of the Idea-Marathon, thinking as if D University or the TTAs had been attempting to make it compulsory for students to record their thoughts. But these misunderstandings gradually dissolved after several weeks.

With repeated efforts of us to offer advice and with the TTA's encouragement to those students, the slower students gradually began more active participation.

5.2.5 Results of the Idea-Marathon at D University from 2007-2012

Year	Number of participating students	IMS Commenced	IMS Completed	Number of Days	Total Idea Numbers
2007	20	2007/5/14	2007/8/8	87	1942
2008	37	2008/5/19	2009/1/7	234	10094
2009	59	2009/10/19	2010/1/19	93	12919
2010	87	2010/4/20	2010/7/27	98	14630
2011	207	2011/4/27	2011/7/1	208	17480
2012	553	2012/10/10	2013/1/18	101	57804

Table 8 Number of Participating Students and Total Number of Ideas at D University

As seen in the Table 8 of the recorded number of ideas by students, the number of student participants and number of ideas increased every year. And the total number of ideas increased accordingly. The students successful to complete this career design course with Idea-Marathon have been issued the beginners' certificate.

One students who completed the course of the Idea-Marathon:

> *"I am quite happy to fulfill the Idea-Marathon Certificate conditions as a target of the Idea-Marathon training for Career Design this year. I could brush up my creative ability by continuing the Idea-Marathon from late April to today. I also could find some valuable ideas through the Idea-Marathon. From now on, I will continue to practice the Idea-Marathon by writing down my ideas into my notebook immediately whenever I get any new ideas. Through the Career Design class, I could obtain new knowledge, and understand the value of the Idea-Marathon. I am so satisfied with this opportunity of experiencing the Idea-Marathon through Career Design."* (Mr. A, Aug, 2010)

5.2.6 The Targets of the D University's Idea-Marathon Study

After thinking of and writing down ideas, students are supposed to talk to others about their ideas, but this is not enough. The Idea-Marathon members are going to form a Group Idea-Marathon for the next stage as part of their junior and senior courses of D University, but tracking of this effect on these students has yet to be performed.

In other universities like Kobe University and Wakayama University, the full members of one professor's research group (professor, associate professor, lecturer, researchers, post-graduate students, undergraduate students) are doing the Idea-Marathon as a Group Idea-Marathon movement or workshop, but not yet at the D University.

5.2.7 Qualitative Discussion

The Idea-Marathon System (the Idea-Marathon) is a powerful tool for establishing an intellectual and creative base for students. Though we must do a follow-up study on all students to confirm whether they continue the Idea-Marathon in their notebooks, I understand that through the four years of D University experiment and experience, the starting and stabilization of the Idea-Marathon system for students is one of the basic intellectual activities characterized of being D University students, not only for students of engineering technology and science, but for art and non-engineering students as well.

Once students get used to the Idea-Marathon custom, they can continue to use it for life. I am planning to promote the Idea-Marathon as a program for all the universities in Japan and in the world.

5.2.8 Procedure after the 1st Lecture of the Idea-Marathon

The first TTCT test was implemented on October 10, 2012, before the first Idea-Marathon lecture. Usually, we make the Pretest as the TTCT Type A and the Posttest as the TTCT Type B. However, in D University, we make the reversed way of making the Pretest as the TTCT Type B and the Posttest as the TTCT Type A, by which we tried to prove the Type A and Type B were compatible and the Pretest and Posttest can be either Type A or Type B.

After the first lecture and workshop on Oct 10, 2012 until the second lecture on January 22, 2013, the following the Idea-Marathon e-Training System programs were implemented:

(1) October 18, 2012: The first ETS one week after the first Idea-Marathon lecture and workshop)
(2) November 1, 2012: 2nd ETS
(3) November 15, 2012: 3rd ETS
(4) November 30, 2012: 4th ETS
(5) December 13, 2012: 5th ETS
(6) December 27, 2012: 6th ETS
(7) January 10, 2013: 7th ETS
(8) January 17, 2013: 8th ETS

The second TTCT test was done on January 23, 2013 as the posttest.

5.2.9 TTCT Tests before the Idea-Marathon Lecture at D University

5.2.9.1 t-Test Results of TTCT Pre-Posttests Score

Between the Pretest and the Posttest with a three month Idea-Marathon practice in D University, a statistically significant difference was found for the Norm Reference Measures: Total Score ($t(16)=5.016$, $p<.01$), Originality ($t(16)=3.107$, $p<.01$), Elaborations ($t(16)=3.915$, $p<.01$) and Resistance to Premature Closure ($t(16)=4.891$, $p<.01$). No significant difference was found for the component of Fluency and Abstractness of Titles (Table 9)

	Change of Scores between Pre-& Post test			
	Pre-test	Post-test	*t* value	Sig.
Measurement	M(SD)	M(SD)		
Total Score	548(56)	605(37)	5.016	*p*<.01
Fluency	104(16)	105(20)	0.032	*n.s.*
Originality	98(15)	114(17)	3.107	*p*<.01
Elaborations	147(13)	158(3)	3.915	*p*<.01
Abstractness of Titles	107(21)	118(19)	1.651	*n.s.*
RPC	92(15)	110(17)	4.891	*p*<.01
M=Score Means SD=Standard Deviation				
df=16 *p*<.05 *p*<.01 (Two sided t-test)				

Table 9 t-Test Result of TTCT Scores of Pre-Posttest at D University

5.2.9.2 13 Item Creative Strength Criterion-Referenced Measures at D University

The comparison of TTCT Pretest and Posttest for the 13 item Creative Strength Criterion-Referenced Measures were tested by the Mann-Whitney U-test.

Out of 13 items, "Movement and Action" ($p<.01$), "Expressiveness of Titles" ($p<.01$), "Synthesis of Lines and Circles" ($p<.05$) "Extending or Breaking Boundaries" ($p<.01$) were significant. Total scores for all 13 items were tested by t-tests with a significance (t (16) =3.162, $p<.01$) (Table 10).

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	15	20		*n.s.*
2	Story-telling Articulateness	15	20		*n.s.*
3	Movement and action	13	22		*p*<.01
4	Expressiveness of Titles	14	21		*p*<.01
5	Synthesis of Incomplete Figures	16	19		*n.s.*
6	Synthesis of Lines or Circles	21	14		*p*<.05
7	Unusual Visualization	19	16		*n.s.*
8	Internal Visualization	16	19		*n.s.*
9	Extending or Breaking Boundaries	14	22		*p*<.01
10	Humor	17	18		*n.s.*
11	Richness of Imagery	17	18		*n.s.*
12	Colorfulness of Imagery	15	20		*n.s.*
13	Fantasy	15	20		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	10(3)	14(4)	3.162	*p*<.01
Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=16, *n.s.*:no significant, p<.01,p<.05					

Table 10 TTCT13 item Creative Strength Criterion-Referenced Measures at D University Students

5.2.9.3 ANOVA Analysis for Comparison of TTCT Norm-referenced Measures Pre-Posttest among Top, Middle, Low Group at D University

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest tests
TML: Top-, Middle-, and Low-scoring groups
T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

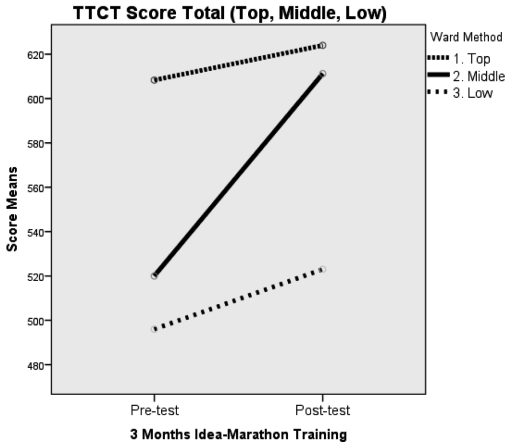
Top	6 students
Middle	9 students
Low	2 students
Total	17 students

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest (F (1, 14) =25.734, p<.01), and among TML (F(1,14)=19.267, p<.01), and the Bonferroni multiple comparison test confirmed significant results both within Pre-Posttest(Pretest < Posttest, $p < .05$) and among TML (p<.05).

An interaction was found within Pre-Posttest and among TML (F (2, 14) =12.612, p<.01, MSE=447.817). The Bonferroni multiple comparison test confirmed a significant main effect for the Middle group within Pre-Posttest (Pretest < Posttest, p<.05), while there were no significant results for Top or Low within the Pre–Post group.

At Pretest, there was significance between T-M and T-L (T > M, T > L, p<.05), but none between M-L (M > L). At Posttest, however, T-M (M < T) was not significant, indicating no difference between T-M at Posttest. Middle got closer to the Top (Figure 46).



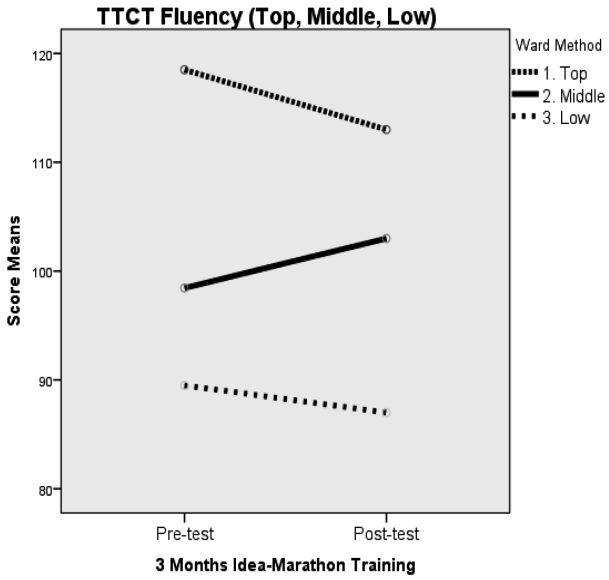
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	608.33	26.942	6
	2	520.00	24.648	9
	3	496.00	80.610	2
	Total	548.35	55.503	17
STL-Post	1	624.000	20.4548	6
	2	611.222	20.3026	9
	3	523.000	7.0711	2
	Total	605.353	36.5717	17

Figure 46 D University Score Total among TML

(2) Fluency

Concerning Fluency, there was significant main effects among TML ($F(1,14)=5.468$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results between T-L ($p<.05$), but there were no significant effects between T-M or M–L(T>M>L). No interaction was found (Figure 47).



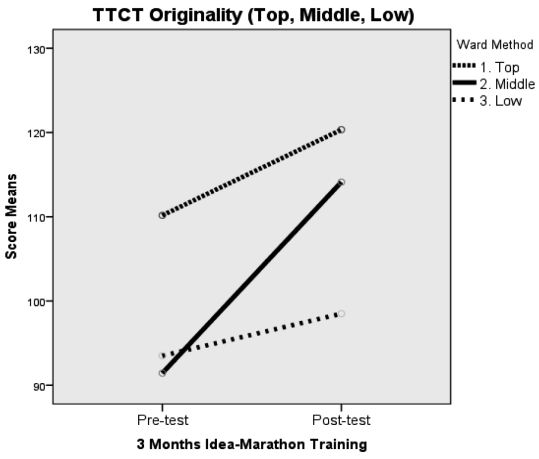
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	118.50	14.502	6
	2	98.44	10.309	9
	3	89.50	19.092	2
	Total	104.47	16.245	17
FLU-Post	1	113.00	25.322	6
	2	103.00	15.992	9
	3	87.00	0.000	2
	Total	104.65	19.871	17

Figure 47 D University Fluency among TML

(3) Originality

ANOVA analysis of Originality indicated no interaction or significant main effect within Pre-Posttest or among TML (Figure 48).



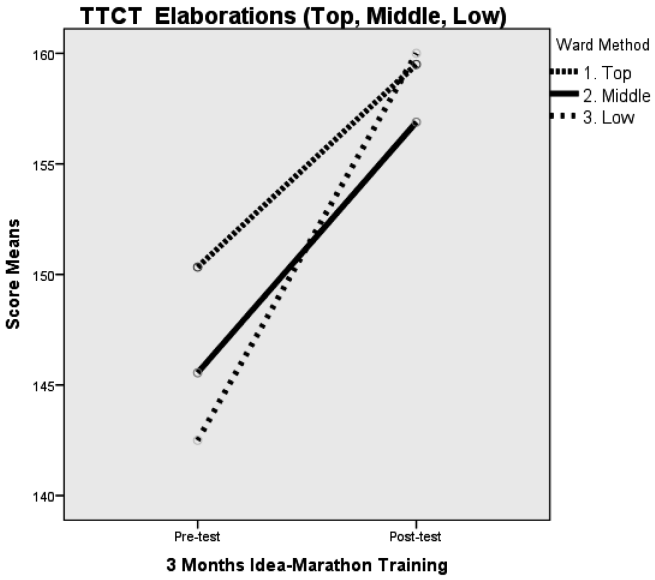
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	110.17	14.372	6
	2	91.44	13.097	9
	3	93.50	7.778	2
	Total	98.29	15.369	17
ORI-Post	1	120.33	20.383	6
	2	114.11	15.145	9
	3	98.50	7.778	2
	Total	114.47	17.121	17

Figure 48 D University Originality among TML

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for Pre-Posttest ($F(1,14)=12.037$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest < Posttest, $p<.05$). No interaction was found (Figure 49).



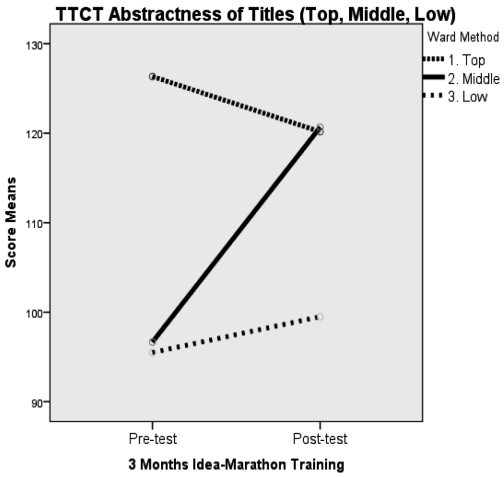
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	150.33	9.893	6
	2	145.56	14.380	9
	3	142.50	20.506	2
	Total	146.88	12.966	17
ELA-Post	1	159.50	1.225	6
	2	156.89	3.887	9
	3	160.00	0.000	2
	Total	158.18	3.167	17

Figure 49 D University Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,14)=4.424$, $p<.05$), and the Bonferroni multiple comparison test confirmed no significant results among TML. No interaction was found (Figure 50).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	126.33	12.848	6
	2	96.67	16.086	9
	3	95.50	19.092	2
	Total	107.00	20.506	17
ABT-Post	1	120.17	18.638	6
	2	120.67	20.316	9
	3	99.50	9.192	2
	Total	118.00	19.203	17

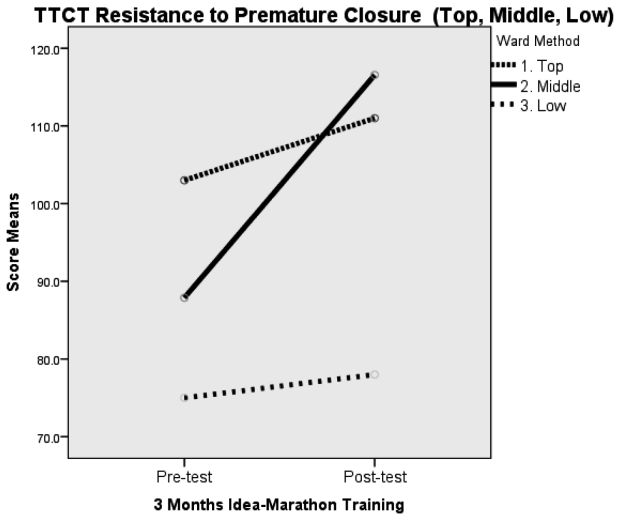
Figure 50 D University Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects among TML ($F(1,14)=5.554$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results between M-L and T-L ($p<.05$), but there were no significant effects between T-M. There were sig-

nificant main effects within Pre-Posttest ($F(1,14) = 16.110$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest ($p<.05$).
An interaction was found within Pre-Posttest and among TML ($F(2,14)=8.250$, $p<.01$, $MSE = 62.786$). The Bonferroni multiple comparison test confirmed a significant main effect for the Middle group within Pre-Posttest (Pretest < Posttest, p<.05), while there were no significant results for Top or Low within the Pre–Post group.

At Pretest, there was no significance among TML (T > M, M > L, T > L). At Posttest, however, M–L and T–L ((M > L and T > L, $p<.05$) were significant, indicating that Middle got higher than Top (Figure 51).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	103.000	11.1355	6
	2	87.889	14.0129	9
	3	75.000	14.1421	2
	Total	91.706	15.5031	17
RPC-Post	1	111.00	12.296	6
	2	116.56	12.768	9
	3	78.00	5.657	2
	Total	110.06	16.832	17

Figure 51 D University Resistance to Premature Closure among TML

5.2.10 Opinions of D University Students Who Participated in Idea-Marathon Class and Pre-Post TTCT Tests: 17 students

1 We actively operate our brain when we need to think for study or work purposes. At other times, our brains likely act unconsciously. But after I began the Idea-Marathon, I noticed that my brain was more active during my spare time, and I was starting to think more by watching, hearing, and drawing associations. By doing so, I was both creating new ideas and connecting old ideas with new ones. I had more time to think, but the time needed to create ideas is still too limited. In my circumstances, the reason I cannot create ideas quickly is that I am still a beginner of the Idea-Marathon, and there is a gap between my circumstances and my interest. But generally speaking, I can expect the powerful effect of the Idea-Marathon to grow as I continue it into the future. Though I just began filling my notebook, I will continue to fill it more as time continues.

2 Through the Idea-Marathon, I could more clearly focus on current items in need of my attention as well as set targets and goals for the future. Through my writing, I could imagine and think with greater ease and concreteness. This is great. Furthermore, I could leave my impressions about my personal moments in my notebook. From now on, I will keep my comments about movies and other events in my notebook.

3 The continual training of the Idea-Marathon increased my ability to continue working on a project or thought for an extended period of time and create long-term plans for the future. Another great effect of the training was the writing method and discussion protocol in meetings. After writing, more

participants could express their ideas and concepts effectively. The Idea-Marathon can be used for this purpose, too.

4 A positive trait I found in practicing the Idea-Marathon was that by writing the ideas into my notebook, I didn't forget the acquired ideas. As with any important decision, I was looking for the best possible reasons to select one over another. For example, there was an instance I was supposed to choose between two of my lectures for the next semester. At first, I got a little lost. But I wrote in my notebook a list of my own thoughts about possible decisions and made my decision based on that list. Furthermore, by turning my thinking into a custom, I feel I can make more suggestions and proposals in our meetings.

5 The Idea-Marathon helped me self-training my own idea creation by using sentences and drawings. If we can create and supply our ideas immediately upon request, it is quite useful for R&D. It is also highly useful that the Idea-Marathon encourages us to stock our ideas in our notebooks. I am not quite sure whether these accumulated ideas will invite serendipity to me or not. But a constantly growing stock of my own ideas is surely useful for my future.

6 The Idea-Marathon has helped me keep a continual habit going every day.

7 I understood thoroughly that I should maintain my own idea stockpile and keep them ready for quick retrieval. Though good ideas often come to our mind by chance, if I always keep my sensors open, I feel many more good ideas coming. I feel I attained a more rapid idea creation through participating in the circle activity and playing games. I can make better use of my time thanks to the Idea-Marathon.

8 Before the Idea-Marathon, I kept all my ideas in memory only and never wrote them onto paper. This lecture helped me create the habit of writing my ideas in memos. By writing the ideas, our brains can forget to memorize the idea until we have a use for the written ideas. Once we record the idea and put it aside, we can shift our brain activity toward thinking of new ideas. This thought method of putting ideas aside in notebooks is quite useful. I will keep using the Idea-Marathon.

9 I had experienced being unable to create ideas when requested to do so. On the other hand, I got some good ideas when doing nothing at all. Perhaps we do acquire better ideas when we are relaxing. Before I started the Idea-Marathon, I was just discarding good ideas by eventually forgetting them within the confines of my brain. Starting the Idea-Marathon has continued to yield many ideas.

10 By continuing the Idea-Marathon, I feel strongly that the Idea-Marathon can strengthen creativity, continuity, and concentration. Before the Idea-Marathon, creativity could rarely be obtained on the spot when necessary. But while I was doing the Idea-Marathon, I understood that everyday thinking practice could create deeper ideas. I believe in the power of continuity.

11 I got into the habit of memorizing ideas. This Idea-Marathon is good. I had never used paper for recording ideas before. During the Idea-Marathon, I was always checking and integrating my schedule. By writing my weekly plans in my notebook, I could maintain clear deadlines for my report. When I got even subtle ideas, I got used to using a memo or post-it to record it, and I am avoiding forgetting ideas.

12 The most important point of emphasis for my Idea-Marathon training was my re-confirmation of the importance of creativity. After graduation, I will most probably be engaged with an R&D department within a company. In order to succeed in that position, I should make idea creation a habit.

13 I can review what I wrote in my notebook before, and I think that ability is a great thing. What I think in my brain can be forgotten within a few days if not written down immediately. I could better secure specific time for thinking in my life. Before I started the Idea-Marathon, I never kept a notebook with me all the time, even when ideas occurred to me. But now I am writing my ideas and

expressing them in sentences. I could delete discrepancies and contradictions and make my thinking more logical.

14 Through the Idea-Marathon, I could review my ideas at a later time. Before learning this method, I had difficulty retaining ideas and plans, as I did not write them down. I just forgot them. After the Idea-Marathon, I tried to write all ideas and items to attend to as often as possible. I could review my notebooks and retrieve ideas and to-do items from my memory.

15 I think the best merit of the Idea-Marathon is the freedom to choose idea subjects. I noticed that no matter what the idea was, even a subtle one every day can be a good idea. Through the Idea-Marathon I made myself very agile in the recording of my ideas.

16 Through the Idea-Marathon, I was changed in my position and approach to study, work, and activity. I was usually very steady in solving problems. But because of this steadiness, my efficiency was low, and ideas took too much time. Through this steady passing of time, I likely lost my direction by taking too much time. I could not formulate results. Through the instant power of the Idea-Marathon, I created quantity rather than quality. But out of quantity, we choose the best idea. Later, I found myself listing simultaneous ideas and comparing them. And I chose the best of the two, and my efficiency of idea creation is now higher.

17 I have a long-term habit of creating new ideas thanks to the Idea-Marathon. I don't feel any trouble creating ideas now. I can create my ideas in a shorter time than before. These accumulated ideas are really helping me with the theme of my graduation thesis and in looking for a job after graduation. I just look at my ideas in my notebooks. I think the Idea-Marathon will help me in the future.

5.2.11 D University Study Discussion

5.2.11.1 Reversed Type Test

We reversed the order of the TTCT tests, using the Type B test as the pretest and Type A as the posttest, to confirm that there was no difference in difficulty between the two tests. We usually use TTCT Figural Type A as the Pretest and Type B as the Posttest in many of our experiments in this dissertations.

Suppose that TTCT Figural Type B test is easier than Type A, the score of Type B is naturally higher than Type A. We tried to confirm the degree of easiness or difficulty between these two types of TTCT Figural tests by reversing the test order as Type B for the Pretest and Type A for the Posttest.

The results showed no difference, because D University students scores improved under the reverse test design.

The TTCT test results indicated the favorable effects of the Idea-Marathon system on the creativity components of not only Norm Referenced Measures but 13 items Criterion Referenced Measures. Since genders are not clarified in the test data, we did not apply by gender tests.

5.2.11.2 ANOVA Analysis of Pre-Posttest Among Top, Middle and Low Scores

In the Top, Middle, and Low test scores, there were interactions in Total Score and Resistance to Premature Closure indicating improvement of the Middle group. The Middle group scored higher than the Top group for Resistance to Premature Closure on the posttest. According to the graphical data, the Middle score improved for Fluency, Originality, Elaborations, and Abstractness of Titles. There were nine students in the Middle group, which is 53% of the total. The Top declined a little in Fluency and Abstractness of Titles.

5.2.11.3 Affirmative Comments of IMS Participants

All students participating in both the Idea-Marathon lectures and the TTCT pretest and posttest commented on the various effects of the Idea-Marathon on themselves.

As shown by the TTCT scores and student comments, the Idea-Marathon system improves creativity. In the case of D University, enthusiastic Team Teaching Assistants (TTA) clearly made Idea-Marathon training smoother.

5.2.11.4 The Importance of Team Teaching Experts (TTA)

At the earlier stage of the Idea-Marathon, even at D University, without the TTAs and ETS Support System, half of the students would have stopped the Idea-Marathon system within one week.

All TTAs implemented the Idea-Marathon well, which suggests ideal education styles. In companies and laboratories especially, the internal organization of TTAs for expanding the Idea-Marathon through a mentor system is likely of benefit. The Idea-Marathon is often included as a training program for new company employees, and implementation of the Team Teaching Expert (TTX) system is likely also beneficial. Three months of Idea-Marathon training was generally effective toward improving creativity.

5.2.11.5 Today Almost All Sophomore Students at D University Are Participating in the Idea-Marathon

Since 2013, almost all sophomore students have participated in career-development courses, including the Idea-Marathon system. In the near future, all D University sophomore and higher students will undergo Idea-Marathon training with a number of Team Teaching Assistants. We will investigate the resulting educational effects.

5.3 K University

5.3.1 K University Summary

This chapter presents the creativity efforts of three months of the Idea-Marathon Training for undergraduate students of K University, Ishikawa Prefecture, Japan.

As a result of the t-Test analysis within two TTCT Pre-Posttest before and after, the With IMS (experimental) group had statistically significant improvement in TTCT creative Norm Referenced Measures, such as “Total score”, “Fluency” and “RPC”.

As for the Without IMS (control) group, t-test indicated that statistically significant improvement was found in Originality. In ANOVA analysis, there was no significant result between Genders nor interactions among all the Norms Referenced Measures.

The ANOVA analysis of Top, Middle and Low groups (by Cluster Analysis) indicated that the Middle group improved significantly.

5.3.2 The Idea-Marathon Lecture at K University

The Idea-Marathon lecturer tried to give maximum motivation to all the students so that every students would initiate the Idea-Marathon on that day in class by their own will.

5.3.3 Support System for the Idea-Marathon

5.3.3.1 ETS (e-Training System) at K University

The ETS (e-Training System) is the monitoring, commenting and support system for trainees in the Idea-Marathon course, which was first developed by Higuchi in 2005 for the training of newly employed staff in companies.

At the end of the first lesson in K University, students were requested to participate in the ETS. Even if almost all of the students are highly motivated to start the Idea-Marathon at the time of the first Idea-Marathon lecture, it is quite common that their motivation can start declining after just three days. The brain cannot maintain the same memory with the same level of motivation for more than three days, unless there is additional motivation given.

Therefore, if students are left on their own after the first Idea-Marathon lecture, almost 60% to 80% are expected to fade out of the practice within a few days. However, if students are told at the end of the first lesson that they are going to report their number of ideas to their teacher after one week, they keep this subject in their minds all the time for more than 3 days with sustained motivation.

After one week, after one and a half months and after three months, the results of these reports (ETS-1) are shown in Table 1. This shows how important it is to use the ETS, since three months later the medium (or slow starting students) become accustomed to using the Idea-Marathon. They are able to maintain their motivation.

We focus on sending encouraging messages to slower students encouraging them to think about and write down their ideas to re-start their Idea-Marathon notebooks (Table 11).

Students' number	IMS Start Date	First Report day	Days Passed	Number of Ideas	Reply to Students with Comments in Japanese	Second Report day	Days Passed	Number of Ideas	Reply to Students with Comments in Japanese	Third Report day	Days Passed	Number of Ideas	Reply to Students with Comments in Japanese
1	2012/5/31	2012/6/15	16	3	Personal comments in Japanese blinded	2012/6/29	30	3	Personal comments in Japanese blinded	2012/7/13	44	30	Personal comments in Japanese blinded
2	2012/5/31	2012/6/15	16	10	Personal comments in Japanese blinded	2012/6/29	30	25	Personal comments in Japanese blinded	2012/7/13	44	57	Personal comments in Japanese blinded
3	2012/5/31	2012/6/15	16	17	Personal comments in Japanese blinded	2012/6/29	30	19	Personal comments in Japanese blinded	2012/7/13	44	19	Personal comments in Japanese blinded
4	2012/5/31	2012/6/15	16	3	Personal comments in Japanese blinded	2012/6/29	30	5	Personal comments in Japanese blinded	2012/7/13	44	10	Personal comments in Japanese blinded
5	2012/5/31	2012/6/15	16	5	Personal comments in Japanese blinded	2012/6/29	30	35	Personal comments in Japanese blinded	2012/7/13	44	50	Personal comments in Japanese blinded
6	2012/5/31	2012/6/15	16	10	Personal comments in Japanese blinded	2012/6/29	30	30	Personal comments in Japanese blinded	2012/7/13	44	35	Personal comments in Japanese blinded
7	2012/5/31	2012/6/15	16	0	Personal comments in Japanese blinded	2012/6/29	30	43	Personal comments in Japanese blinded	2012/7/13	44	45	Personal comments in Japanese blinded
8	2012/5/31	2012/6/15	16	0	Personal comments in Japanese blinded	2012/6/29	30	5	Personal comments in Japanese blinded	2012/7/13	44	40	Personal comments in Japanese blinded
9	2012/5/31	2012/6/15	16	50	Personal comments in Japanese blinded	2012/6/29	30	80	Personal comments in Japanese blinded	2012/7/13	44	140	Personal comments in Japanese blinded
10	2012/5/31	2012/6/15	16	4	Personal comments in Japanese blinded	2012/6/29	30	10	Personal comments in Japanese blinded	2012/7/13	44	15	Personal comments in Japanese blinded
11	2012/5/31	2012/6/15	16	20	Personal comments in Japanese blinded	2012/6/29	30	25	Personal comments in Japanese blinded	2012/7/13	44	60	Personal comments in Japanese blinded
12	2012/5/31	2012/6/15	16	13	Personal comments in Japanese blinded	2012/6/29	30	50	Personal comments in Japanese blinded	2012/7/13	44	20	Personal comments in Japanese blinded
13	2012/5/31	2012/6/15	16	9	Personal comments in Japanese blinded	2012/6/29	30	20	Personal comments in Japanese blinded	2012/7/13	44	75	Personal comments in Japanese blinded
14	2012/5/31	2012/6/15	16	0	Personal comments in Japanese blinded	2012/6/29	30	12	Personal comments in Japanese blinded	2012/7/13	44	16	Personal comments in Japanese blinded
15	2012/5/31	2012/6/15	16	0	Personal comments in Japanese blinded	2012/6/29	30	6	Personal comments in Japanese blinded	2012/7/13	44	10	Personal comments in Japanese blinded
16	2012/5/31	2012/6/15	16	2	Personal comments in Japanese blinded	2012/6/29	30	5	Personal comments in Japanese blinded	2012/7/13	44	28	Personal comments in Japanese blinded
17	2012/5/31	2012/6/15	16	8	Personal comments in Japanese blinded	2012/6/29	30	2	Personal comments in Japanese blinded	2012/7/13	44	14	Personal comments in Japanese blinded
18	2012/5/31	2012/6/15	16	5	Personal comments in Japanese blinded	2012/6/29	30	20	Personal comments in Japanese blinded	2012/7/13	44	38	Personal comments in Japanese blinded
19	2012/5/31	2012/6/15	16	15	Personal comments in Japanese blinded	2012/6/29	30	20	Personal comments in Japanese blinded	2012/7/13	44	30	Personal comments in Japanese blinded
20	2012/5/31	2012/6/15	16	10	Personal comments in Japanese blinded	2012/6/29	30	10	Personal comments in Japanese blinded	2012/7/13	44	10	Personal comments in Japanese blinded
21	2012/5/31	2012/6/15	16	3	Personal comments in Japanese blinded	2012/6/29	30	19	Personal comments in Japanese blinded	2012/7/13	44	142	Personal comments in Japanese blinded
22	2012/5/31	2012/6/15	16	15	Personal comments in Japanese blinded	2012/6/29	30	28	Personal comments in Japanese blinded	2012/7/13	44	34	Personal comments in Japanese blinded
23	2012/5/31	2012/6/15	16	5	Personal comments in Japanese blinded	2012/6/29	30	5	Personal comments in Japanese blinded	2012/7/13	44	5	Personal comments in Japanese blinded
24	2012/5/31	2012/6/15	16	4	Personal comments in Japanese blinded	2012/6/29	30	8	Personal comments in Japanese blinded	2012/7/13	44	10	Personal comments in Japanese blinded
25	2012/5/31	2012/6/15	16	10	Personal comments in Japanese blinded	2012/6/29	30	10	Personal comments in Japanese blinded	2012/7/13	44	50	Personal comments in Japanese blinded
26	2012/5/31	2012/6/15	16	3	Personal comments in Japanese blinded	2012/6/29	30	16	Personal comments in Japanese blinded	2012/7/13	44	38	Personal comments in Japanese blinded
27	2012/5/31	2012/6/15	16	0	Personal comments in Japanese blinded	2012/6/29	30	19	Personal comments in Japanese blinded	2012/7/13	44	19	Personal comments in Japanese blinded
		Total Ideas written in all students notebooks		224		Total Ideas written in all students notebooks		527		Total Ideas written in all students notebooks		1,040	
										Idea Numbers per student per day		0.91	

Table 11 ETS Data for Experimental Group at K University

5.3.3.2 Weekly Supply of e-Hints by Internet

All the Idea-Marathon participants of the K University students received e-Hints every week, from which they could create their own new ideas.

Some examples of e-Hints are:

(1) Create a new Sushi recipe

(2) Think of a new type of vending machine

(3) Imagine new functions and uses for a calculator

The students had been supplied with Weekly e-Hints throughout the full period of the class. After sending e-Hints for half a year, students became used to creating ideas from the e-Hints, as well as original ideas from their own idea themes. E-Hints are an approach providing a run up to and springboard for students' creative development.

5.3.3.3 Recommendations for Utilizing Teaching Assistants

A habit-making training like the Idea-Marathon Method becomes more effective with the use of teaching assistants (TAs). Wortman (1997) strongly recommends the use of TAs, even using junior or senior undergraduate students from the same university [59]

Wortman says TAs will make the class more enjoyable and active. But for the Idea-Marathon, TAs, if they have been practicing the Idea-Marathon before the students by themselves and understanding the various advantages out of the continuation, can enable students to continue to walk the long distance of the Idea-Marathon training. TAs can also understand the most important educational point that "teaching is the best studying and self-encouragement."

5.3.4 The TTCT Pre-Posttest for K University Students

5.3.4.1 TTCT Tests Schedule for With IMS (experimental) Group and Without IMS (Control) Group

Two TTCT Figural tests of the Pretest on May 24, 2012 and the Posttest on Sept 21, 2012 were administered for two groups of K University freshmen students, one for With IMS (experimental) group and another for Without IMS (control) group.

5.3.4.2 t-Test Result of TTCT Tests Pre-Posttest for With IMS (experimental) Group

The TTCT Figural Tests for With IMS (Experimental) Group of students, found statistically significant differences for Total Score ($t(25)=2.27$, $p<.05$), and for the components of Fluency ($t(25)=3.091$, $p<.01$) and RPC ($t(25)=4.409$, $p<.01$). No significant differences were found for the components of Originality, Elaborations or Abstractness of Titles (Table 12).

	Change of Scores between			
	Pre-test	Post-test	*t* value	Sig.
Measurement	M(SD)	M(SD)		
Total Score	510(68)	547(81)	2.270	*p<.05*
Fluency	90(20)	103(21)	3.091	*p<.01*
Originality	99(23)	103(23)	0.903	*n.s.*
Elaborations	149(13)	143(24)	1.398	*n.s.*
Abstractness of Titles	96(16)	103(22)	1.450	*n.s.*
RPC	77(14)	95(22)	4.409	*p<.01*
M=Score Means SD=Standard Deviation				
df=25 p<.05 p<.01 (Two sided t-test)				

Table 12 t-Test Results for the TTCT Pre-Posttest for With IMS (Experimental) Group Students at K University

5.3.4.3 t-Test Result of TTCT Tests Pre-Posttest for Without IMS (control) Group

The TTCT Figural Tests for Without IMS (control) group students found statistically significant difference for Originality ($t(15)=2.228$, $p<.05$) but no significant difference were found for Total Score, Fluency, Elaborations, Abstractness of Titles or RPC (Table 13).

	Change of Scores between Pre- & Post test			
	Pre-test	Post-test	*t* value	Sig.
Measurement	M(SD)	M(SD)		
Total Score	450(84)	461(153)	0.380	*n.s.*
Fluency	77(21)	90(28)	1.825	*n.s.*
Originality	79(19)	92(28)	2.228	*p<.05*
Elaborations	130(37)	120(40)	1.323	*n.s.*
Abstractness of Titles	92(16)	75(44)	1.762	*n.s.*
RPC	72(9)	83(30)	1.615	*n.s.*
		M=Score Means SD=Standard Deviation		
		df=15 *p*<.05 *p*<.01 (Two sided t-test)		

Table 13 t-Test Results for the TTCT Pretest and Posttest for Without IMS (Control) Group Students at K University

5.3.4.4 13 Items Creative Strength Criterion Referenced Measures Analyzing Idea-Marathon Experimental Group

TTCT Figural Pre-Posttests for the Experimental Group of K University was analyzed by Mann-Whitney U-test for 13 Items Creative Strength-Criterion Referenced Measures and the Score Total was by t-test.

Out of 13 items of Creative Strength Criterion Reference Measures, “Synthesis of Lines or Circles” and “Fantasy” are significant (p<.05) (Table 14).

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	29	24		*n.s*
2	Story-telling Articulateness	26	27		*n.s*
3	Movement and action	25	28		*n.s*
4	Expressiveness of Titles	28	25		*n.s*
5	Synthesis of Incomplete Figures	27	27		*n.s*
6	Synthesis of Lines or Circles	22	31		*p<.05*
7	Unusual Visualization	27	26		*n.s*
8	Internal Visualization	28	25		*n.s*
9	Extending or Breaking Boundaries	30	23		*n.s*
10	Humor	24	29		*n.s*
11	Richness of Imagery	29	24		*n.s*
12	Colorfulness of Imagery	27	26		*n.s*
13	Fantasy	30	21		*p<.05*
14	Score Total of 13 Creative Strength M(SD)	11(4)	10(4)	1.281	*n.s*
	Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=15, *n.s.*:no significant, p<.01,p<.05				

Table 14 13 items Creative Strength Criterion Reference Measures at K University

5.3.5 The ANOVA Analysis of the TTCT Score in K University

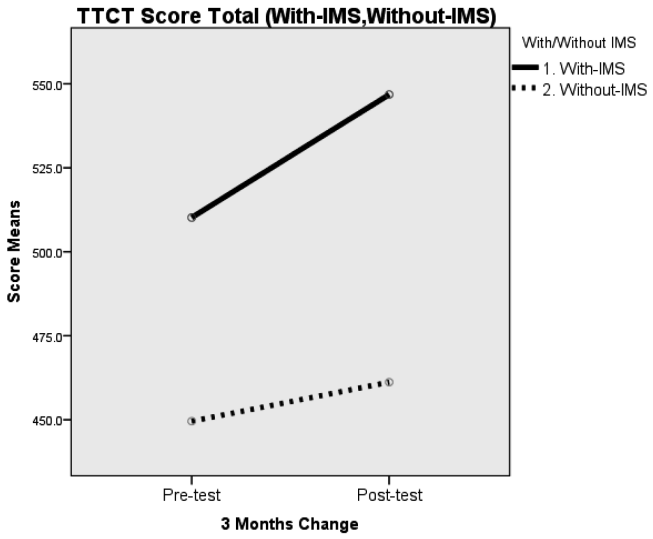
5.3.5.1 ANOVA Analysis for Comparison of TTCT Norm-Referenced Measures Pre-Post Between With IMS (experimental) group and Without IMS (control) Groups at K University

Abbreviations and Acronyms

IMS: Idea Marathon System
With IMS: The experimental group of students who are practicing Idea Marathon
Without IMS: The control group of students who are not practicing Idea Marathon
Pre-Posttest: Pretest and Posttest
MSE: Mean Square Error

(1) Score Total

ANOVA analysis of Score Total indicated significant results for main effects for With IMS and Without IMS (F (1,40)=7.845, p<.01), and the Bonferroni multiple comparison test confirmed significant results (p<.05). No interaction was found (Figure 52).



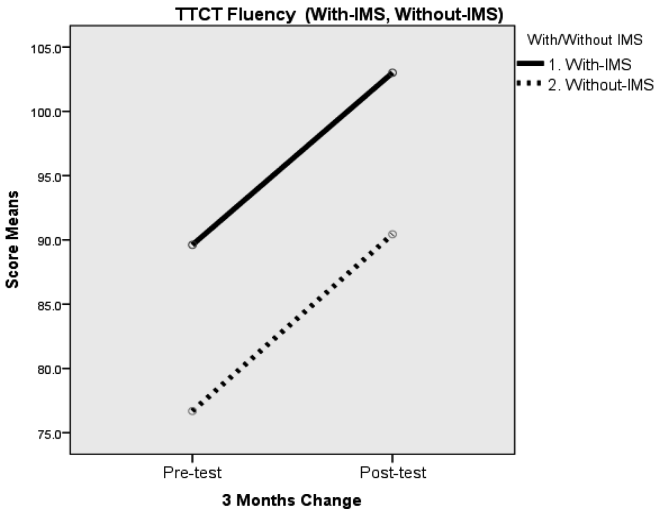
Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
STL-Pre	With IMS	510.192	67.5390	26
	Without IMS	449.563	84.2860	16
	Total	487.095	79.1740	42
STL-Post	With IMS	546.808	80.9489	26
	Without IMS	461.188	153.2546	16
	Total	514.190	119.8304	42

Figure 52 K University Score Total With/Without IMS

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest (F(1, 40)=11.300, p<.01) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, p<.05), and for With IMS and Without IMS (F(1,40)=4.793, p<.05), and the Bonferroni multiple comparison test confirmed significant results for With IMS and Without IMS (p<.05). No interaction was found (Figure 53).



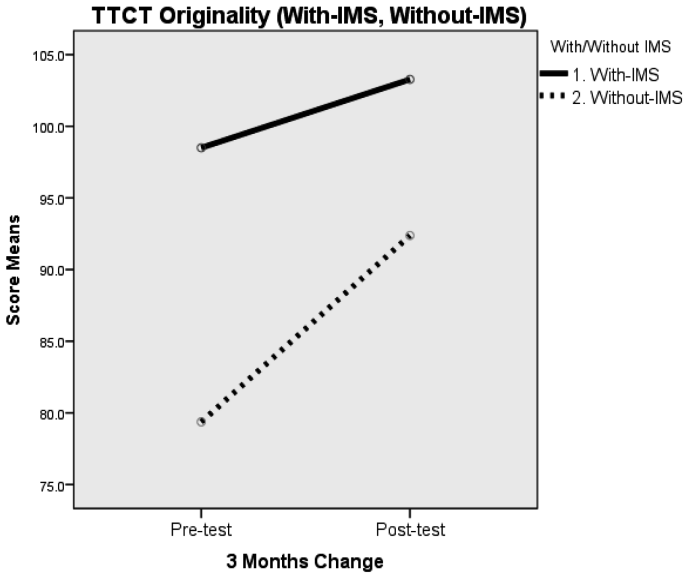
Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
FLU-Pre	With IMS	89.615	20.2644	26
	Without IMS	76.688	20.9021	16
	Total	84.690	21.2276	42
FLU-Post	With IMS	103.000	20.8940	26
	Without IMS	90.438	28.3195	16
	Total	98.214	24.4486	42

Figure 53 K University Fluency With/Without IMS

(3) Originality

ANOVA analysis of Originality indicated significant results for main effects for Pre-Posttest ($F(1, 40)=4.759$, $p<.05$) and the Bonferroni multiple comparison test confirmed significant results (Pre-test<Posttest, $p<.05$), and for With IMS and Without IMS ($F(1,40)=6.079$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results for With IMS and Without IMS ($p<.05$). No interaction was found (Figure 54).



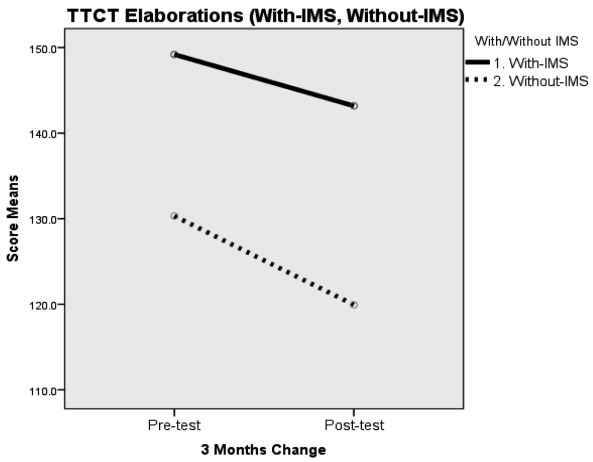
Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
ORI-Pre	With IMS	98.500	22.5712	26
	Without IMS	79.375	18.7896	16
	Total	91.214	22.9820	42
ORI-Post	With IMS	103.269	22.5930	26
	Without IMS	92.375	27.9473	16
	Total	99.119	25.0134	42

Figure 54 K University Originality With/Without IMS

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for With IMS and Without IMS ($F(1,40)=6.925$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results ($p<.05$). No interaction was found (Figure 55).



Descriptive Statistics

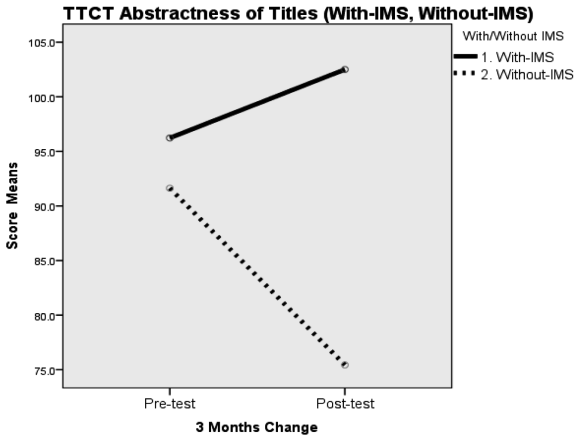
With/Without IMS		Mean	Std. Deviation	N
ELA-Pre	With IMS	149.192	13.1545	26
	Without IMS	130.313	37.3251	16
	Total	142.000	26.4824	42
ELA-Post	With IMS	143.192	24.3820	26
	Without IMS	119.938	40.0507	16
	Total	134.333	32.8631	42

Figure 55 K University Elaborations With/Without IMS

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated significant results for main effects for With IMS and Without IMS ($F(1, 40)=5.671$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results ($p<.05$).

An interaction was found within Pre-Posttest and between With IMS and Without IMS ($F(1,40)=6.176$, $p<.05$, $MSE = 404.419$). A simple main effect was confirmed as significant by the Bonferroni multiple comparison for Without IMS within Pre-Posttest (Pretest > Posttest, $p<.05$), and there was no significance at Pretest between With IMS and Without IMS (Without IMS < With IMS), but significance appeared at Posttest (Without IMS < With IMS, $p<.05$). This indicates the wider difference between With IMS and Without IMS in Posttest (Figure 56).



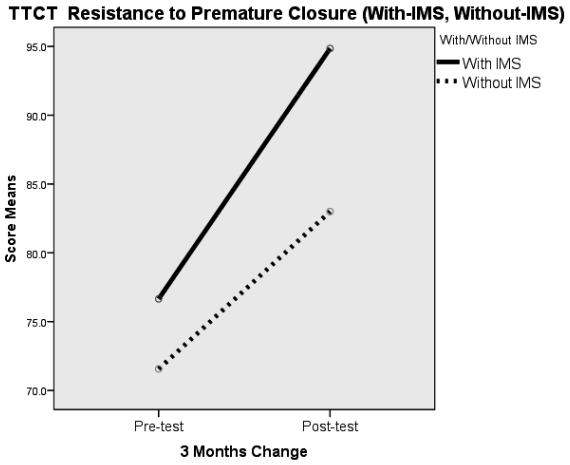
Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
ABT-Pre	With IMS	96.231	15.8071	26
	Without IMS	91.625	16.1488	16
	Total	94.476	15.9025	42
ABT-Post	With IMS	102.500	21.6005	26
	Without IMS	75.438	44.2598	16
	Total	92.190	34.3236	42

Figure 56 K University Abstractness of Titles With/Without IMS

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,40)=15.052$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 57).



Descriptive Statistics

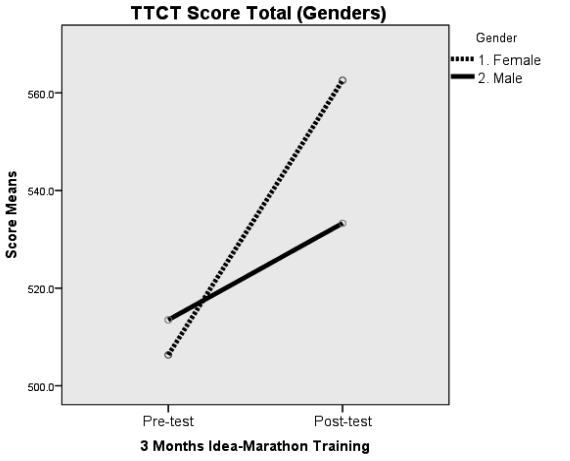
With/Without IMS		Mean	Std. Deviation	N
RPC-Pre	With IMS	76.654	14.1193	26
	Without IMS	71.563	9.3735	16
	Total	74.714	12.6477	42
RPC-Post	With IMS	94.846	22.3744	26
	Without IMS	83.000	30.0178	16
	Total	90.333	25.8614	42

Figure 57 K University Resistance to Premature Closure With/Without IMS

5.3.5.2 ANOVA Analysis for Comparison of TTCT Norm Referenced Measures Pre-Posttest between Genders at K University

(1) Score Total

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest ($F(1,24)=9.187$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 58).



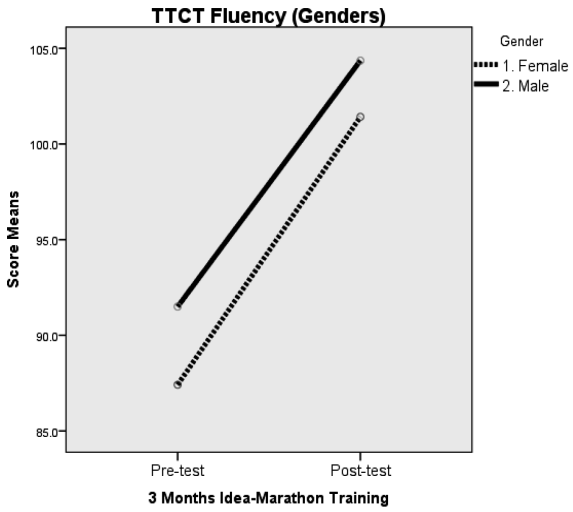
Descriptive Statistics

Gender		Mean	Std. Deviation	N
STL-Pre	F	506.333	55.0493	12
	M	513.500	78.6284	14
	Total	510.192	67.5390	26
STL-Post	F	562.583	77.3862	12
	M	533.286	84.3057	14
	Total	546.808	80.9489	26

Figure 58 K University Score Total in Genders

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest ($F(1,24)=9.187$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 59).

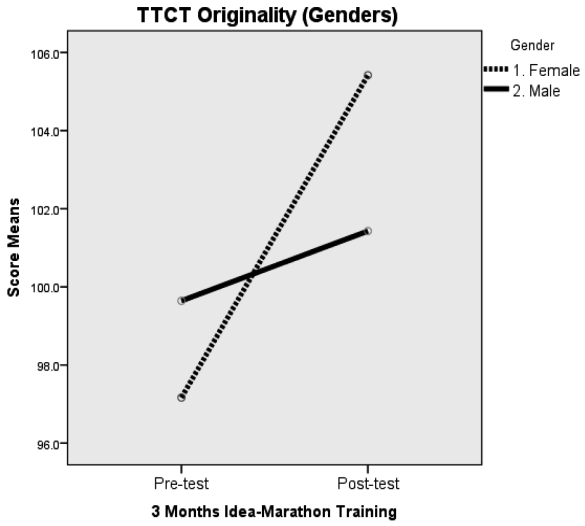


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
FLU-Pre	F	87.417	16.2002	12
	M	91.500	23.6505	14
	Total	89.615	20.2644	26
FLU-Post	F	101.417	19.6027	12
	M	104.357	22.5852	14
	Total	103.000	20.8940	26

Figure 59 K University Fluency in Genders

(3) Originality

ANOVA analysis of Originality indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 60).

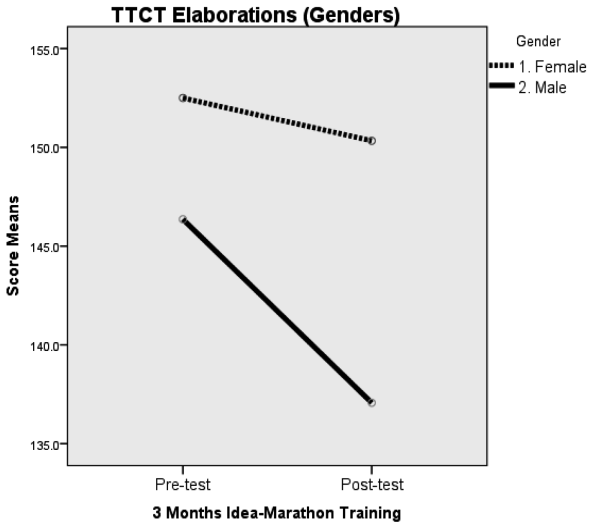


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ORI-Pre	F	97.167	14.7206	12
	M	99.643	28.1660	14
	Total	98.500	22.5712	26
ORI-Post	F	105.417	21.5046	12
	M	101.429	24.1333	14
	Total	103.269	22.5930	26

Figure 60 K University Originality in Genders

(4) Elaborations

ANOVA analysis of Elaborations indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 61).

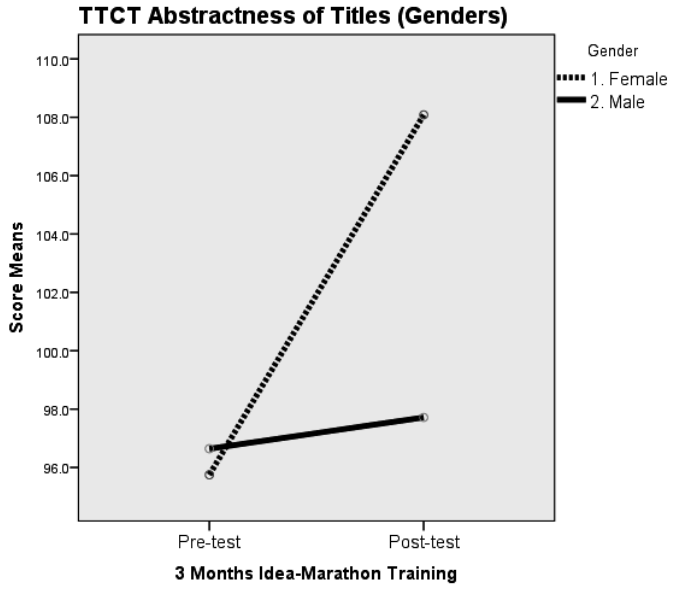


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ELA-Pre	F	152.500	11.8283	12
	M	146.357	13.9868	14
	Total	149.192	13.1545	26
ELA-Post	F	150.333	22.5765	12
	M	137.071	24.9907	14
	Total	143.192	24.3820	26

Figure 61 K University Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 62).

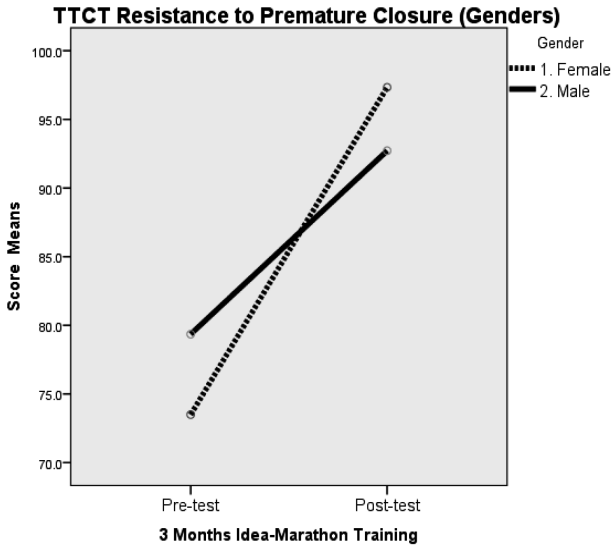


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ABT-Pre	F	95.750	16.1252	12
	M	96.643	16.1274	14
	Total	96.231	15.8071	26
ABT-Post	F	108.083	19.1618	12
	M	97.714	23.0899	14
	Total	102.500	21.6005	26

Figure 62 K University Abstractness of Titles in Genders

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,24)=20.710$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 63).



Descriptive Statistics

Gender		Mean	Std. Deviation	N
RPC-Pre	F	73.500	10.6728	12
	M	79.357	16.4298	14
	Total	76.654	14.1193	26
RPC-Post	F	97.333	23.7232	12
	M	92.714	21.8154	14
	Total	94.846	22.3744	26

Figure 63 K University Resistance to Premature Closure in Genders

5.3.5.3 ANOVA Analysis for Comparison of TTCT Norm-Referenced Measures in Pre-Posttest and Top, Middle, Low Groups at K University

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest
TML: Top-, Middle-, and Low-scoring groups
T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

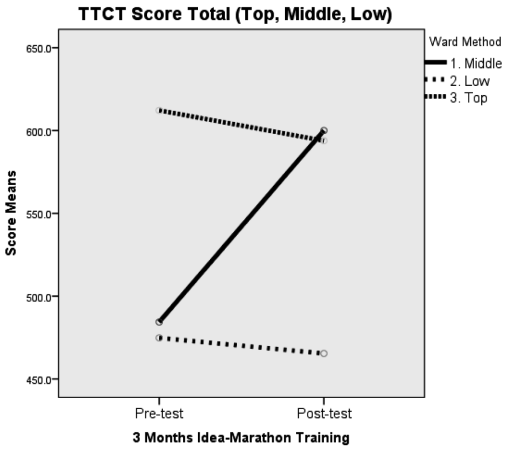
Top	6 students
Middle	10 students
Low	10 students
Total	26 students

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest ($F(1,23)=7.180$, $p<.05$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$) Among TML ($F(1,23)=29.119$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,23)=17.335$, $p<.01$, MSE = 1466.307). The Bonferroni multiple comparison test confirmed a significant main effect for Middle group within Pre-Posttest (Pretest < Posttest, $p<.05$), while there was no significant results for Top and Low group within the Pre-Posttest.

At Pretest, there was significance T-M and T-L (T > M and T > L, p<.05), but none between M–L (M > L). At Posttest, however, T-M (T < M) was not significant, indicating no difference between T-M. Middle got higher than Top (Figure 64).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	484.400	51.3641	10
	2	474.800	26.2501	10
	3	612.167	22.4537	6
	Total	510.192	67.5390	26
STL-Post	1	600.000	39.6961	10
	2	465.400	53.2900	10
	3	593.833	56.9962	6
	Total	546.808	80.9489	26

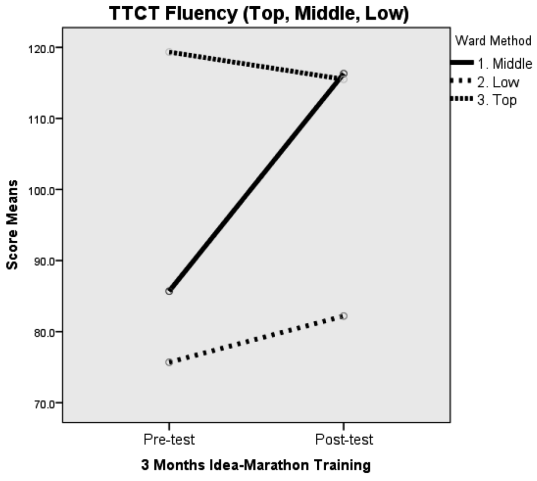
Figure 64 K University Score Total among TML

(2) Fluency

Concerning Fluency, there were significant main effects within Pre-Posttest (F(1,23)=9.963, p<.01) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest p<.05). Among TML (F(1,23)=41.483, p<.01), and the Bonferroni multiple comparison test confirmed significant results among TML(p<.05).

An interaction was found within Pre-Posttest and among TML (F(2,23)=8.610, p<.01, MSE = 151.472). The Bonferroni multiple comparison test confirmed a significant main effect for Middle group within Pre-Posttest (Pretest < Posttest, p<.05) while there were no significant results for Top and Low group within the Pre-Posttest.

At Pretest, there was significance between T-M and T-L (T > M and T > L, p<.05), but none between M–L (M > L). At Posttest, however, T-M (T < M) was not significant, indicating no difference between T-M. Middle got higher than Top (Figure 65).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	85.700	13.7764	10
	2	75.700	10.2746	10
	3	119.333	6.6232	6
	Total	89.615	20.2644	26
FLU-Post	1	116.300	16.6136	10
	2	82.200	7.6274	10
	3	115.500	13.2174	6
	Total	103.000	20.8940	26

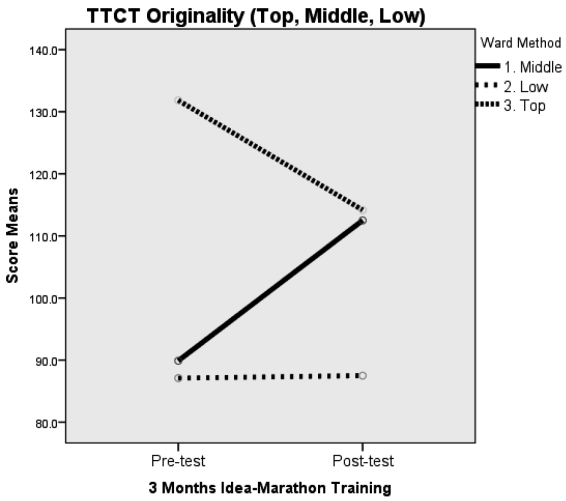
Figure 65 K University Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects among TML ($F(1,23)=15.989$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L and T-M ($p<.05$), but there were no significant effects between M–L.

An interaction was found within Pre-Posttest and among TML ($F(2,23)=6.267$, $p<.01$, $MSE=254.916$). The Bonferroni multiple comparison test confirmed a significant main effect for Middle within Pre-Posttest (Pretest < Posttest, $p<.05$), while there were no significant results for Top or Low within the Pre–Post group.

At Pretest, there was significance between T-M and T–L (T > M, T > L, $p<.05$), but none between M–L (M > L). At Posttest, however, T-M (T > M) was not significant, indicating no difference between T-M at Posttest. Middle got closer to the Top (Figure 66).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	89.900	16.1964	10
	2	87.100	10.5246	10
	3	131.833	11.6003	6
	Total	98.500	22.5712	26
ORI-Post	1	112.500	23.1721	10
	2	87.500	10.4270	10
	3	114.167	24.0783	6
	Total	103.269	22.5930	26

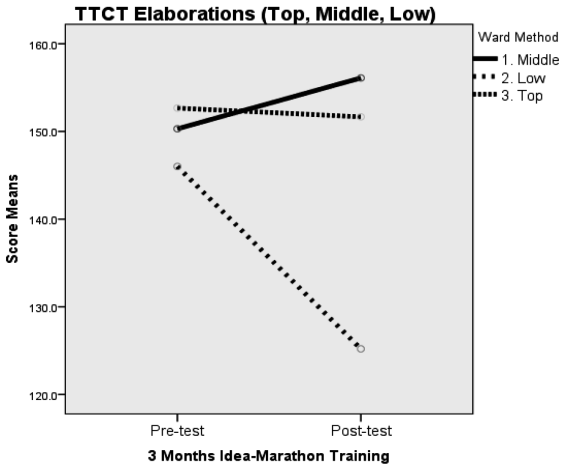
Figure 66 K University Originality among TML

(4) Elaborations

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,23)=4.400$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results between T-L and T-M ($p<.05$), but there were no significant effects between M–L.

An interaction was found within Pre-Posttest and among TML ($F(2,23)=5.214$, $p<.05$, $MSE=178.983$). The Bonferroni multiple comparison test confirmed a significant main effect for the Low group within Pre-Posttest (Pretest > Posttest, $p<.05$), while there were no significant results for Top or Middle within the Pre–Post group.

At Pretest, there was no significance among TML (T > M, M > L, T > L, $p<.05$). At Posttest, however, M–L (M > L, $p<.05$) was significant, while M-T and T-L were not significant (M> T), indicating bigger difference between M–L at Posttest. Middle is higher than Top and Low went down in Posttest (Figure 67).



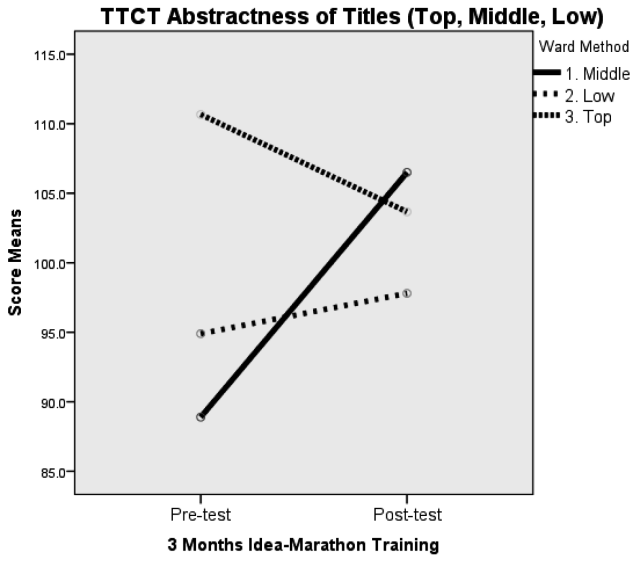
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	150.300	11.4412	10
	2	146.000	12.2384	10
	3	152.667	17.9629	6
	Total	149.192	13.1545	26
ELA-Post	1	156.100	3.4140	10
	2	125.200	31.7833	10
	3	151.667	8.1404	6
	Total	143.192	24.3820	26

Figure 67 K University Elaborations among TML

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or among TML (Figure 68).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	88.900	14.9254	10
	2	94.900	14.4488	10
	3	110.667	10.5578	6
	Total	96.231	15.8071	26
ABT-Post	1	106.500	16.1813	10
	2	97.800	21.8927	10
	3	103.667	30.3491	6
	Total	102.500	21.6005	26

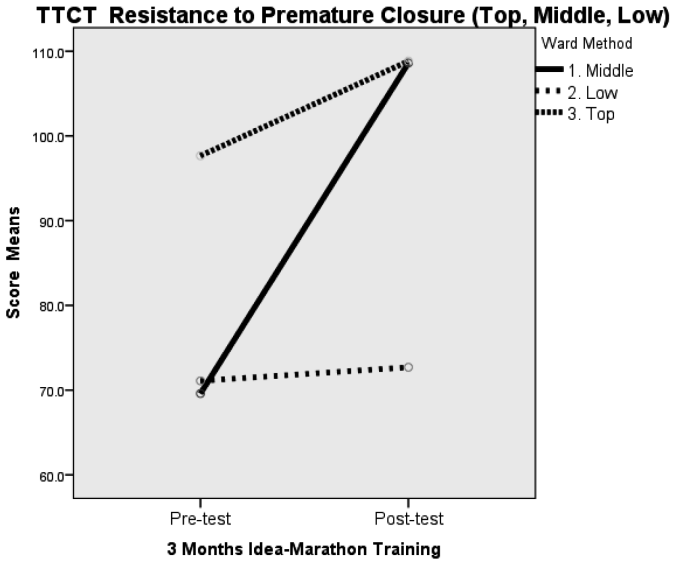
Figure 68 K University Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects within Pre-Posttest ($F(1,23)=45.589$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$) Among TML ($F(1,23)=21.030$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,23)=23.014$, $p<.01$, MSE = 80.157). The Bonferroni multiple comparison test confirmed a significant main effect for Top group within Pre-Posttest (Pretest > Posttest, $p<.05$) and Middle group within Pre-Posttest (Pretest < Posttest, $p<.05$), while there were no significant results for Low group within the Pre-Posttest.

At Pretest, there was significance T-M and T-L (T > M and T > L, $p<.05$), but none between M–L (M < L). At Posttest, however, M-L and T-L were significant (M > L, T > L, $p<.05$) while T-M (T < M) was not significant, indicating no difference between T-M. Middle got very close to Top (Figure 69).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	69.600	8.3693	10
	2	71.100	9.0854	10
	3	97.667	5.5737	6
	Total	76.654	14.1193	26
RPC-Post	1	108.600	16.1052	10
	2	72.700	11.0660	10
	3	108.833	14.8918	6
	Total	94.846	22.3744	26

Figure 69 K University Resistance to Premature Closure among TML

5.3.6 K University Chapter Discussion

5.3.6.1 t-Test Results Between the With IMS and the Without IMS Groups

The results of *t*-test analysis of TTCT scores between the pretest and posttest, and those of two-factor factorial ANOVA on the With IMS (experimental) and Without IMS (control) groups, indicate that Idea-Marathon training over three months effectively improved student creativity in TTCT Score Total, Fluency, and Resistance to Premature Closure. While control group Originality scores improved, Elaborations and Abstractness of Titles scores significantly decreased in the posttest.

5.3.6.2 ANOVA Analysis of TTCT Pre-Posttest Between Genders at K University

At this university, no significant results were seen between genders, nor was any interaction indicated in Genders group analysis.

5.3.6.3 ANOVA Analysis of TTCT Pre-Posttest Among Top, Middle and Low Scores

After dividing the experimental class into Top, Middle, and Low groups and performing ANOVA cluster analysis, the Idea-Marathon system was found to have the largest impact on the Middle group. The Top and Low group scores decreased, while those of the Middle group increased. This may have happened because after TTCT pretesting, many students at the middle level were highly stimulated by the Idea-Marathon class, finding it to be a metaphorical lifeline thrown to them as the students were flown down the river by the conventional, mass-production-style educational system.

They might have found the Idea-Marathon as one of the first step to build their own intellectual construction in their university life.

Another important factor at K University, where the Idea-Marathon had such favorable creative effects as documented by the tests is that in this university, the experimental group belonged to the Media class, where the practice of the Idea-Marathon was proven to be a powerful tool for their specialty. Through their media course studies, the students are always expected to create new ideas for their report and workshop. Therefore the students could make self-improvement through their daily practice of the Idea-Marathon.

5.3.6.4 Idea-Marathon Effects at K University

t-Tests and ANOVA tests analysis performed at K University indicated that the Idea-Marathon generally had favorable effects on creativity. As stated above the experimental group at this university was composed of students in a media class, and daily practice of the Idea-Marathon system provided a powerful tool for student self-improvement. Continued Idea-Marathon practice beyond the original six months might further improve the quality of students' work and lives.

Thus, we have two suggestions for this K University:

(1) In university education, mild encouragement toward participation in the Idea-Marathon system, such as offering a minimal number of course credits for successful completion and continuation of the Idea-Marathon for the full lecture course, is likely more effective than strong pressure such as compulsory participation. For this purpose, including Idea-Marathon practice in course syllabi is likely effective.

(2) An Idea-Marathon support system such as an e-Training System (ETS) and a supply of Thinking Hints should be established for future classes, including Teaching Assistants as ETS experts.

Chapter 6 Laboratories & Companies

6.1 Laboratory A.

6.1.1 Proceding Study

Amabile (1997) says, "*All innovation begins with creative ideas* [60]." For any laboratory or R&D department, creativity is critical. Management in such laboratories and R&D departments has been always looking for the "royal road" to making inventions and discoveries.

Amabile identified the five key features of a conceptual model of a "Creative Environment":

(1) Encouragement of Creativity

(2) Autonomy or Freedom

(3) Resources

(4) Pressures

(5) A Lack of Organizational Impediments to Creativity [60].

The role of the Idea-Marathon in laboratories and R&D departments supports the same features as this conceptual model.

(1) Encouragement of Creativity

The Idea-Marathon training for researchers and R&D staff continued for a certain period of time *encourages creativity* through the practice of doing thinking into writing every day.

(2) Autonomy or Freedom

The Idea-Marathon practice of keeping a notebook of ideas supports perfectly *Autonomy and Freedom* as it is completely free to think and write anything in the notebook and nobody else will check the Idea-Marathon notebook or force somebody to do the Idea-Marathon.

(3) Resources

The ideas continuously accumulated in these notebooks become, in turn, a Precious *Resource* for the organization.

(4) Pressures

For any long practitioners of the Idea-Marathon, not only daily finding of subjects or themes for thinking in business or life are always welcome to process the daily Idea-Marathon, but also even any possible business troubles or problems can become challenging subjects to solve in the Idea-Marathon life.

Global creative competition also provides an additional comfortable *Pressure* to the skilled practitioners of the Idea-Marathon.

(5) A Lack of Organizational Impediments to Creativity

The Group Idea-Marathon recommends to inspire internal discussion, reporting, appealing, proposing and consulting the selected ideas to be realized inside the organizations. The habits of these internal communications will *remove the impediment to creativity*.

If these ideas are discussed inside the organization with colleagues, the ideas will be sanded and polished within the network. And once this becomes a habit, once the Idea-Marathon is part of the intellectual infrastructure of the organization, then the steady increase in the group's stock of ideas will start, no matter what kind of group it is.

Although in many laboratories and R&D departments, management expects elite creative members to have innovative ideas, the basic concept of the Idea-Marathon is to make everybody more creative so that ideas come flowing out of everyone just like water comes flowing out of a tap. Only in this case, ideas have been accumulated in their notebooks like water tanks.

6.1.2 Idea-Marathon in Laboratories

In Japan, recently, many laboratories are adopting the Idea-Marathon for the creativity training of their researchers.

It, thus, becomes more important to show how the Idea-Marathon can contribute to improve creativity through the typical Idea-Marathon training as shown by quantitative analysis of creativity effects in laboratories.

This chapter explains analysis of empirical experiment for measuring effect of creativity improvement before and after the Idea-Marathon training method for about a 3 months period, especially for researchers in R&D and laboratories. To confirm the creativity influence to researchers in details, TTCT Figural tests were selected.

One major company's laboratory A in Tokyo, Japan offered us the cooperation for this experiment.

As the result of the quantitative analysis, the Idea-Marathon was found to be significantly effective in improving the creative factors measured by the TTCT test.

6.1.3 The Content of the Idea-Marathon Training

The Idea-Marathon training in laboratories and the R&D departments of companies is usually carried out as follows:

1) Three weeks before the first Idea-Marathon lecture, all the participants are handed one A5 sized file-notebook, a refill, and one Idea-Marathon textbook.

2) On the first day, the Idea-Marathon training lasts for two hours, followed by an actual workshop on note-making for another two hours.

3) There are a total of four Idea-Marathon seminars (lecture plus workshop) over six months.

6.1.4 The Idea-Marathon Training Schedule.

6.1.4.1 The first Idea-Marathon Seminar (lecture/workshop)

On the starting month for 4 hours

Contents: In first Idea-Marathon seminar, a two hour lecture contains the origin of the Idea-Marathon System (IMS), the record of successful applications of the Idea-Marathon, etc. and in a workshop (two hours), participants are given some thinking hints for ideas and some easy group work.

6.1.4.2 The second Idea-Marathon Seminar (mini lecture/workshop)

One month after the first lecture for two hours

Contents: After the mini-lecture, a workshop is held for creating ideas according to the themes given.

6.1.4.3 The third Idea-Marathon Seminar (mini lecture, group idea presentation and, workshop)

Three months after the first lecture for three hours

Contents: After the mini lecture, groups of participants make an idea presentation of which participants discuss and then do a further workshop to create ideas on a certain theme.

6.1.4.4 The fourth Idea-Marathon Seminar (mini lecture, personal idea presentation and group idea presentation)

Six months for three hours

Contents: After the mini-lecture, every participants and group makes a presentation on the best ideas created during these six months.

6.1.4.5 ETS (e-Training System)

The comments on ETS give each participant about their progress, about how to recover the short balance of number of ideas counted from the starting date, how to control daily ideas, how not to forget to do the Idea-Marathon every day.

Every two weeks, ETS was administered. ETS is quite a time consuming and painstaking work.

This reporting of the total number of ideas from participants and the replying and commenting from the Idea-Marathon Institute, both by e-mails, is called as the ETS (e-Training System).

ETS is an essential and inevitable part of the Idea-Marathon training. In case someone stops doing the Idea-Marathon for a while during the training course, we can detect the stoppage within two or three weeks' time and start appealing to the stopped or sleeping participant to resume the IMS, even supplying extra emergency hints for ideas.

The direct comments of different sorts to each participant are appreciated by trainees since they understand these comments take time.

Within the six month training time, there are about eight to nine ETS arrangement.

These supports, supplying Thinking Hints and ETS, are continued until the end of the Idea-Marathon's final training at six months. The fourth and final Idea-Marathon seminar is mostly devoted to the New Idea Exhibition by group and individual participants. One idea per day is the minimum requirement, and the average result is about 1.5 within six months' time. As for laboratories, it is great for researchers to collect many ideas in their notebooks because these are the seeds of innovations.

6.1.5 TTCT Pre-Posttest for the Idea-Marathon at a Laboratory of A. Food Company

One laboratory of a major food company in Tokyo, Japan, agreed to administer TTCT tests two times, once as a pretest and once as a posttest in 2012, during the three month Idea-Marathon training period.

6.1.6 TTCT Figural Pretest

Before starting the Idea-Marathon System (IMS) training at the first lecture and workshop, the TTCT test was administered as a pretest without previous notice on 9/Feb,2012 according to TTCT Directions Manual Figural A and B translated into Japanese [61]. The test time was 30 minutes consisting of three activities, 10 minutes each, for completing pictures. The number of participants in this first pretest was 27 persons, and 21 persons re-appeared for the posttest, and the official examinees were 21 persons. The author himself administered the Figural tests according to TTCT manual. After the TTCT Figural test, the Idea-Marathon's first lecture and workshop was held for the participating researchers. On May 15, 2012, about three months after the first TTCT test, TTCT Figural test was administered by the author.

6.1.7 After the First Seminar (Lecture and Workshop)

After the first lecture and workshop until the second TTCT Figural test, the following the Idea-Marathon activities were implemented:

(1) Feb 16, 2012: The first ETS one week after the first Idea-Marathon lecture/workshop

(2) March 2, 2012: The second ETS three weeks after the first Idea-Marathon lecture/workshop

(3) March 13, 2012: The second lecture/workshop for two hours was done one month after the first lecture/workshop.

(4) March 30, 2012: The third ETS

(5) April 27, 2012: The fourth ETS

(6) May 15, 2012: The third lecture.

6.1.8 Results of the TTCT Pre-Posttest

6.1.8.1 t-Test Results of the TTCT Pre-Posttest

The scores of the 21 participants who took both two TTCT tests are discussed in this chapter.

	Change of Scores			
	Pre-test	Post-test	*t* value	Sig.
Measurement	M(SD)	M(SD)		
Total Score	529(79)	618(64)	6.859	*p<.01*
Fluency	87(20)	109(22)	5.760	*p<.01*
Originality	105(25)	126(21)	3.971	*p<.01*
Elaborations	144(20)	152(17)	2.596	*p<.05*
Abstractness of Titles	105(23)	120(24)	3.083	*p<.01*
RPC	89(17)	112(17)	5.088	*p<.01*
M=Score Means SD=Standard Deviation				
df=21 *p*<.05 *p*<.01 (Two sided t-test)				

Table 15 t-Test Analysis of TTCT Pre-Posttest at Laboratory A.

Analysis by t-Test between two tests showed statistical significance in. Norm Referenced Measures for Score Total ($t(21)=6.859$, $p<.01$), Fluency ($t(21)=5.760$, $p<.01$), Originality ($t(21)=3.971$, $p<.01$), Elaboration ($t(21)=2.596$, $p<.05$), Abstractness of Titles ($t(21)=3.083$, $p<.01$) and RPC ($t(21)=5.088$, $p<.01$) showed statistical significance, which indicates that the three month practice of the Idea-Marathon caused a favorable effect on these creative factors (Table 15).

6.1.8.2 Study of 13 item Creative Strength Criterion Referenced Measures.

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	20	25		*n.s.*
2	Story-telling Articulateness	23	23		*n.s.*
3	Movement and action	25	20		*n.s.*
4	Expressiveness of Titles	23	22		*n.s.*
5	Synthesis of Incomplete Figures	20	25		*n.s.*
6	Synthesis of Lines or Circles	17	28		*p<.01*
7	Unusual Visualization	17	28		*p<.01*
8	Internal Visualization	20	25		*n.s.*
9	Extending or Breaking Boundaries	26	19		*p<.05*
10	Humor	21	24		*n.s.*
11	Richness of Imagery	25	20		*n.s.*
12	Colorfulness of Imagery	22	23		*n.s.*
13	Fantasy	17	28		*p<.01*
14	Score Total of 13 Creative Strength M(SD)	13(5)	16(5)	2.221	*p<.05*
Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=21, *n.s.*:no significant, p<.01,p<.05					

Table 16 13 Item Creative Strength Criterion Referenced Measures at Laboratory A.

The comparison of the TTCT Pretest and Posttest for 13 item Creative Strength Criterion-Referenced Measures by Mann-Whitney U-test showed significance for Synthesis of Lines or Circles (p<.01), Unusual Visualization (p<.01), Extending or Breaking Boundaries (p<.05) and Fantasy (p<.01). The total scores of the Pretest and the Posttest were tested by t-test, which showed significance (t(21)=2.221, p<.05) (Table 16).

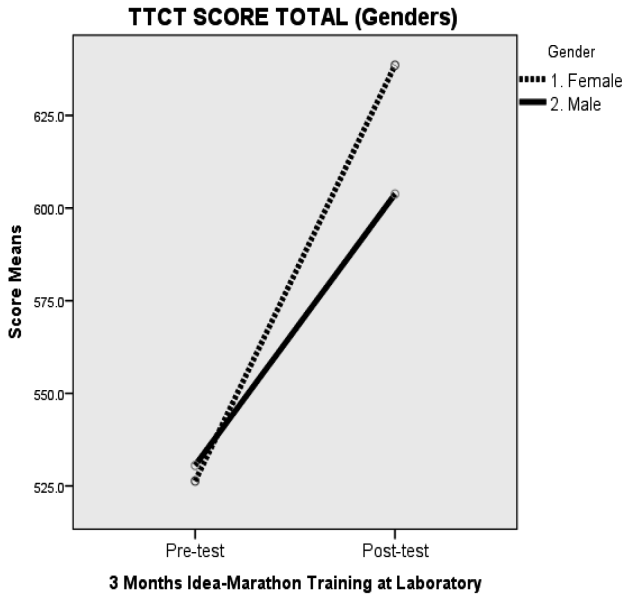
6.1.9 ANOVA Analysis of the TTCT Score at A Laboratory

6.1.9.1 ANOVA Analysis of TTCT Norm Referenced Measures Pre-Posttest in Genders at A. Laboratory

Male 13 persons
Female 9 persons
Total 22 persons

(1) Score Total

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest (F(1,20)=52.246, p<.01), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, p<.05). No interaction was found (Figure 70).



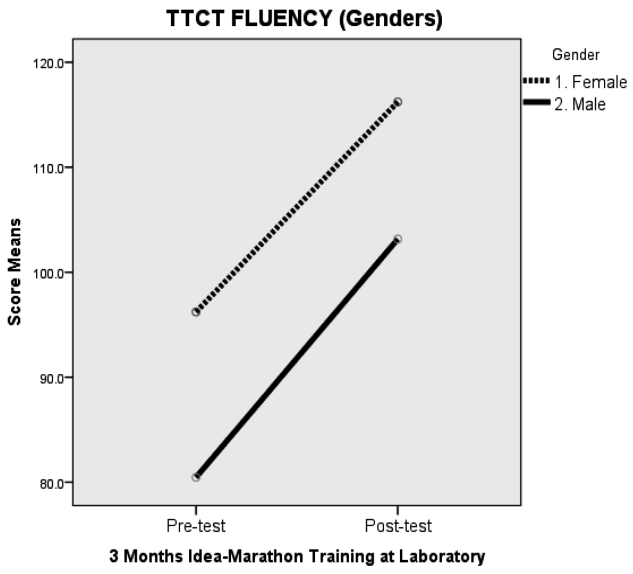
Descriptive Statistics

Gender		Mean	Std. Deviation	N
STL-Pre	F	526.333	87.0747	9
	M	530.538	75.8305	13
	Total	528.818	78.6049	22
STL-Post	F	638.556	40.6390	9
	M	603.769	74.0238	13
	Total	618.000	63.7712	22

Figure 70 Laboratory Score Total in Genders

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest (F(1,20)=30.043, p<.01), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest p<.05). No interaction was found (Figure 71).

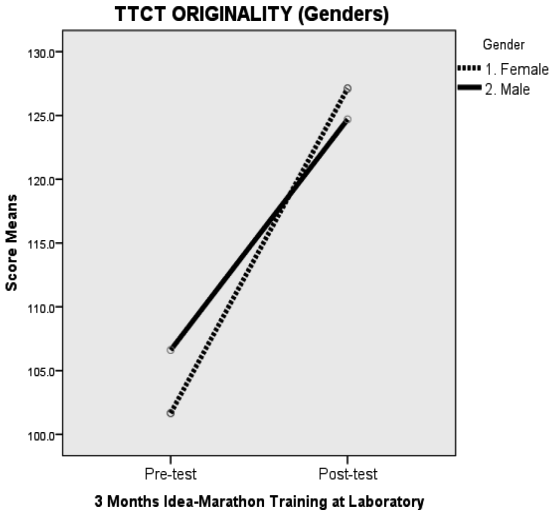


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
FLU-Pre	F	96.222	20.5899	9
	M	80.462	17.9100	13
	Total	86.909	20.1917	22
FLU-Post	F	116.222	22.0895	9
	M	103.154	20.2190	13
	Total	108.500	21.5113	22

Figure 71 Laboratory Fluency in Genders

(3) Originality

ANOVA analysis of Originality indicated significant results for main effects for Pre-Posttest ($F(1,20)=15.812$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). No interaction was found (Figure 72).

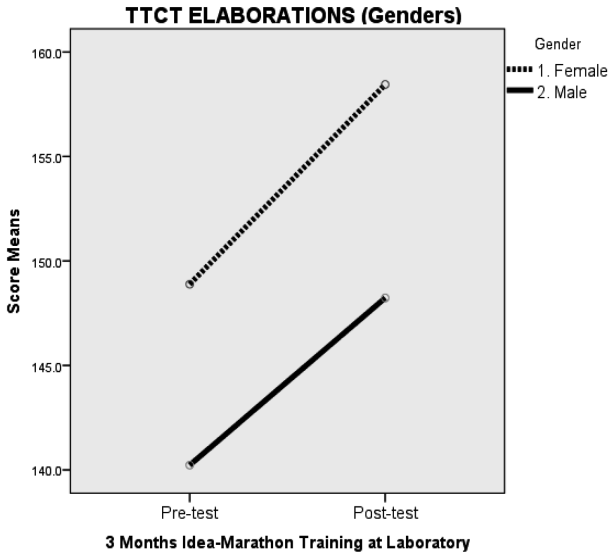


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ORI-Pre	F	101.667	22.0681	9
	M	106.615	27.3024	13
	Total	104.591	24.8532	22
ORI-Post	F	127.111	17.6242	9
	M	124.692	24.1122	13
	Total	125.682	21.2612	22

Figure 72 Laboratory Originality in Genders

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for Pre-Posttest ($F(1,20)=6.427$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). No interaction was found (Figure 73).

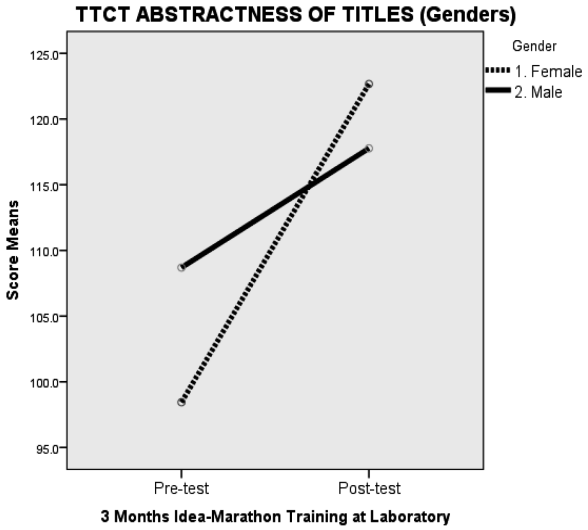


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ELA-Pre	F	148.889	16.5638	9
	M	140.231	22.6353	13
	Total	143.773	20.4029	22
ELA-Post	F	158.444	2.7437	9
	M	148.231	21.4948	13
	Total	152.409	17.1260	22

Figure 73 Laboratory Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated significant results for main effects for Pre-Posttest ($F(1,20)=11.660$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). No interaction was found (Figure 74).



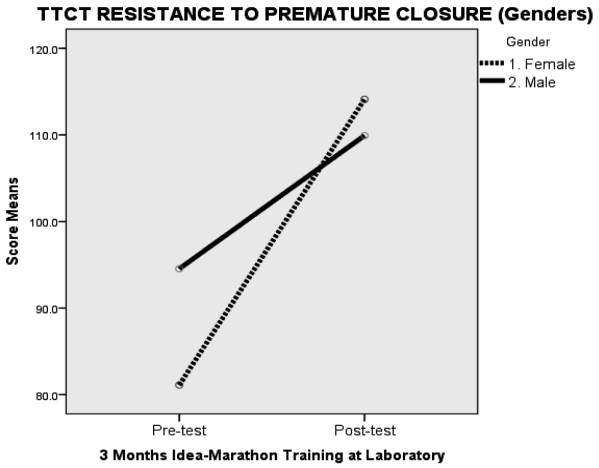
Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ABT-Pre	F	98.444	28.4522	9
	M	108.692	18.7145	13
	Total	104.500	23.1326	22
ABT-Post	F	122.667	20.6458	9
	M	117.769	27.0036	13
	Total	119.773	24.1896	22

Figure 74 Laboratory Abstractness of Titles in Genders

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,20)=33.392$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$).

An interaction was found within Pre-Posttest and between Genders ($F(1,20)=4.426$, $p<.05$, MSE = 186.427). A simple main effect was confirmed as significant by the Bonferroni multiple comparison for Male and Female within Pre-Posttest (Pretest<Posttest, p<.05), and not significant between Genders either Pretest and Posttest (Figure 75).



Descriptive Statistics				
Gender		Mean	Std. Deviation	N
RPC-Pre	F	81.111	14.3217	9
	M	94.538	17.8588	13
	Total	89.045	17.4942	22
RPC-Post	F	114.111	12.5244	9
	M	109.923	20.3366	13
	Total	111.636	17.3357	22

Figure 75 Laboratory Resistance to Premature Closure in Genders

6.1.9.2 ANOVA Analysis for Comparison of TTCT Norm-Referenced Measures Pre-Posttest among Top, Middle, Low Groups at A. Laboratory

Abbreviation and Acronym

Pre-Posttest: Pretest and Posttest,

TML: Top, Middle and Low score groups,

T:Top score group, M:Middle score group, L:Low score group

T-M: Top and Middle groups,

M-L: Middle and Low groups,

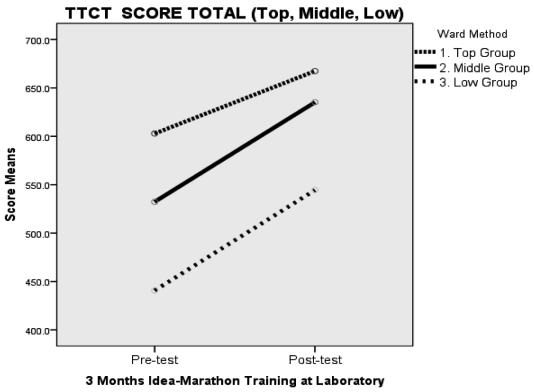
T-L: Top and Low groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

Top	8 persons
Middle	7 persons
Low	7 persons
Total	22 persons

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest ($F(1,19)=48.256$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). Among TML ($F(1,19)=65.897$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 76).

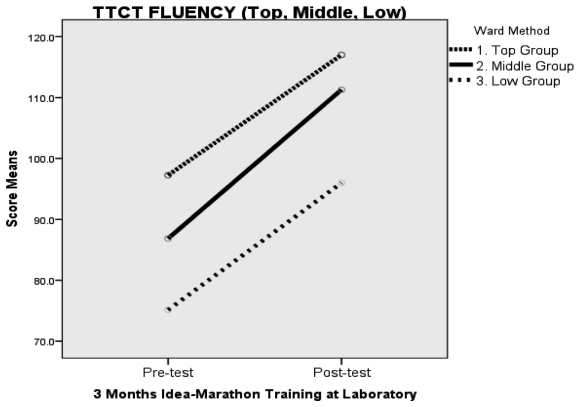


Ward Method		Mean	Std. Deviation	N
STL-Pre	1	602.875	23.4365	8
	2	532.286	40.2398	7
	3	440.714	54.6160	7
	Total	528.818	78.6049	22
STL-Post	1	667.375	13.1468	8
	2	635.143	26.8168	7
	3	544.429	58.3491	7
	Total	618.000	63.7712	22

Figure 76 Laboratory Score Total among TML

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects within Pre-Posttest ($F(1,19)=30.554$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). No interaction was found (Figure 77).

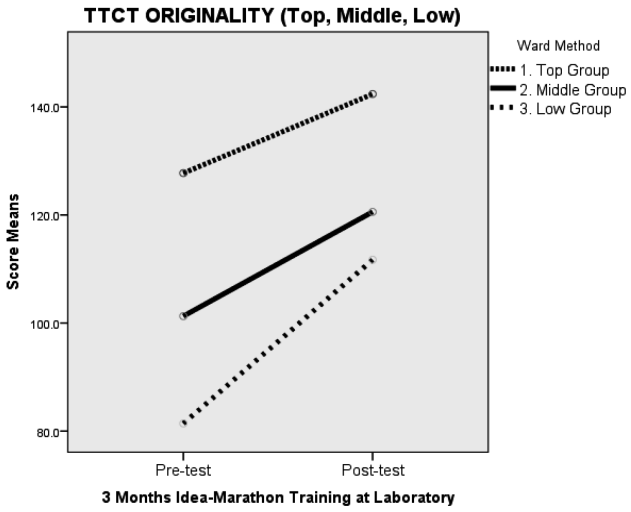


Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	97.250	20.6933	8
	2	86.857	15.9628	7
	3	75.143	19.1957	7
	Total	86.909	20.1917	22
FLU-Post	1	117.000	21.8567	8
	2	111.286	19.1982	7
	3	96.000	20.1494	7
	Total	108.500	21.5113	22

Figure 77 Laboratory Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects within Pre-Posttest ($F(1,19) = 15.781$, $p<.01$) and among TML ($F(1,19)=23.997$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and between T-M and T–L ($p<.05$), but there were no significant effects between M-L. No interaction was found (Figure 78).



Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	127.750	12.9035	8
	2	101.286	20.0060	7
	3	81.429	14.6157	7
	Total	104.591	24.8532	22
ORI-Post	1	142.375	16.6728	8
	2	120.571	11.8723	7
	3	111.714	22.0735	7
	Total	125.682	21.2612	22

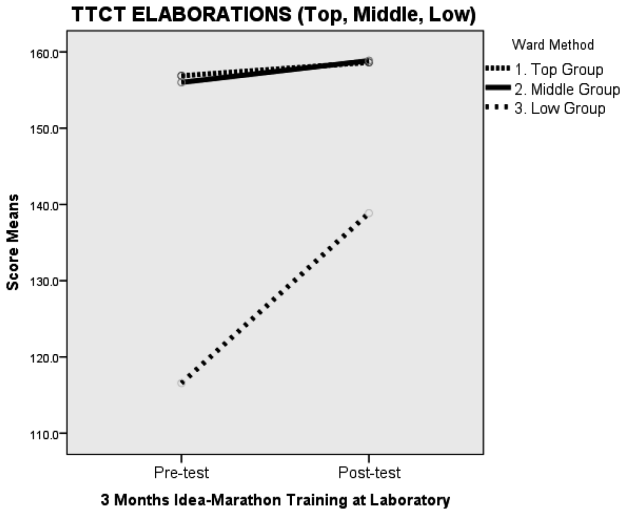
Figure 78 Laboratory Originality among TML

(4) Elaborations

Concerning Elaborations, there were significant main effects within Pre-Posttest ($F(1,19) = 10.469$, $p<.01$) and among TML ($F(1,19)=21.214$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, p<.05) and between T-L and M-L (p<.05).

An interaction was found within Pre-Posttest and among TML ($F(2,19)=5.700$, $p<.05$, $MSE = 84.100$). The Bonferroni multiple comparison test confirmed a significant main effect for Low group within Pre-Posttest (Pretest < Posttest, p<.05) while there were no significant results for Top and Middle group within the Pre-Posttest.

At Pretest, there was significance between M-L and T-L (M > L, T > L, p<.05), but none between T-M (T > M). At Posttest, however, M-L and T-L (M > L and T > L) was not significant, indicating no difference between TML. Low got closer to Middle and Top (Figure 79).

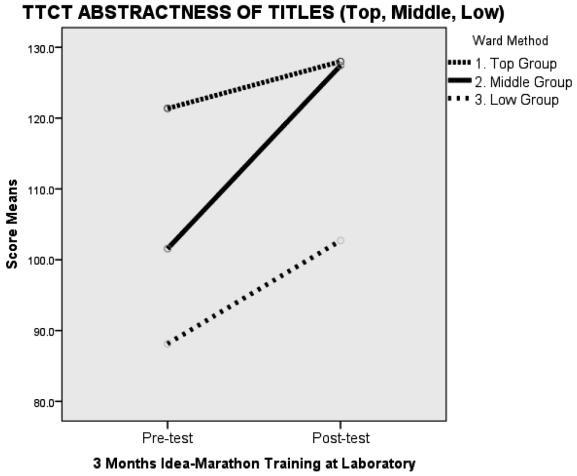


Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	156.875	6.7493	8
	2	156.000	4.7958	7
	3	116.571	10.6904	7
	Total	143.773	20.4029	22
ELA-Post	1	158.625	2.8754	8
	2	158.857	3.0237	7
	3	138.857	26.3339	7
	Total	152.409	17.1260	22

Figure 79 Laboratory Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects within Pre-Posttest ($F(1,19)=10.295$, $p<.01$) and among TML ($F(1,19)=5.446$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest $p<.05$) and between T-L ($p<.05$). No interaction was found (Figure 80).

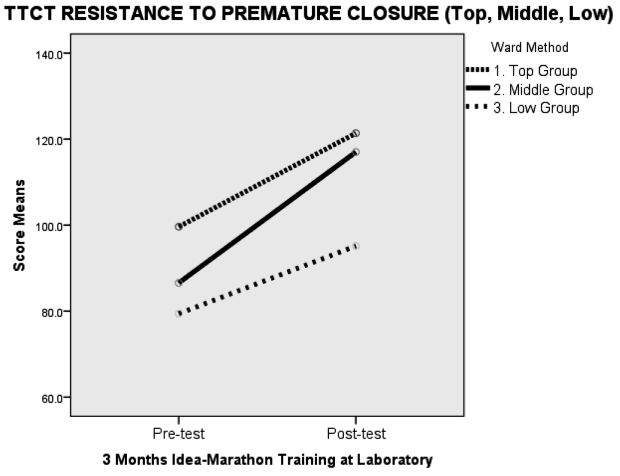


Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	121.375	21.4005	8
	2	101.571	17.4151	7
	3	88.143	18.2613	7
	Total	104.500	23.1326	22
ABT-Post	1	128.000	18.9887	8
	2	127.429	24.7040	7
	3	102.714	22.7795	7
	Total	119.773	24.1896	22

Figure 80 Laboratory Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects within Pre-Posttest ($F(1,19)=25.566$, $p<.01$) and among TML ($F(1,19)=9.382$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest $p<.05$) and between T-L ($p<.05$). No interaction was found (Figure 81).



Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	99.625	13.4795	8
	2	86.571	14.2812	7
	3	79.429	19.7725	7
	Total	89.045	17.4942	22
RPC-Post	1	121.375	15.8739	8
	2	117.000	11.7047	7
	3	95.143	11.9782	7
	Total	111.636	17.3357	22

Figure 81 Laboratory Resistance to Premature Closure among TML

6.1.10 The Influence of the ETS on Creativity

The correlation between total idea quantity recorded in the ETS to each of the five Norm-referenced measures and total score was moderately significant in Abstractness of Titles only r=0.463 p<.05 while the correlation between total idea quantity and Fluency, Originality, Elaboration and Resistance

to Premature Closure were not statistically significant. The quantity of ideas which each person created during these three months is shown in ETS (Table 17).

Name	IMS Starting date	First ETS date	Days from starting	Number of Ideas	2nd ETS date	Days from startin	Number of Ideas	3rd ETS date	Days from starting	Number of ideas	4th ETS date	Days from starting	Number of Ideas
A	2012/1/30	2012/2/16	18	87	a	33	120	2012/3/30	61	183	2012/4/27	89	215
B	2012/2/2	2012/2/16	15	31	2012/3/2	30	52	2012/3/30	58	85	2012/4/27	86	113
C	2012/2/1	2012/2/16	16	24	2012/3/2	31	32	2012/3/30	59	57	2012/4/27	87	132
D	2012/2/3	2012/2/16	14	17	2012/3/2	29	28	2012/3/30	57	58	2012/4/27	85	89
E	2012/2/3	2012/2/16	14	17	2012/3/2	29	30	2012/3/30	57	59	2012/4/27	85	88
F	2012/2/1	2012/2/16	16	34	2012/3/2	31	61	2012/3/30	59	103	2012/4/27	87	145
G	2012/2/3	2012/2/16	14	17	2012/3/2	29	30	2012/3/30	57	45	2012/4/27	85	92
H	2012/1/31	2012/2/16	17	147	2012/3/2	32	204	2012/3/30	60	235	2012/4/27	88	273
I	2012/2/2	2012/2/16	15	20	2012/3/2	30	35	2012/3/30	58	64	2012/4/27	86	94
J	2012/2/3	2012/2/16	14	17	2012/3/2	29	30	2012/3/30	57	58	2012/4/27	85	85
K	2012/2/3	2012/2/16	14	51	2012/3/2	29	98	2012/3/30	57	183	2012/4/27	85	281
L	2012/2/1	2012/2/16	16	33	2012/3/2	31	56	2012/3/30	59	130	2012/4/27	87	189
M	2012/2/1	2012/2/16	16	32	2012/3/2	31	57	2012/3/30	59	103	2012/4/27	87	159
N	2012/2/1	2012/2/16	16	15	2012/3/2	31	20	2012/3/30	59	75	2012/4/27	87	121
O	2012/2/1	2012/2/16	16	25	2012/3/2	31	43	2012/3/30	59	80	2012/4/27	87	106
P	2012/1/26	2012/2/16	22	29	2012/3/2	37	46	2012/3/30	65	87	2012/4/27	93	115
Q	2012/2/1	2012/2/16	16	53	2012/3/2	31	96	2012/3/30	59	169	2012/4/27	87	203
A	2012/2/2	2012/2/16	15	23	2012/3/2	30	38	2012/3/30	58	89	2012/4/27	86	120
R	2012/2/8	2012/2/16	9	23	2012/3/2	24	98	2012/3/30	52	163	2012/4/27	80	178
S	2012/2/1	2012/2/16	16	23	2012/3/2	31	42	2012/3/30	59	93	2012/4/27	87	125
T	2012/2/1	2012/2/16	16	20	2012/3/2	31	42	2012/3/30	59	93	2012/4/27	87	132
Total				985			1,673			2,984			4,149

Table 17　Table of ETS Data at Laboratory A.

6.1.11　E-mailed Interview Results for 19 Participants After Three Months

Interviews by e-mails for opinion about the Idea-Marathon after third seminar was made.

	Qestions	Answer	Response Number
1	Did you understand the IMS concept?	Understood considerably	6
		Reasonably	9
		No change	0
2	Did you try any other creativity method?	Various	0
		A little	1
		Nothing Else	18
3	Do you agree with the effects of IMS?	Very much	3
		Reasonably	14
		No change	2
4	How did you write into notebook?	Immediately when Ideas coming	7
		Sometimes	10
		No change	2
5	Is ETS necessary?	Absolutely necessary	7
		Necessary	8
		Not necessary	4
6	Is Weekly Hints necessary?	Absolutely necessary	5
		Necessary	10
		Not necessary	4

Table 18　E-mail Interview Result for 19 participants After Three Months at Laboratory A.

It was possible for some participants in the Idea-Marathon training to get involved with other creativity methods throughout the three months training. Or they might have started other kinds of creative methods other than the Idea-Marathon during this period.

Interviews by internet were made about whether they had any other types of creativity training during these three months other than the Idea-Marathon.

We received 19 responses from the 21 participants. Only one person replied that he had read one book, “Lateral Thinking” by Paul Slone, but and all others confirmed that they had not taken any other

training during this period. The summary of the results of this e-mail interview is shown here (Table 18).

6.1.12 A Laboratory Study Discussion

6.1.12.1 Significant Results On All Five Norms

The scores on all five Norm-Referenced Measures showed significant results between the TTCT pretest and posttest, indicating that Idea-Marathon training had a favorable impact on creativity in this research.

6.1.12.2 Significant Component in 13 Item Creative Strength

The creative strength Criterion-Referenced Measures showed significant improvement in "Synthesis of Lines or Circles," "Extending or Breaking Boundaries," and "Fantasy."

6.1.12.3 Possible Doubt About Type A and B Test Easiness

These results called into question whether the TTCT posttest might be easier than the pretest. As this is difficult to verify in laboratory settings, we investigated possible differences at the D University (section 5-2).

6.1.12.4 ANOVA Analysis of TTCT Pre-Posttest Between Genders

The ANOVA analysis of TTCT Pre-Posttest between Genders indicated no significant results nor interactions.

6.1.12.5 ANOVA Analysis of TTCT Pre-Posttest Among Top, Middle and Low

Pretesting at A. Laboratory indicated creative gaps among the Top, Middle, and Low groups. This gap remained in the posttest, but all TML scores improved in parallel with Score Total and Fluency.

The gap narrowed as the Low group scores approached those of the Middle and Top groups in Originality and Elaborations. Middle group scores got closer to those of the Top group for Abstractness of Titles and Resistance to Premature Closure. An interaction was only seen for Elaborations.

6.1.12.6 Others

(1) Correlation between TTCT and ETS

The number of ideas of each participants shown in ETS were checked for any possible correlation with TTCT scores. Only Abstractness of Titles was significantly observed for correlation.

(2) About Questionnaires

1) In the replies to the questionnaire about the Idea-Marathon effects, everybody mentioned that they understood the positive impact of the Idea-Marathon within the three months period.

2) During this three month period, all the participants explained that they have not had any other creative activity training or education except for one person who had read one book about creativity.

3) 17 people out of 19 seemed to have an indication of getting the habit of thinking and writing their thoughts down immediately.

4) The majority agreed on the necessity of the ETS and of the supply of Thinking hints supply.

(3) Control Group Experiment

Although we could not have settings for a control group in this experiment, we could approximately estimate that these researchers did not have any other training nor self-development of creativity training other than the Idea-Marathon from the Pretest to Posttest for three months. We may, thus, take the results of Pretest as the results of a Post-test for a virtual control group.

6.2 Company P. Employees' Training

6.2.1 P Company Idea-Marathon Staff Training Summary

Creative power is also required in the business world as well as in laboratories and R&D departments.

Since the author of this dissertation had belonged to one of the biggest trading company in Japan and stayed in overseas for long time as a sales representative for about 20 years. During the time that the Idea-Marathon System (IMS) was founded. This system has continued to be a powerful survival tool in the international business competition.

Many business persons desire and are always trying to be more creative through many kinds of self-regulated training. The Idea-Marathon is one of the self-regulated training methods expanding in Japan.

In this chapter, the TTCT tests were administered in Company P. where the Idea-Marathon training was adopted. Before the first Idea-Marathon training seminar, the TTCT Pretest was administered on November 1, 2013 to a total of 21 participants (19 males and 2 females).

After the TTCT Pretest, the first Idea-Marathon seminar took place. After the first training, the ETS (e-Training System) was arranged five times. Then on January 24, 2014, the TTCT Posttest was administered.

6.2.2 The TTCT Tests of the Idea-Marathon Seminars at P. Company

6.2.2.1 t-Test Results of TTCT Pre-Posttest at Company P.

Between the Pretest and the Posttest with a three month Idea-Marathon practice in Company P., a statistically significant difference was found for two Norm Referenced Measures: Total Score ($t(20)=2.187$, $p<.05$) and Originality ($t(20)=3.371$, $p<.01$). No significant difference was found for the component of Fluency, Elaborations, Abstractness of Titles and RPC (Table 19).

	Change of Scores Between Pre-& Post test			
	Pre-test	Post-test	t-value	Sig
Measurement	M(SD)	M(SD)		
Score Total	557(97)	591(85)	2.187	*p<.05*
Fluency	99(19)	110(25)	1.99	*n.s.*
Originality	111(27)	126(23)	3.371	*p<.01*
Elaborations	145(18)	152(11)	1.878	*n.s.*
Abstractness of Titles	106(24)	106(34)	0.018	*n.s.*
RPC	95(22)	97(17)	0.576	*n.s.*

M=Score Means, SD=Standard Deviation
df=20, *p<.05, p<.01* (Two sided t-test)

Table 19 t-Test of TTCT Pre-Posttest of Five Norms Referenced Measures at P. Company

6.2.2.2 13 Item Creative Strength Criterion-Referenced Measures

The comparison of TTCT Pretest and Posttest for the 13 item Creative Strength Criterion-Referenced Measures (Table 20) were tested by the Mann-Whitney U-test.

Out of 13 items, there were significant result in “Synthesis of Lines and Circles”($p<.01$), “Richness of Imagery”($p<.05$) and “Score Total.”($t(20)=2.568$, $p<.05$)

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	21	22		*n.s.*
2	Story-telling Articulateness	20	23		*n.s.*
3	Movement and action	21	22		*n.s.*
4	Expressiveness of Titles	20	23		*n.s.*
5	Synthesis of Incomplete Figures	20	23		*n.s.*
6	Synthesis of Lines or Circles	17	26		$p<.01$
7	Unusual Visualization	21	22		*n.s.*
8	Internal Visualization	21	22		*n.s.*
9	Extending or Breaking Boundaries	21	23		*n.s.*
10	Humor	22	21		*n.s.*
11	Richness of Imagery	18	25		$p<.05$
12	Colorfulness of Imagery	22	21		*n.s.*
13	Fantasy	20	23		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	11(6)	13(6)	2.568	$p<.05$

Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided)
df=20, *n.s.*:no significant, p<.01,p<.05

Table 20 13 Item Creative Strength Criterion-Referenced Measures at Company P.

6.2.2.3 ANOVA Analysis for Comparison of TTCT Norm Referenced Measures Pre-Posttest among Top, Middle, Low Groups at P. Company

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest tests

TML: Top-, Middle-, and Low-scoring groups

T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group

T–M: Top- and Middle-scoring groups

M–L: Middle- and Low-scoring groups

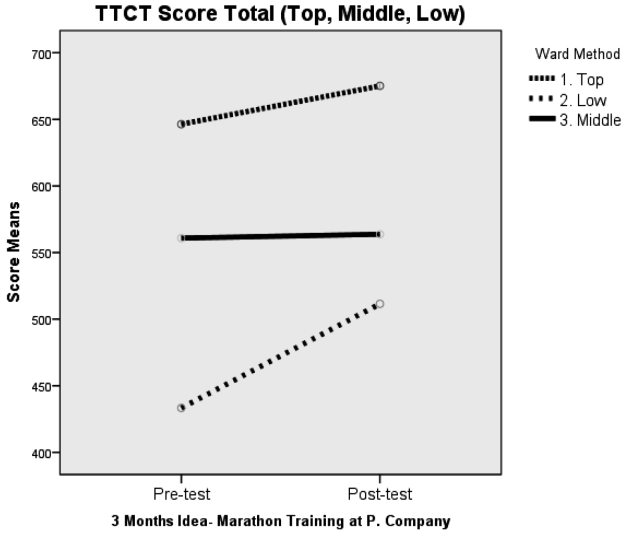
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

Top	8 persons
Middle	7 persons
Low	6 persons
Total	21 persons

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest ($F(1,18)=5.930$, $p<.05$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). Among TML ($F(1,18)=63.060$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML (T>M>L, $p<.05$). No interaction was found (Figure 82).



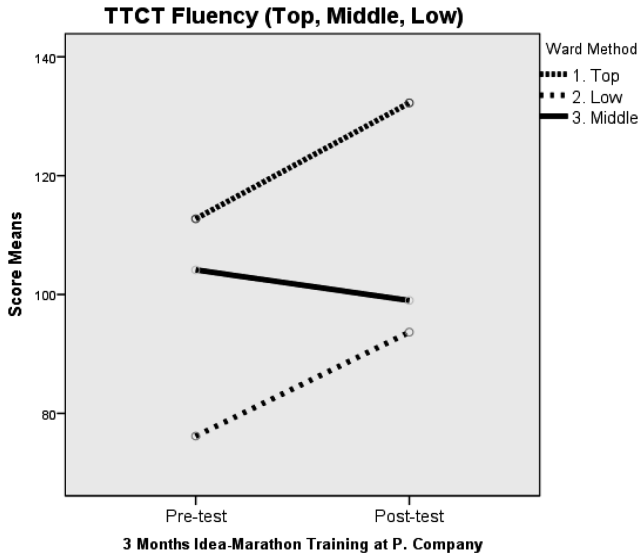
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	646.38	40.655	8
	2	433.33	43.117	6
	3	560.86	43.276	7
	Total	557.00	96.920	21
STL-Post	1	675.13	41.021	8
	2	511.50	62.106	6
	3	563.71	48.400	7
	Total	591.24	85.108	21

Figure 82 P. Company Score Total among TML

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest ($F(1,18)=4.417$, $p<.05$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). Among TML ($F(2,18)=23.660$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 83).



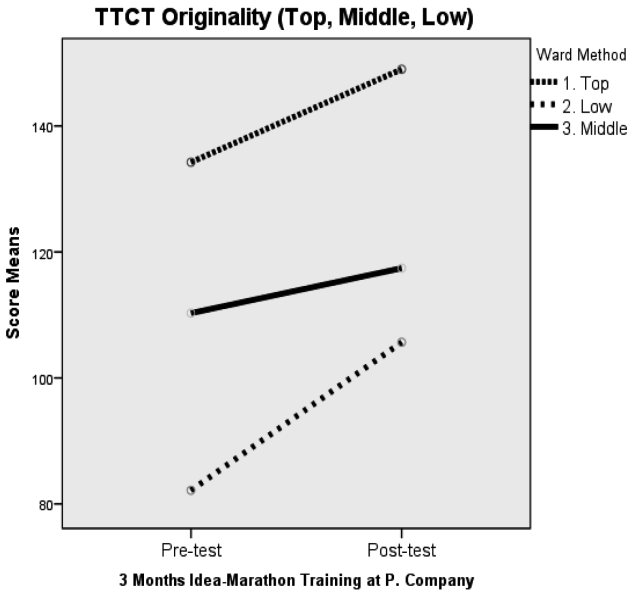
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	112.75	8.531	8
	2	76.17	12.222	6
	3	104.14	14.392	7
	Total	99.43	19.133	21
FLU-Post	1	132.25	16.290	8
	2	93.67	20.944	6
	3	99.00	18.148	7
	Total	110.14	24.934	21

Figure 83 P. Company Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects within Pre-Posttest ($F(1,18)=11.955$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest $p<.05$). Among TML ($F(1,18)=28.747$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML (T>M>L, $p<.05$). No interaction was found (Figure 84).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	134.25	14.160	8
	2	82.17	7.414	6
	3	110.29	23.690	7
	Total	111.38	26.795	21
ORI-Post	1	149.00	9.118	8
	2	105.67	15.135	6
	3	117.43	17.511	7
	Total	126.10	23.231	21

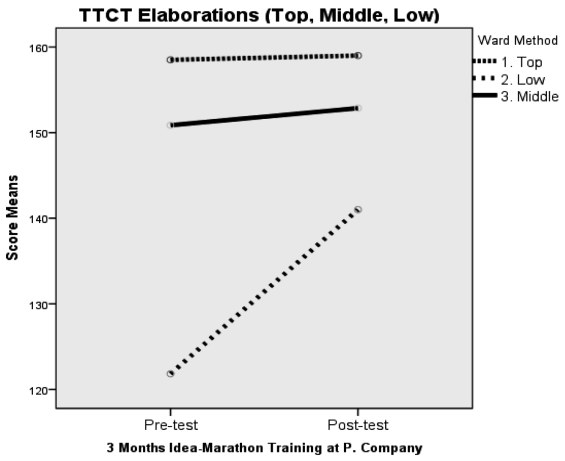
Figure 84 P. Company Originality among TML

(4) Elaborations

Concerning Elaborations there were significant main effects within Pre-Posttest ($F(1,18)=5.745$, $p<.05$) and TML ($F(1,18)=34.034$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest $p<.05$) and between T-L and M-L ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,18)=3.701$, $p<.05$, $MSE = 94.023$). The Bonferroni multiple comparison test confirmed a significant main effect for Low group within Pre-Posttest (Pretest<Posttest, $p<.05$).

At Pretest, there was significance M-L and T-L (M > L and T > L, $p<.05$), but none between T-M (T > M). At Posttest, T-L was significant, however, M-L (M > L) was not significant. Low got closer to Middle (Figure 85).



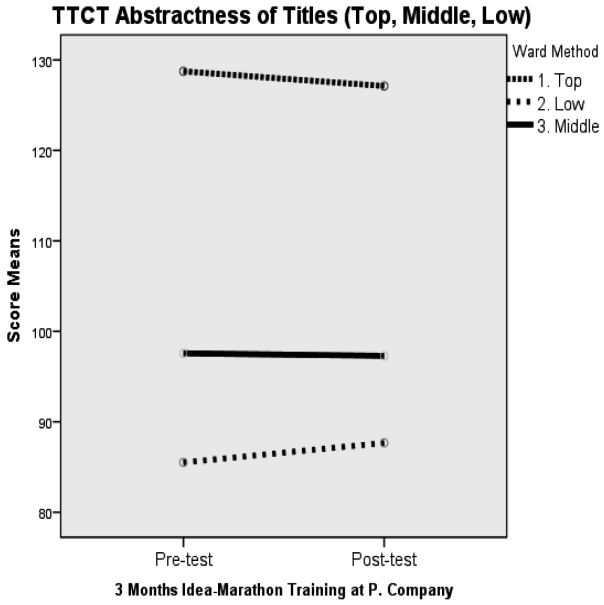
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	158.50	2.268	8
	2	121.83	14.730	6
	3	150.86	9.008	7
	Total	145.48	18.057	21
ELA-Post	1	159.00	2.828	8
	2	141.00	11.489	6
	3	152.86	11.408	7
	Total	151.81	11.444	21

Figure 85 P. Company Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,18)=8.016$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L and T-M ($p<.05$), but there was no significant effects between M–L. No interaction was found (Figure 86).



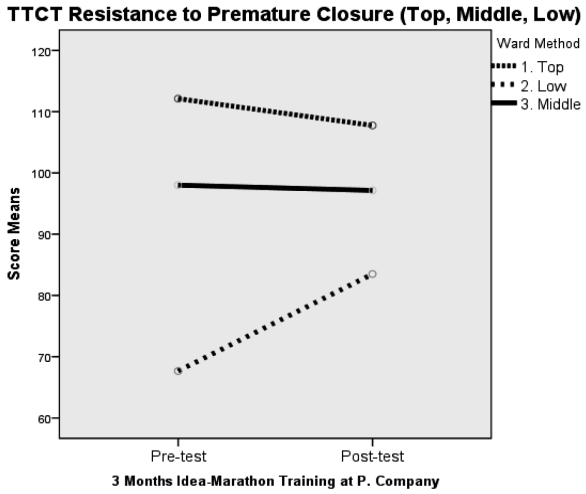
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	128.75	14.370	8
	2	85.50	15.808	6
	3	97.57	15.662	7
	Total	106.00	23.797	21
ABT-Post	1	127.13	19.924	8
	2	87.67	45.491	6
	3	97.29	24.164	7
	Total	105.90	33.725	21

Figure 86 P. Company Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,18)=24.310$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L ($p<.05$), but there was no significant effects between M–L and T-M. No interaction was found (Figure87).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	112.13	13.389	8
	2	67.67	11.130	6
	3	98.00	9.730	7
	Total	94.71	21.601	21
RPC-Post	1	107.75	13.573	8
	2	83.50	18.436	6
	3	97.14	12.941	7
	Total	97.29	17.335	21

Figure 87 Company P. Resistance to Premature Closure among TML

6.2.3 The Correlation between the ETS and TTCT Score

The correlation between total idea quantity recorded in the ETS and each of the five TTCT Norm Referenced Measures and Score Total of each participant in P. Company, was checked and by the Pearson's product-moment correlation coefficient method.

ETS's total ideas of the participants were significantly correlated with the TTCT's Score Total (r=.533, p<.05), Elaborations (r=.490, p<.05) and RPC (r=.519, p<.05).

6.2.4 "P" Company Study Discussion

Idea-Marathon training started on Nov 1, 2013 at Company P. Training started with 27 participants, but due to work time conflicts the number was reduced to 25 persons. The TTCT Figural Pretest was administered before the first seminar, which was well received by the participants. Participants were serious and tense at first, but relaxed by the end of the seminar.

An e-Training System (ETS) commenced one week following the seminar. In the ETS, participants reported their total number of ideas at certain dates, and received comments for each report regarding their number of ideas. Second and third seminars were held one and three months after the first, and the TTCT Posttest was performed after the third seminar.

At P Company, between the Pretest and Posttest there were five ETS sessions, which resulted in high idea recording rates and high total numbers of ideas. ANOVA analysis of TTCT score totals dividing participants into Top, Middle, and Low groups by Cluster Analysis showed significant Low group results for Elaborations. The Low group scores approached those of the Middle and Top groups.

ETS data indicated that participants maintained the rules of the Idea-Marathon, particularly the rule for thinking and immediately writing down ideas every day.

One new hypothesis for our future study was obtained here that the correlation between ETS idea numbers and TTCT Scores might be dependent to the participants' degree of the enthusiasm for thinking ideas and writing them into the notebooks every day. If the enthusiasm is getting higher, the correlation of TTCT Figural test score might be more significant with the idea numbers of ETS.

"Degree of enthusiasm" might be measured by the rate of absentee, or by the rate of daily idea creation into writing

6.3 Company N., New Hires, men and women who are Recent Graduates

6.3.1 Company N Summary

In Japan, the year for companies, laboratories, government offices and universities starts in April and ends on the last day of March of the next year. So the students who graduate from universities in March will start working in companies and laboratories in April.

All the major companies in Japan which are newly employing recent graduates (in March), male and female every year, are ready to give various training courses to them at least for one to three months from the starting date of their careers in April.

The longest training can continue for one year. These long term trainings include everything from basic manners to highly technical training, including creativity training.

Recently, more and more companies are starting to adopt the Idea-Marathon training plan for new staff. The use of notebooks is so important, not only for recording purposes like writing minutes or reports, but also for creative work like writing ideas down in notebooks for proposal making.

In this chapter, N. Company new hires (total 21 new hires, men 12 and women 9) were given a two month daily Idea-Marathon training including the TTCT Pretest and Posttest.

Although the period of the Idea-Marathon training for these new hires in N. Company was shorter than the usual three month between the Pretest and the Posttest, their willpower and motivation were very high, and their ETS records were also very high every day.

6.3.2 The TTCT Tests for the New Hires in the Idea-Marathon Seminars at N. Company

6.3.2.1 t-Test Result of TTCT Pre-Posttest at Company N.

Between the Pretest and the Posttest with a three month Idea-Marathon practice in N. Company, a statistically significant difference was found for the Norm Referenced Measures: Total Score ($t(20)=8.492$, $p<.01$), Fluency ($t(20)=6.608$, $p<.01$), Originality ($t(20)=4.994$, $p<.01$) and RPC ($t(20)=7.181$, $p<.01$). No significant difference was found in the component of Elaborations and Abstractness of Titles (Table 21).

	Change of Scores			
	Pre-test	Post-test	t-value	Sig
Measurement	M(SD)	M(SD)		
Score Total	551(42)	633(41)	8.492	*p<.01*
Fluency	87(15)	113(19)	6.608	*p<.01*
Originality	106(20)	129(20)	4.994	*p<.01*
Elaborations	153(8)	157(5)	2.031	*n.s.*
Abstractness of Titles	114(22)	114(18)	0.053	*n.s.*
RPC	92(15)	119(16)	7.181	*p<.01*
M=Score Means, SD=Standard Deviation				
df=20, *p<.05, p<.01* (Two sided t-test)				

Table 21 t-Tests Result of TTCT Scores Pretest and Posttest of Company N. New Hires

6.3.2.2 13 Item Creative Strength Criterion-Referenced Measures

The comparison of TTCT Pretests and Posttests for the 13 Item Creative Strength Criterion-Referenced Measures (Table 22) were tested by the Mann-Whitney U-test.

Out of 13 items, there were significant result for “Synthesis of Lines or Circles($p<.01$)”and “Richness of Imagery($p<.05$)” decreasing mean average with significance ($p<.05$).

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	20	23		*n.s.*
2	Story-telling Articulateness	23	20		*n.s.*
3	Movement and action	22	21		*n.s.*
4	Expressiveness of Titles	23	20		*n.s.*
5	Synthesis of Incomplete Figures	22	21		*n.s.*
6	Synthesis of Lines or Circles	15	28		*p<.01*
7	Unusual Visualization	21	22		*n.s.*
8	Internal Visualization	21	22		*n.s.*
9	Extending or Breaking Boundaries	20	23		*n.s.*
10	Humor	21	22		*n.s.*
11	Richness of Imagery	24	19		*p<.05*
12	Colorfulness of Imagery	20	23		*n.s.*
13	Fantasy	20	23		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	11(4)	12(4)	1.585	*n.s.*
	Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=20, *n.s.*:no significant, *p*<.01,*p*<.05				

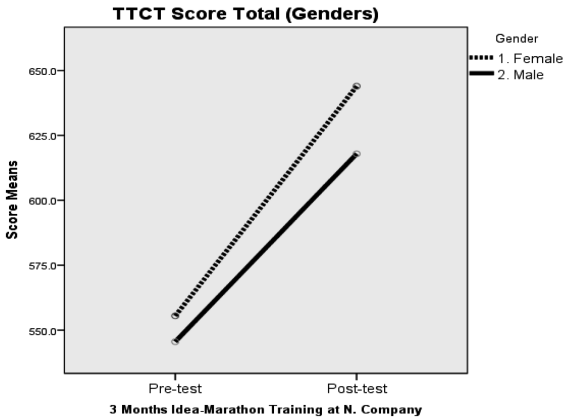
Table 22　13 Item Criterion Referenced Measure at Company N. New Hires

6.3.2.3　ANOVA Analysis for Comparison of TTCT Norm Referenced Measures Pre-Posttest in Genders at N. Company New Hires

Female 12 persons
Male　9 persons
Total　21 persons

(1)　Score Total

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest ($F(1,19)=67.551$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 88).



Descriptive Statistics				
Gender		Mean	Std. Deviation	N
STL-Pre	F	555.500	44.9495	12
	M	545.556	38.5944	9
	Total	551.238	41.6232	21
STL-Post	F	643.917	38.6863	12
	M	617.889	40.7291	9
	Total	632.762	40.7540	21

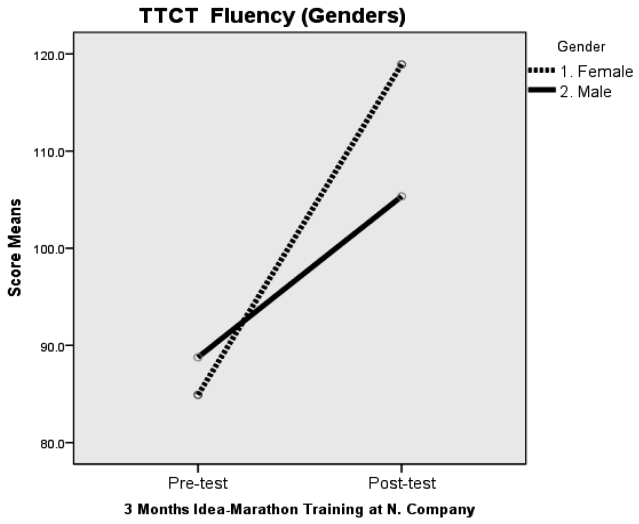
Figure 88 N. Company Score Total in Genders

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest ($F(1,19)=48.007$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$).

The interaction was found within Pre-Posttest and between Genders ($F(1,19)=5.716$, $p<.05$, $MSE=136.901$). The Bonferroni multiple comparison test confirmed a significant main effect between Genders within Pre-Posttest (Pretest < Posttest, $p<.05$)

At Pretest, there was no significance between Genders (M > F). At Posttest, however, significance was found between Genders (F > M, $p<.05$). (Figure 89).

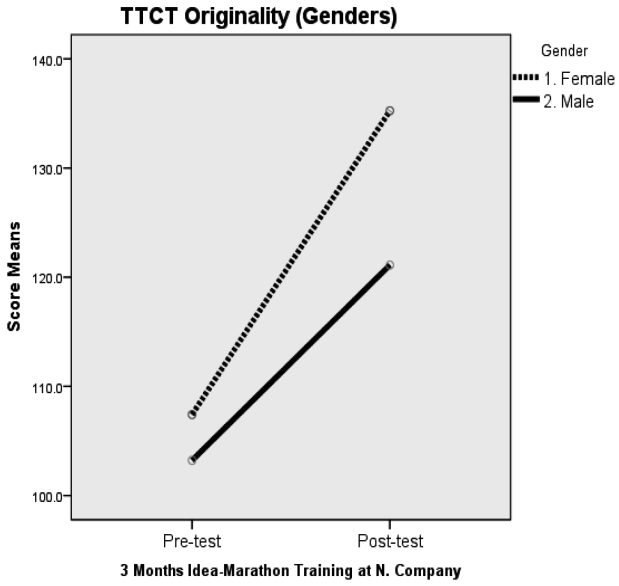


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
FLU-Pre	F	84.917	13.6346	12
	M	88.778	17.6619	9
	Total	86.571	15.1940	21
FLU-Post	F	118.917	19.9702	12
	M	105.333	15.5081	9
	Total	113.095	19.0523	21

Figure 89 N. Company Fluency in Genders

(3) Originality

ANOVA analysis of Originality indicated significant results for main effects for Pre-Posttest ($F(1,19)=23.091$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 90).



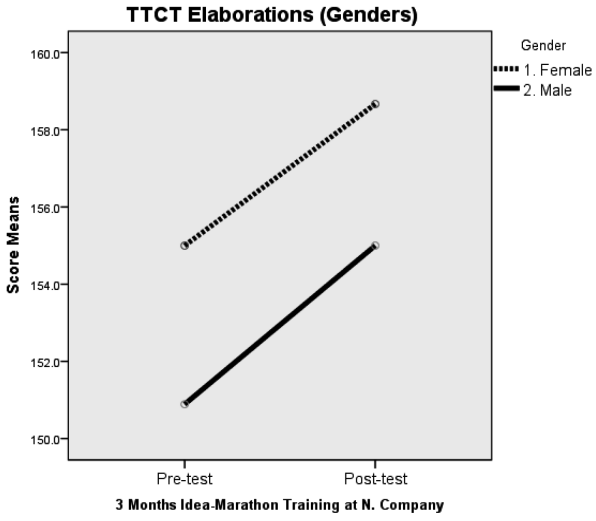
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ORI-Pre	F	107.417	16.4784	12
	M	103.222	23.8473	9
	Total	105.619	19.5281	21
ORI-Post	F	135.250	17.9804	12
	M	121.111	19.4386	9
	Total	129.190	19.5029	21

Figure 90 N. Company Originality in Genders

(4) Elaborations

ANOVA analysis of Elaborations indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 91).



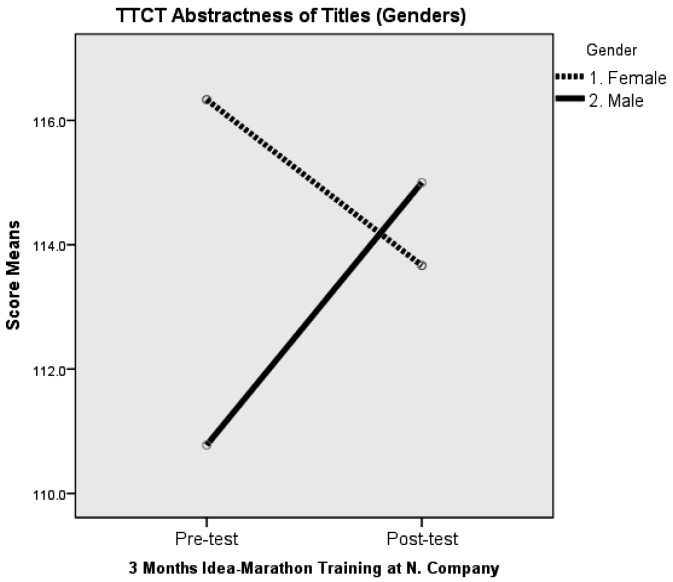
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ELA-Pre	F	155.000	7.4223	12
	M	150.889	8.4476	9
	Total	153.238	7.9492	21
ELA-Post	F	158.667	2.9644	12
	M	155.000	5.5902	9
	Total	157.095	4.5597	21

Figure 91 N. Company Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Elaborations indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 92).

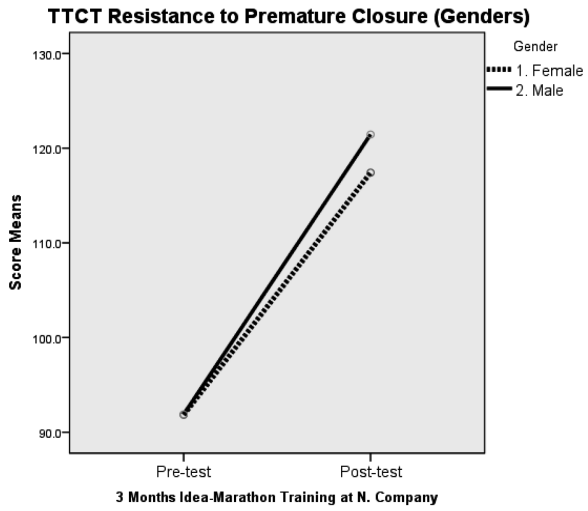


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
ABT-Pre	F	116.333	26.2586	12
	M	110.778	17.0131	9
	Total	113.952	22.4265	21
ABT-Post	F	113.667	20.0424	12
	M	115.000	16.3783	9
	Total	114.238	18.1298	21

Figure 92 N. Company Abstractness of Titles in Genders

(6) Resistance to Premature Closure

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest ($F(1,19)=49.653$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 93).



Descriptive Statistics				
Gender		Mean	Std. Deviation	N
RPC-Pre	F	91.833	15.1408	12
	M	91.889	15.3170	9
	Total	91.857	14.8300	21
RPC-Post	F	117.417	17.1595	12
	M	121.444	14.5096	9
	Total	119.143	15.8218	21

Figure 93 N. Company Resistance to Premature Closure in Genders

6.3.2.4 ANOVA Analysis for Comparison of TTCT Norm Referenced Measures in Pre-Posttest among Top, Middle, Low Groups

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest tests

TML: Top-, Middle-, and Low-scoring groups

T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

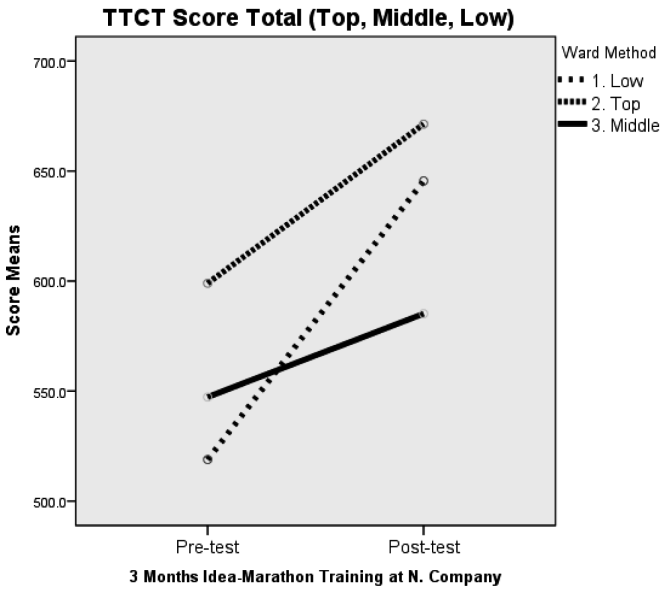
Top	6 persons
Middle	7 persons
Low	8 persons
Total	21 persons

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest ($F(1,18)=270.699$, $p<.01$) and among TML ($F(1,18)=19.531$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest, $p<.05$) and among T-M and T-L ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,18)=31.594$, $p<.01$, MSE = 238.391). The Bonferroni multiple comparison test confirmed a significant main effect for TMP within Pre-Posttest (Pretest < Posttest, $p<.05$)

At Pretest, there was significance between T-M and between T-L (T > M and T > L, $p<.05$), but none between M–L (M > L). At Posttest, however, T-M and M-L (T > M, M < L, $p<.05$) were significant, indicating no difference between T-L. Low got closer to Top and higher than Middle (Figure 94).



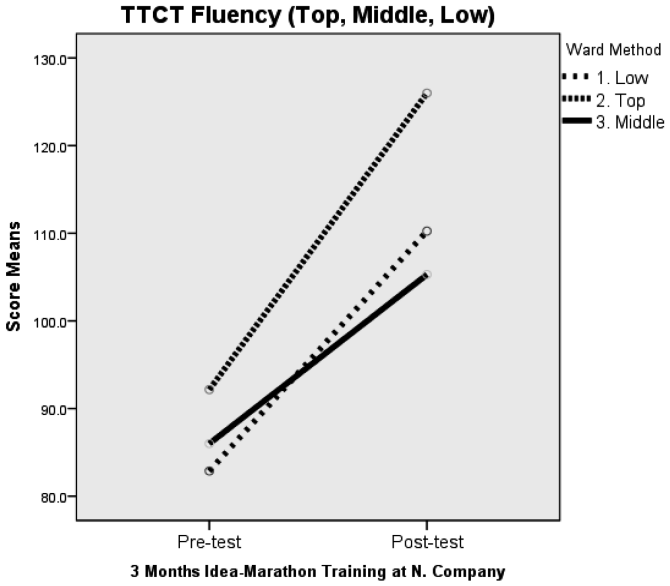
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	518.875	29.8445	8
	2	599.000	21.4942	6
	3	547.286	25.5911	7
	Total	551.238	41.6232	21
STL-Post	1	645.500	23.5068	8
	2	671.333	10.4243	6
	3	585.143	21.2480	7
	Total	632.762	40.7540	21

Figure 94 N. Company Score Total among TML

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest ($F(1,18)=44.188$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 95).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	82.875	9.6723	8
	2	92.167	23.8865	6
	3	86.000	11.6190	7
	Total	86.571	15.1940	21
FLU-Post	1	110.250	18.8509	8
	2	126.000	20.1693	6
	3	105.286	14.4189	7
	Total	113.095	19.0523	21

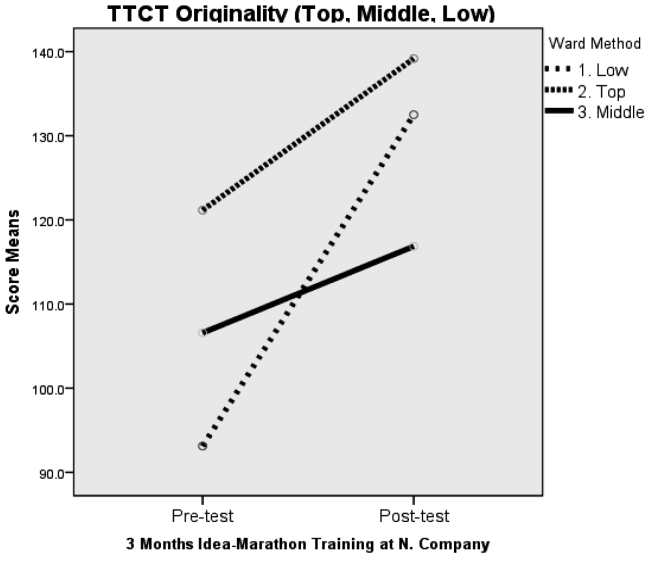
Figure 95 N. Company Fluency among TML

(3) Originality

ANOVA analysis of Originality indicated significant results for main effects for Pre-Posttest ($F(1,18)=31.951$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,18)=5.186$, $p<.05$, MSE = 164.870). The Bonferroni multiple comparison test confirmed a significant main effect for TML within Pre-Posttest (Pretest < Posttest, $p<.05$).

At Pretest, there was significance between T-L (T > L, $p<.05$), but none between T-M and M–L (T > M, M > L). At Posttest, however, TML was not significant (T > M, T > L, M < L), indicating no difference among TML. Low got closer to Top and higher than Middle (Figure 96).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	93.125	15.7066	8
	2	121.167	16.0676	6
	3	106.571	17.8125	7
	Total	105.619	19.5281	21
ORI-Post	1	132.500	21.2065	8
	2	139.167	20.4002	6
	3	116.857	10.2377	7
	Total	129.190	19.5029	21

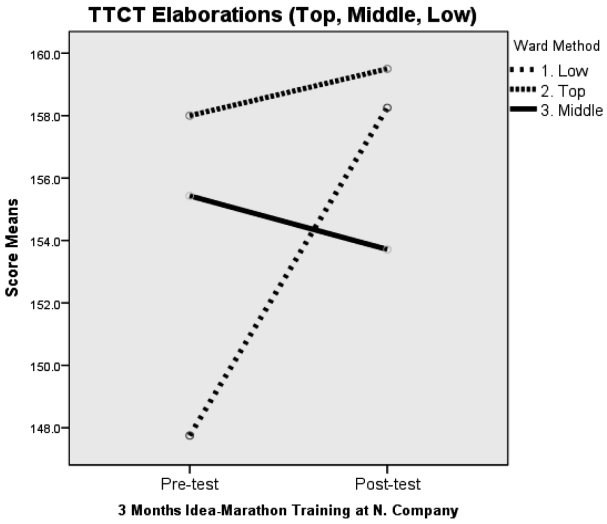
Figure 96 N. Company Originality among TML

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for Pre-Posttest ($F(1,18)=4.811$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,18)=5.964$, $p<.05$, $MSE=25.304$). The Bonferroni multiple comparison test confirmed a significant main effect for the Low group within Pre-Posttest (Pretest < Posttest, $p<.05$), while there were no significant results for Top or Middle within the Pre–Post group.

At Pretest, there was significance between T–L (T > L, $p<.05$), but none between T–M and M-L (T > M>L). At Posttest, however, there was no significance among TML (M < L, T > L). Low was higher than Middle and got closer to the Top (Figure 97).



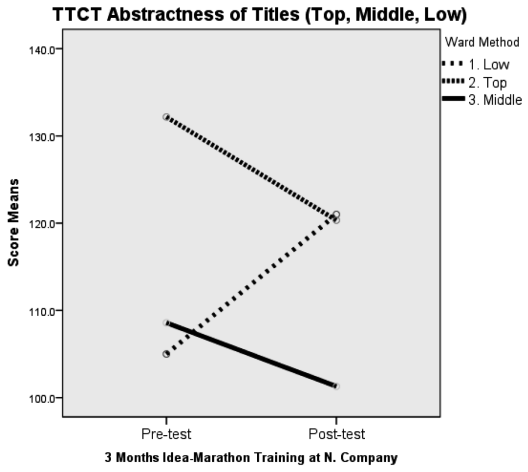
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	147.750	10.1101	8
	2	158.000	2.4495	6
	3	155.429	4.2370	7
	Total	153.238	7.9492	21
ELA-Post	1	158.250	2.8661	8
	2	159.500	1.2247	6
	3	153.714	6.1296	7
	Total	157.095	4.5597	21

Figure 97 N. Company Elaborations among TML

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or among TML (Figure 98).



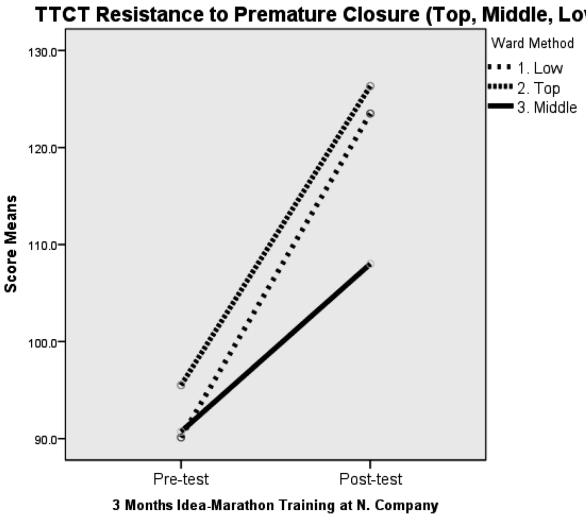
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	105.000	15.3809	8
	2	132.167	29.9694	6
	3	108.571	13.4022	7
	Total	113.952	22.4265	21
ABT-Post	1	121.000	12.8174	8
	2	120.333	22.6951	6
	3	101.286	13.4501	7
	Total	114.238	18.1298	21

Figure 98 N. Company Abstractness of Titles among TML

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,18)=55.109$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 99).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	90.125	14.4463	8
	2	95.500	15.5917	6
	3	90.714	16.3780	7
	Total	91.857	14.8300	21
RPC-Post	1	123.500	15.0618	8
	2	126.333	14.7603	6
	3	108.000	12.8970	7
	Total	119.143	15.8218	21

Figure 99 N. Company Resistance to Premature Closure among TML

6.3.3 N Company Study Discussion

ANOVA analysis of genders for Pre-Posttest indicated no difference in creativity test score results between genders among all five Norm-Referenced Measures and Score Total.

ANOVA analysis of Top, Middle, and Low groups as divided by Cluster Analysis indicated that the Low group scores improved significantly, exceeding Middle group scores for all five Norms and Score Total. This remarkable improvement in the Low group is hypothetically explained by the creativity of the Low group being aroused by the daily thinking tasks and journaling the resulting ideas.

While high motivation is a common trait of new employees in Japan, Idea-Marathon training may significantly boost creative thinking.

Company training of recent graduates resulted in a much higher number of ETS ideas, as compared to senior employees. Idea-Marathon training is particularly suited to recent graduates, whose creativity seems particularly susceptible to being stimulated by daily thinking and journaling.

Chapter 7 Children

7.1 Drawing Idea-Marathon for T. Kindergarten

7.1.1 T Kindergarten Drawing Idea-Marathon Summary

Preschool children are raw gemstones, most of whom are buried deeply in the earth, but a few of them might be in shallow ground or on the earth's surface. Preschool children are to be given all possible education, measures, guidance and creative support.

The Drawing Idea-Marathon was developed to improve the creativity of kindergarten children. It is a method based on making a pencil drawing of an object on a small piece of paper. Based on the concept of the Idea-Marathon, the Drawing method requires children to complete a brief drawing session every day.

To analyze the effects on the creativity of the Drawing Idea-Marathon, the Torrance Tests of Creative Thinking (TTCT) were administered. The TTCT Figural tests were performed twice as Pre-Posttest (A type and B type) at an interval of five months to the same five-year-old children in a kindergarten class in Tokyo. Total Score, Fluency, and Originality showed significant results out of the five Norm Referenced Measures of the TTCT Figural Tests. Among the 13 Criterion-Referenced measure items on the TTCT checklist of Creative Strengths, the analysis showed significant results for the Total Score of Creative Strength, Storytelling, Humor, and five other items.

ANOVA analysis indicated that there were no significant differences nor interactions for Genders with Pre-Posttests. The Score Total of the TTCT test Pre-Posttest results were divided into Top, Middle, and Low scoring groups by Ward's method of cluster analysis. Though there was no significance, the Middle group was approaching the Top group in all Norms.

7.1.2 Introduction

In this chapter, the development of the Drawing Idea-Marathon and the study of its effects on creativity are discussed. The Drawing Idea-Marathon is a new method of daily training via drawing for kindergarten children. We expected that, if the Drawing Idea-Marathon was practiced and continued by children on a daily basis, the children would steadily improve in their drawing ability and fondness for drawing as well as obtain confidence in their own drawing. Since the first Drawing Idea-Marathon was practiced in T Kindergarten in Tokyo in 2010, this method has been adopted by eleven kindergartens and nurseries throughout Japan.

The definition of 'Creativity' is described in the *Oxford Dictionary of Psychology (2009)* as "*the production of ideas and objects that are both novel, or original and worthwhile or appropriate, that is useful, attractive, meaningful, or correct* [62]."

This definition of 'Creativity' cannot be applied to the creativity of young children, the reasons for which are discussed here. Regarding their creative ability, we might need a new, more accurate word or new definition of creativity.

Toshiaki Tanabe (1983) pointed out that preschoolers' creativity cannot be clearly distinguished from intelligence itself without creating a new value or term. Young children with poor linguistic ability should be judged by an activity test [63]. This activity test includes a drawing activity performed by young children.

Yuko Iida (1974) says that the life of a preschooler is full of creativity that is often useless in actual life and society [64]. Iida insists on the point that "i*n modern intelligent society or future society, creativity is a necessity which human beings living there must have always before anything. And the base of the creativity is found it the infant period* [64]." In this dissertation, we respected and followed this critics in the application of our creativity test. We created the special terminology of creativity for kindergarten children as "Infant Creativity"

It is clear that the same child with infant creativity will, under the influence of education, society and family atmosphere, grow into a person with creativity as described by the *Oxford Dictionary of*

Psychology. The same creativity is growing and changing from children to researchers. We have to start evaluating children's creativity as if observing a growing seed of rice. Furthermore, it is very important as to how we can give impact to an Infant Creativity.

The Infant Creativity of young children resides in many aspects of ability, including language, arithmetic, clay molding, and music. In this experiment, we tried to improve Infant Creativity through the Drawing Idea-Marathon.

7.1.3 Children's Drawing Creativity

Before measuring how the Idea-Marathon's basic concept of "Every day Drawing in a Notebook" influences children's creativity, we must review the preceding studies of picture drawing training for young children:

Nakagawa(2010) said, *"For children 4 to 6 years old, it is inevitable to think in order through playing and molding activity with concentration and durability and also very important to foresee and to make a plan of activity* [65]*"* According to Nakagawa, children from 4 to 6 years old must be taught to draw by observing step by step drawing instruction every day, how other pupils are drawing, and how to accommodate on object within a piece of sketching paper.

Eisner(1986) said, *"We should understand we cannot leave children untouched in art education as they grow up. We should know we can encourage their art education by proper guidance.[66]"* Eisner was insisting on liberal drawing, but even Eisner said that children should not be left to their own devices and appropriate guidance is required.

In Japan, many kindergartens and nursery schools are still using drawing paper of 788 x 1092 mm or 392 x 542 mm size in class. Children are expected to draw their pictures however they feel like. Some children are eager to begin drawing, but others hesitate. Young children do not always concentrate easily on a single task or observe carefully over a certain time.

There are many problems to be solved in kindergartens and nursery schools at present, and as for the picture drawing activity, there have been some discussions within the Kindergarten Committee of the Ministry of Education, Culture, Sports, Science and Technology in Japan(2013) as follows [67]:

> *In kindergartens, time for drawing picture is decreasing. It is very important for pupils to draw pictures at their age as they will think what they want to express through drawing. Government guide is not clear between writing and drawing. Recently, writing is giving way to PC or mobile sets. People do not need to hand-write to convey messages in sentences. But before using this new equipment, it is critically important for pupils to draw what they observe with confidence.*

The decreasing time devoted to drawing pictures in kindergarten classes is due to the fact that most kindergartens classes are busy every day, week, and season. Usually, kindergartens have only morning programs with fewer available hours than nurseries. Although kindergartens are aware of the necessity of drawing as a means to foster children's creativity, they cannot spend half a day on crafting a single picture.

7.1.4 The Development of the Drawing Idea-Marathon Training Method

In 2010, the author developed an application of the Idea-Marathon into a picture drawing lesson for kindergarten children.

The basic concept of the Idea-Marathon, "Everyday, Thinking and Instantly Writing chronologically in a notebook," was incorporated into this picture drawing activity for kindergarten children.

The Idea-Marathon has been applied and studied in laboratories by Higuchi (2012) [68], companies by Suga (2008) [69], universities by Higuchi [70] and by Kawaji (2012) [71, 72], junior high schools

by Shindo (2008) [73], and elementary schools by Terauchi (2009) [74]. However, there was no study or experience in kindergartens or nurseries.

Students and adults who practice the Idea-Marathon can record their ideas and thoughts into their notebooks without delay. Ideas are written into sentences and pictures are added. But for young children, it is a little more difficult to write down their ideas.

Even though young children can talk about their ideas within their limited vocabulary, they are not expressive in their writing. Some children can read and write letters and words, but others are still largely unable to do so. Some children can draw pictures, but others might only be able to scribble.

Therefore, the Drawing Idea-Marathon was created for kindergarten children as part of their daily activities considering the above-mentioned conditions. Every day, children have one minute for observation before drawing a single object that has been placed in front of them as they sit grouped around a small table. In this way, the essence of the Idea-Marathon to 'Think every day' and 'Write in a notebook," was combined with drawing in order to apply it to kindergarten children.

If the Drawing Idea-Marathon instills children's confidence in drawing by improving their observation skills and basic drawing techniques, they will come to enjoy drawing and become fond of it.

Even though only drawing by way of short, daily exercise, the experience that children accumulate in this process improves their observation and concentration skills.

Until recently, the study of the Idea-Marathon and its experiments has been limited to schools, universities, company staffs, and laboratory researchers. But now the Drawing Idea-Marathon is available to young children who cannot write.

After conducting the Drawing Idea-Marathon for over two years, along with the pretests and posttests of the TTCT Figural tests, we analyzed the influence of the Drawing Idea-Marathon on creativity quantitatively.

For the TTCT Figural test, there are two test-types: pretest and posttest. Usually in USA, the TTCT Figural test is said to administer one-time test for children according to Georgia Torrance Center. In USA, as there is no common fixed creative curriculum like the Drawing Idea-Marathon between Pre-Posttests of TTCT Figural tests.

As children perform the Drawing Idea-Marathon every day, the resulting comparison between the TTCT Pretest and TTCT Posttest may indicate the effect on creativity of the Drawing Idea-Marathon. (Figure 100)

Figure 100 The Drawing Idea-Marathon with Two TTCT Figural Pre-Posttest at kindergartens

7.1.5 The Experimental Design of the Drawing Idea-Marathon Method

The Drawing Idea-Marathon Method requires children to observe and draw an actual object in front of them. They sit around low tables and draw on a piece of paper. Their work is accumulated daily in their notebooks. By observing different objects day by day, children start to notice the delicate shapes of different objects, the slight curves of the edges, lighting and shadows, that they have never noticed before.

Every day, each child makes one small pencil drawing and pastes it in their A5 size Idea-Marathon notebook. The paper itself becomes a sticker, as the back sheet is peeled.

7.1.5.1 A5 Size Notebook and A7 Size Drawing Paper

Figure 101 is a sample page of a Drawing Idea-Marathon notebook

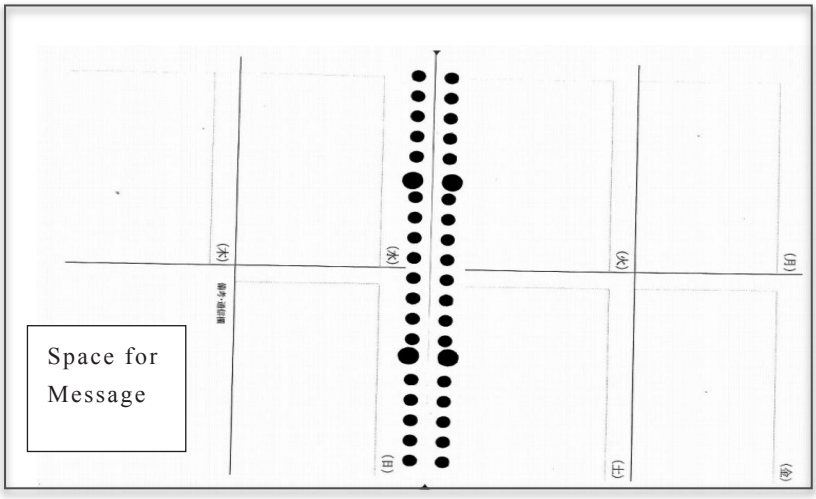


Figure 101 A5 Size Notebook (for one week's space and space for message)

Two pages of an A5 size Idea-Marathon notebook can hold eight pieces of A7 size paper. Each child's seven days' drawing work is pasted here. There is extra space included for parents or a teacher to write messages.

There is a reason why we use a small of piece paper instead of letting children draw directly in the notebook. If children were given the notebook as their drawing paper, they would use all the space for drawing freely, even beyond the section lines. To solve this problem of over-scribbling, they are given a small sized paper every day. When the drawing is complete, their teacher (or the children by themselves if get used to it) peels off the back of the paper and sticks the drawing into the individual notebook (Fig 102).

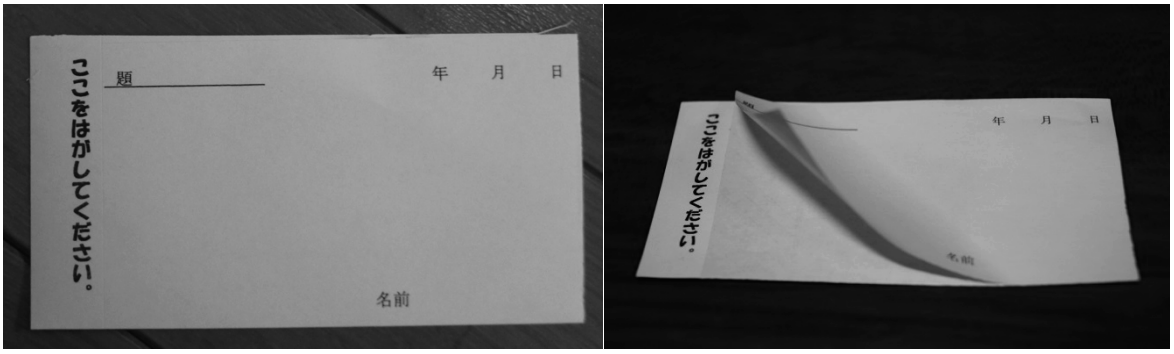


Figure 102 A Small Peelable Sheet for Drawing

7.1.5.2 The Drawing Idea-Marathon Training Design

The Drawing Idea-Marathon training design is as follows:

(1) The Drawing Idea-Marathon is designed so that the whole activity is done in a short time, no more than 15 minutes every day, so that children can remain focused.

(2) Every day a different small object is prepared and placed close to the children as they gather into a group for observation and drawing.

(3) Four or five children sit around a small, round, low table. Each child is given a pencil and an eraser. They are placed around the table so that they can draw their picture while looking at the other children's drawings.

(4) The teacher places a new object into the center of the table and gives a drawing sheet to each child. The teacher writes the name of the object and the date on a white board.

(5) The children copy the teacher's writing and record the name of the object and the date. Some children may need the teacher's assistance for writing

(6) Then, before starting to draw, all the children observe the object for one minute.

(7) At the teacher's signal, the children begin drawing. The teacher moves around the children and observes the pictures being drawn. As she finds good drawings, fine lines, curves, and shapes, she praises the children.

(8) Once the drawings are completed, the teacher pastes the picture sheets into the notebooks. But as they become accustomed to the process, the children themselves can paste the sticker sheets into their own notebooks. (Figure 103)

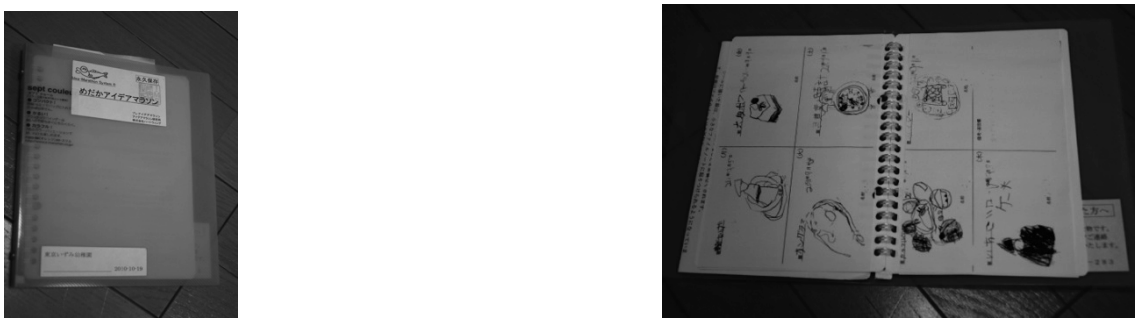


Figure 103 The Drawing Notebook & Notebook's Inside (1 week: 7 pictures +one message)

(9) The children take their Drawing Idea-Marathon notebooks home and show it to their parents. Their parents praise the positive qualities of the work as recommended by the kindergarten. Both teachers and parents write their messages to the child in the extra space provided.

(10) Before weekends, national holidays, and long vacations, the children are given a number of drawing sheets to take home in order to maintain the habit of drawing while at home. They discuss their drawn objects with their parents over these weekends and holidays.

7.1.5.3 The Actual Method of the Drawing Idea-Marathon

When the Drawing Idea-Marathon class segment begins, children bring in low tables from outside the classroom and sit around the tables in groups of four or five. (Figure 104)

Figure 104 Carrying in the Low Table and Sitting around It for Observation

7.1.5.4 Preparation of Objects

For the Drawing Idea-Marathon, 75 kinds of small objects are prepared (Figure 105). Four or five children share one table with a single object. For example, if there are 29 children in a class, seven tables with seven objects are prepared (one of the tables is for five children).

Figure 105 Objects for Drawing

After distributing objects to each table, the teacher writes the name of the object on the whiteboard (Figure 106).

Figure 106 The Teacher Writes the Name of the Object and the Children Copy It, Adding Their Names Onto the Drawing Sheet.

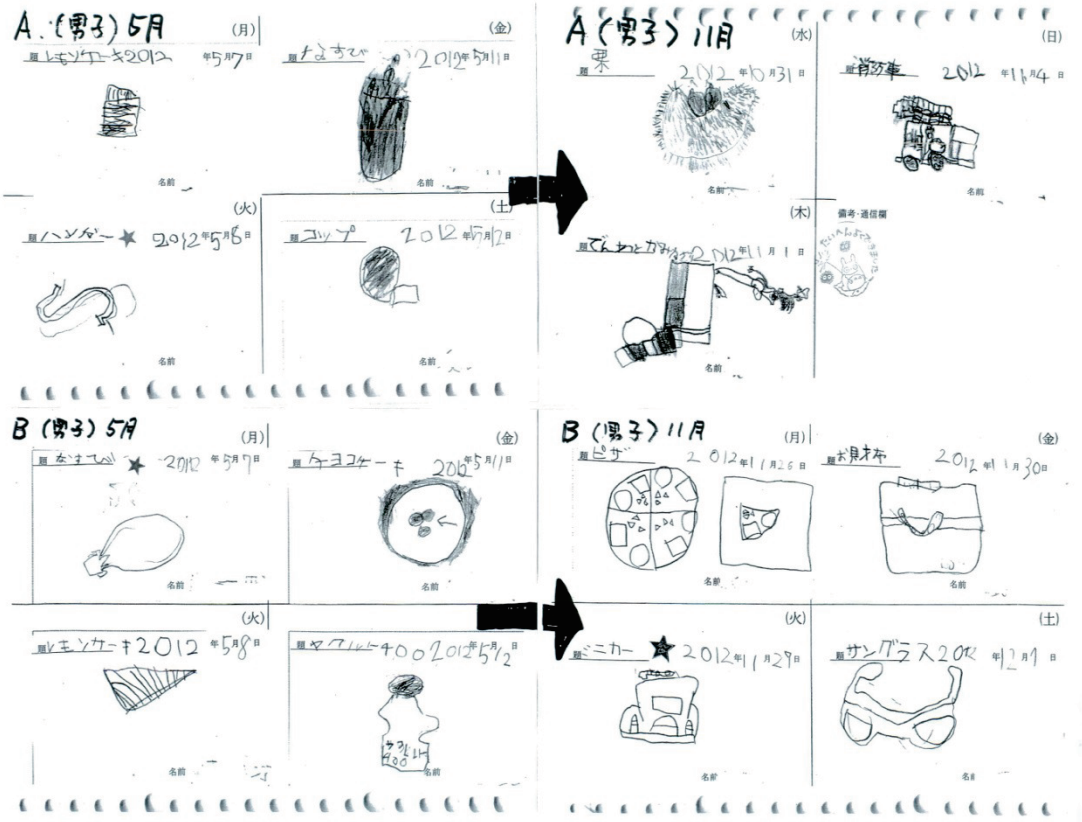
After Observing for One Minute, they Begin Drawing. And when they complete drawing, they bring the notebooks to teacher for pasting the drawn sheet and checking. (Figure 107).

Figure 107　Delivering to their Teacher

7.1.5.5　The Drawing Idea-Marathon at a Kindergarten in Tokyo

In October 2010, T Kindergarten in Tokyo started the Drawing Idea-Marathon, and they still provide the training every year. The experimental training was conducted from May to December 2012.

Figure 108 shows samples of drawings of four children, two boys and two girls. These images are smaller than the actual size.



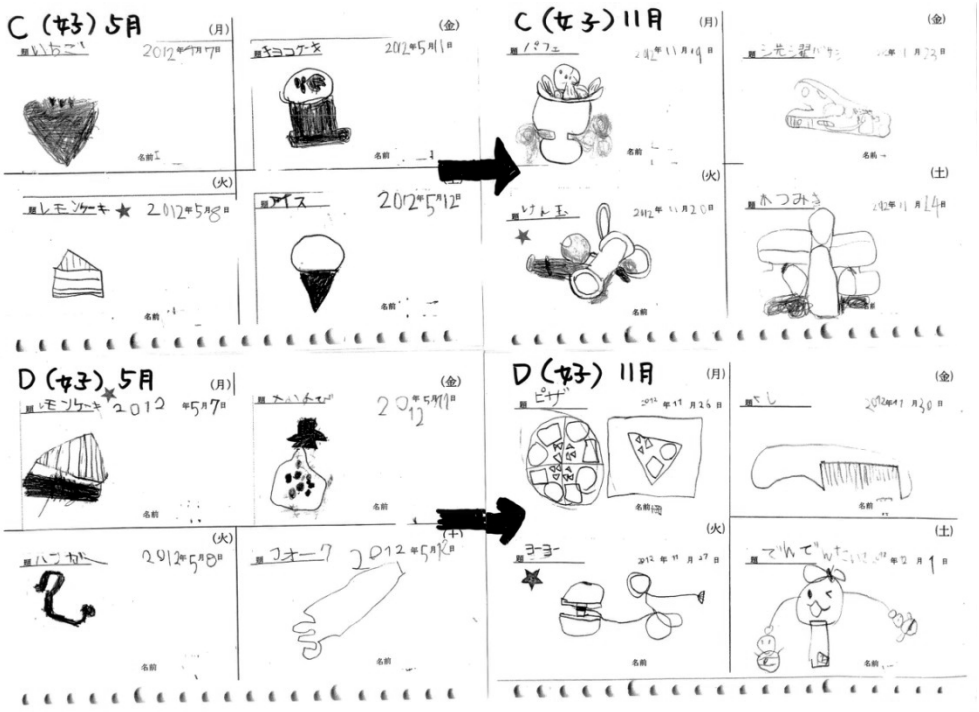


Figure 108　Samples of Drawing Idea-Marathon Notebooks　（names deleted）

7.1.6　Implementation of TTCT Figural Type for the Drawing Idea-Marathon

7.1.6.1　Implementation of the TTCT Figural Tests

At T Kindergarten, the Drawing Idea-Marathon was begun on Monday, May 7, 2012. The TTCT Figural type A was carried out on July 17, 2012, in accordance with the TTCT Figural Type Test manual [20]. After the first test, the Drawing Idea-Marathon was continued. After about five months, the second test (the TTCT Figural type B Test) was carried out on December 4, 2012. There was no advanced notice of either test for the children. They were unable to prepare for these tests.

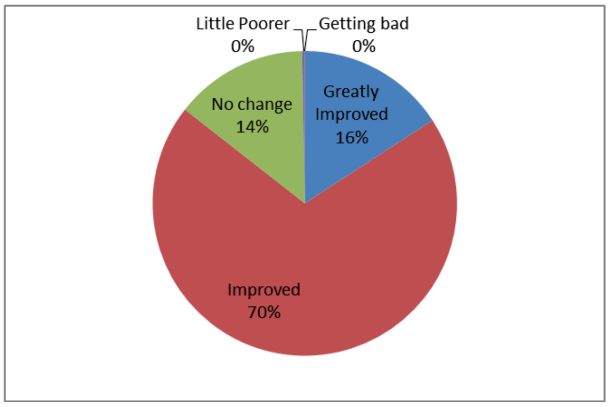
7.1.6.2　Questionnaires for Parents

After beginning the Drawing Idea-Marathon, questionnaires were practiced at around one month after starting.

7.1.7　Results of Questionnaires to Parents

Since around five year old children are observed well by their parents at home, their parents' comments on the effects on creativity and other influences of the Drawing Idea-Marathon must be collected, for which Questionnaires and Replies were obtained from 360 parents from four kindergartens parents (two kindergartens from Sendai, one from Osaka, one from Tokyo).

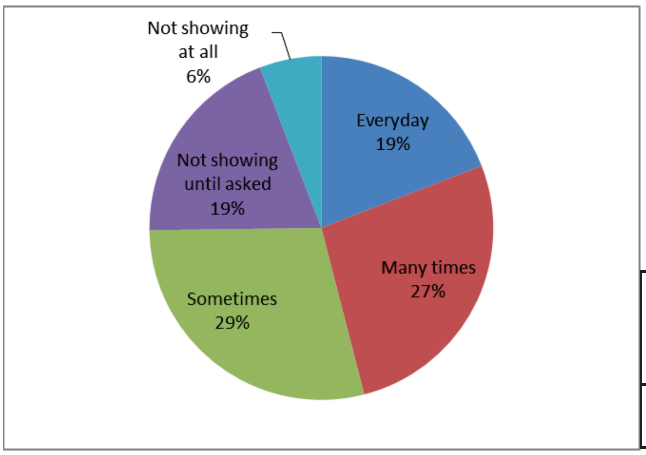
Q1 Did drawing techniques of your child improve? (Figure 109)



Greatly Improved	Improved	No change	Little Poorer	Getting bad
57	251	51	1	0

Figure 109 Question 1

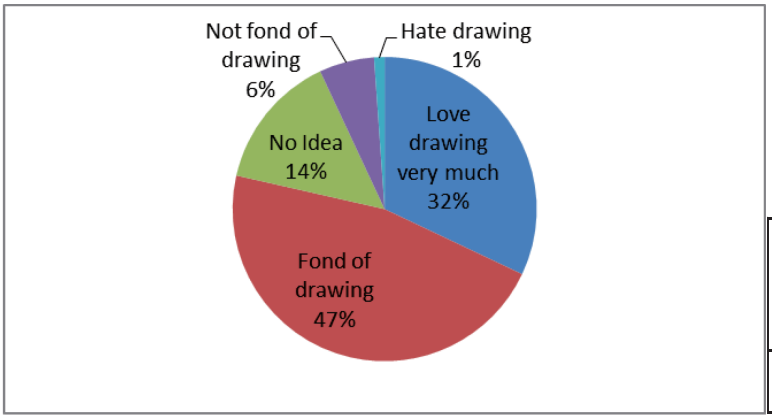
Q2 Does your child show the notebook to you every day? (Figure 110)



Everyday	Many times	Sometimes	Not showing until asked	Not showing at all
69	97	104	70	21

Figure 110 Question 2

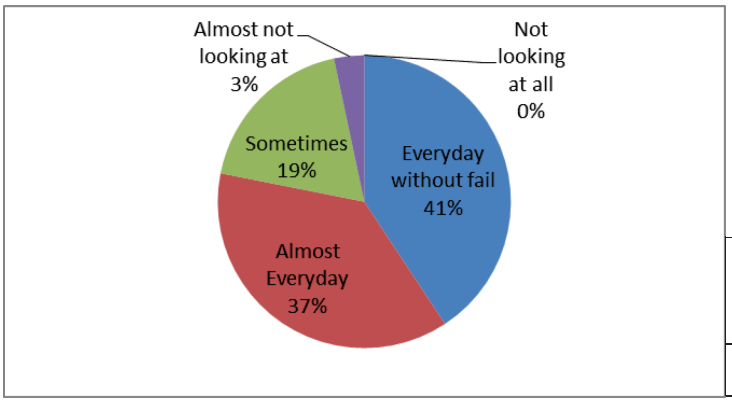
Q3 Is your child fond of drawing? (Figure 111)



Love drawing very much	Fond of drawing	No Idea	Not fond of drawing	Hate drawing
115	167	52	21	4

Figure 111 Question 3

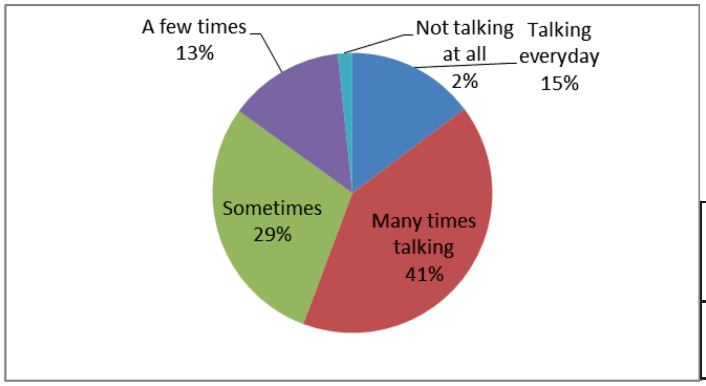
Q4 Do you look at D-IMS (Drawing Idea-Marathon) notebook every day? (Figure 112)



Everyday without fail	Almost Everyday	Sometimes	Almost not looking at	Not looking at all
147	135	67	12	0

Figure 112 Question 4

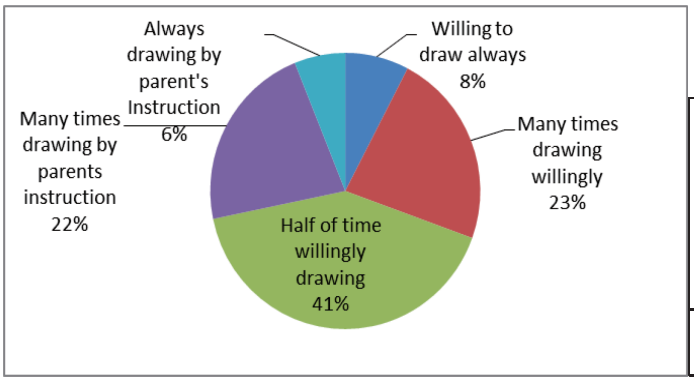
Q5 Are you talking with your child about drawings? (Figure 113)



Talking everyday	Many times talking	Sometimes	A few times	Not talking at all
53	147	105	48	6

Figure 113 Question 5

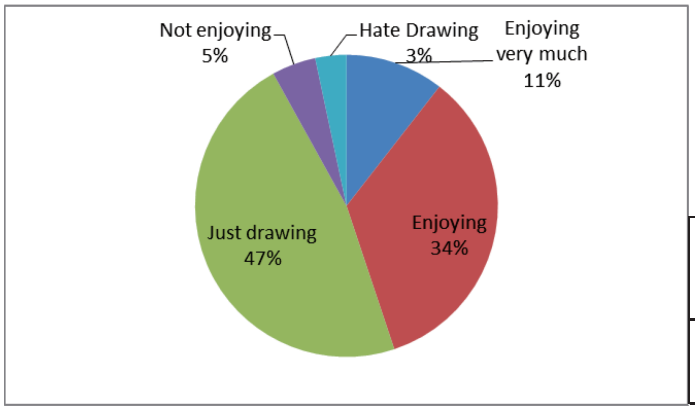
Q6 Is your child willing to draw on Sat/Sun and holidays at home? (Figure 114)



Willing to draw always	Many times drawing willingly	Half of time willingly drawing	Many times drawing by parents instruction	Always drawing by parent's Instruction
10	30	54	29	8

Figure 114 Question 6

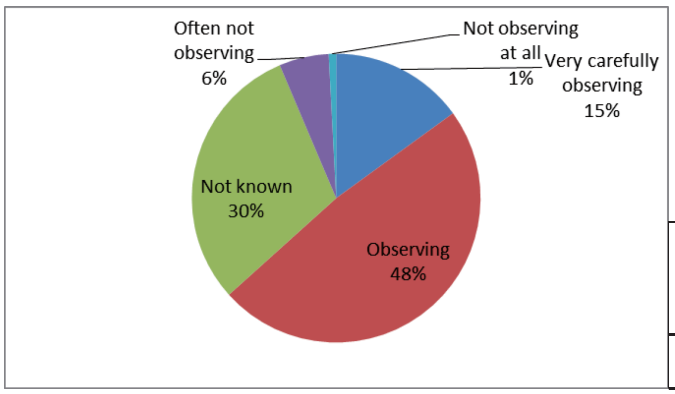
Q7 Is your child enjoying drawings? (Figure 115)



Enjoying very much	Enjoying	Just drawing	Not enjoying	Hate Drawing
38	124	170	17	12

Figure 115 Question 7

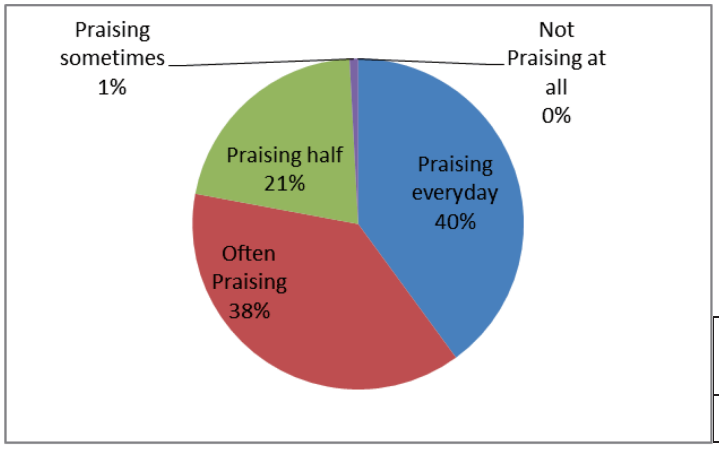
Q8 Is your child drawing with observation? (Figure 116)



Very carefully observing	Observing	Not known	Often not observing	Not observing at all
54	174	109	20	3

Figure 116 Question 8

Q9 Are you praising your child's drawings? (Figure 117)



Praising everyday	Often Praising	Praising half	Praising sometimes	Not Praising at all
143	136	76	3	0

Figure 117 Question 9

7.1.8 Analysis of the TTCT Figural Tests Score

There are 67 children in the Drawing Idea-Marathon Training class. However, there are 61 children who participated in the both Pretest and Posttest of TTCT Figural tests. Therefore, 61 children's scores were analyzed. The scoring method was in accordance with the TTCT manual [75].

7.1.8.1 t-Test Result of TTCT Figural Pre-Posttest

The results of the Drawing Idea-Marathon as measured by the TTCT Figural Tests are shown in Table 1. T-tests within Pre-Posttest showed significance in Total Score ($t(60)=2.202$, $p<.05$), Fluency ($t(60)=2.140$, $p<.05$), and Originality ($t(60)=1.439$, $p<.01$). There was no significance in Elaborations, Abstractness of Titles, and RPC (Table 23).

Change of Scores between Pre-& Post test				
	Pre-test	Post-test	*t* value	Sig
Measurement	M(SD)	M(SD)		
Total Score	391(123)	422(130)	2.202	*p<.05*
Fluency	82(19)	89(26)	2.140	*p<.05*
Originality	85(27)	98(24)	1.439	*p<.01*
Elaborations	112(34)	118(32)	1.709	*n.s.*
Abstractness of Titles	31(47)	37(45)	0.848	*n.s.*
RPC	81(27)	80(33)	0.259	*n.s.*
			M=Score Means	SD=Standard Deviation
	df=60 (All)	*p*<.05	*p*<.01 (Two sided t-test)	

Table 23 t-Test Result of TTCT Figural Pre-Posttest at Kindergarten T.

7.1.8.2 13 Item Creative Strength Criterion-Referenced Measures within Pre-Posttest

The results within Pre-Posttest of the TTCT Figural test for the 13 Item Creative Strength Criterion referenced measures were tested using the Mann-Whitney U-test. As a result, out of the 13 item Creative Strength, there was significance found in Story-telling Articulateness ($p<0.01$), Movement and Action ($p<0.01$), Synthesis of Lines and Circles ($p<0.01$), Unusual Visualization ($p<0.05$), Humor ($p<0.01$), and Colorfulness of Imagery ($p<0.05$) (Tab 3). The Total Score of the thirteen Creative Strength was checked by the t-test and yielded significant results ($t(60)=4.554$ $p<0.01$) (Table 24) .

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	0.07	0.17		*n.s.*
2	Story-telling Articulateness	0.18	0.51		*p<.01*
3	Movement and action	0.13	0.44		*p<.01*
4	Expressiveness of Titles	0.41	0.54		*n.s.*
5	Synthesis of Incomplete Figures	0	0		*n.s.*
6	Synthesis of Lines or Circles	0.41	0.69		*p<.01*
7	Unusual Visualization	0.07	0.34		*p<.05*
8	Internal Visualization	0.05	0.07		*n.s.*
9	Extending or Breaking Boundaries	0.46	0.64		*n.s.*
10	Humor	0.03	0.21		*p<.01*
11	Richness of Imagery	0.74	0.97		*n.s.*
12	Colorfulness of Imagery	0.25	0.49		*p<.05*
13	Fantasy	0.18	0.31		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	3(3)	6(5)	4.554	*p<.01*
	Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=60, *n.s.*.:no significant, p<.01,p<.05				

Table 24　13 Item Creative Strength Criterion-Referenced Measures at Kindergarten T.

7.1.8.3　ANOVA Analysis for Comparison of TTCT Norm-Referenced Measures Pre-Posttest in Genders at T. Kindergarten

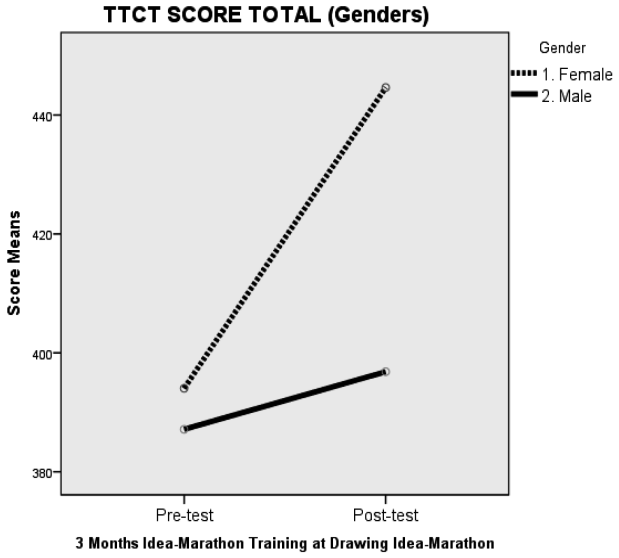
Female 32

Male　29

Total　61

(1) Score Total

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest ($F(1,59)=4.616$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 118).



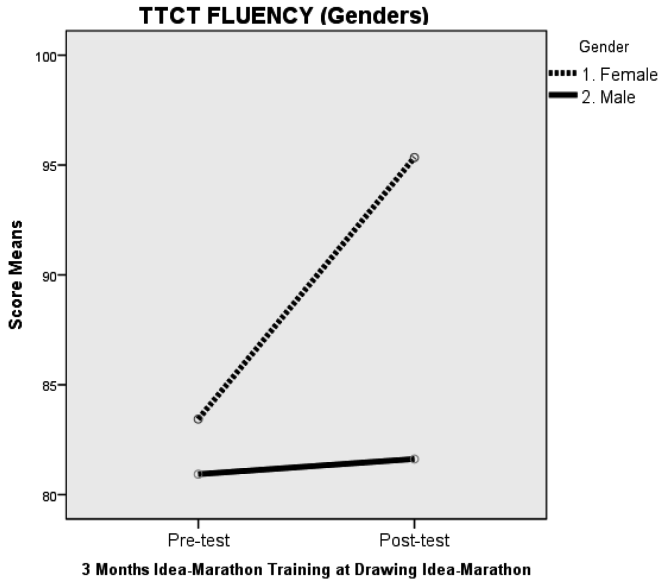
Descriptive Statistics

Gender		Mean	Std. Deviation	N
STL-Pre	F	394.03	111.542	32
	M	387.14	136.787	29
	Total	390.75	123.174	61
STL-Post	F	444.63	109.533	32
	M	396.83	147.022	29
	Total	421.90	129.866	61

Figure 118 T. Kindergarten Score Total in Genders

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects for Pre-Posttest ($F(1,59)=4.365$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 119).



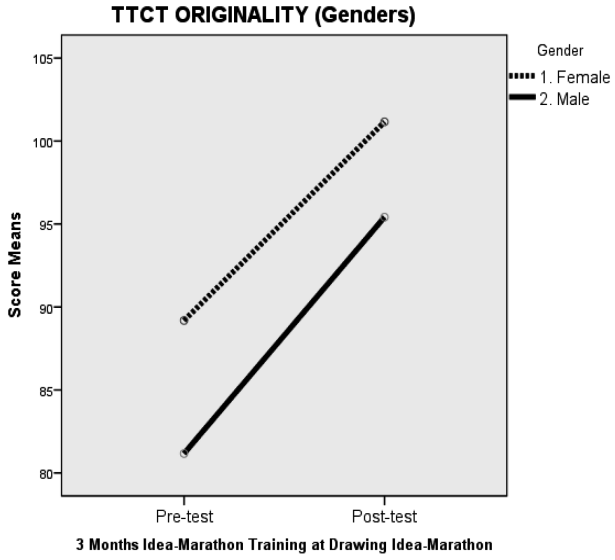
Descriptive Statistics

Gender		Mean	Std. Deviation	N
FLU-Pre	F	83.44	19.255	32
	M	80.93	19.537	29
	Total	82.25	19.269	61
FLU-Post	F	95.34	18.645	32
	M	81.62	31.812	29
	Total	88.82	26.451	61

Figure 119 T. Kindergarten Fluency in Genders

(3) Originality

ANOVA analysis of Originality indicated significant results for main effects for Pre-Posttest ($F(1,59)=19.545$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 120).



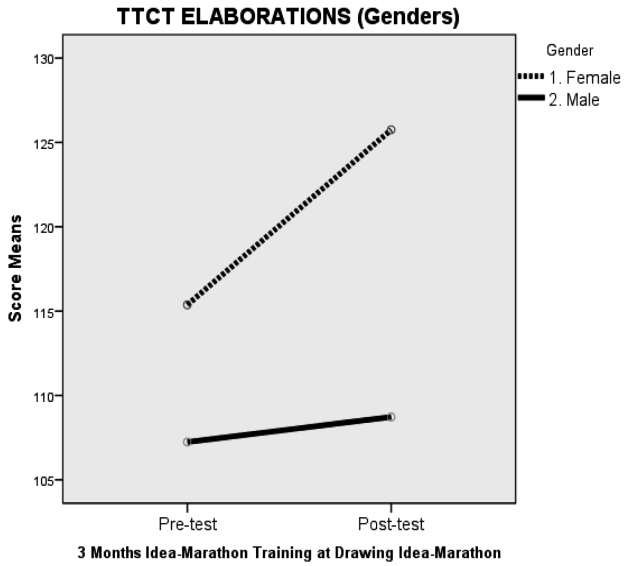
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ORI-Pre	F	89.19	21.677	32
	M	81.17	31.549	29
	Total	85.38	26.899	61
ORI-Post	F	101.16	21.113	32
	M	95.41	26.315	29
	Total	98.43	23.703	61

Figure 120 T. Kindergarten Originality in Genders

(4) Elaborations

ANOVA analysis of Elaborations indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 121).



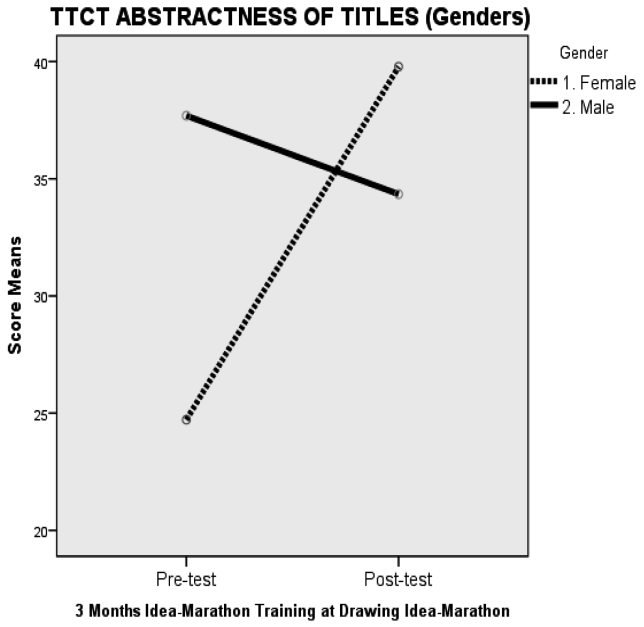
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ELA-Pre	F	115.38	31.875	32
	M	107.24	36.696	29
	Total	111.51	34.207	61
ELA-Post	F	125.75	27.527	32
	M	108.72	35.505	29
	Total	117.66	32.455	61

Figure 121 T. Kindergarten Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 122).



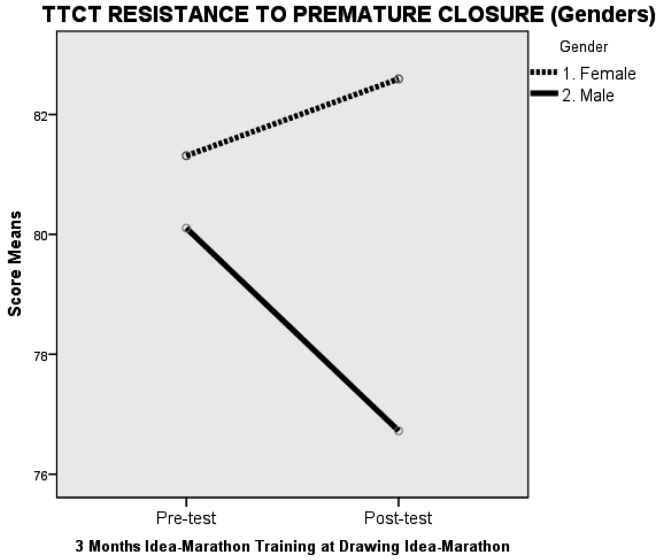
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ABT-Pre	F	24.72	44.092	32
	M	37.69	49.578	29
	Total	30.89	46.842	61
ABT-Post	F	39.78	46.357	32
	M	34.34	45.003	29
	Total	37.20	45.419	61

Figure 122 T. Kindergarten Abstractness of Titles in Genders

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 123).



Descriptive Statistics

Gender		Mean	Std. Deviation	N
RPC-Pre	F	81.31	23.610	32
	M	80.10	31.459	29
	Total	80.74	27.390	61
RPC-Post	F	82.59	25.985	32
	M	76.72	39.368	29
	Total	79.80	32.876	61

Figure 123 T. Kindergarten Resistance to Premature Closure in Genders

7.1.8.4 ANOVA Analysis for Comparison of TTCT Norm-referenced Measures in Pre-Posttest and Top, Middle, Low Groups

Abbreviations and Acronyms
Pre-Posttest: Pretest and Posttest
TML: Top-, Middle-, and Low-scoring groups
T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

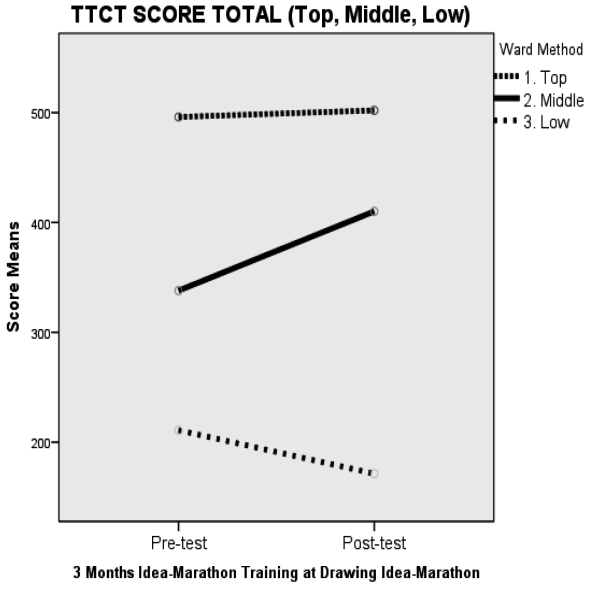
Top	26 children
Middle	28 children
Low	7 children
Total	61 children

(1) Score Total

Concerning Score Total, there were significant main effects among TML ($F(1,58)=83.206$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,58)=4.513$, $p<.05$, MSE = 5461.188). The Bonferroni multiple comparison test confirmed a significant main effect for the Middle group within Pre-Posttest (Pretest <Posttest, $p<.05$), while there were no significant results for Top or Low within the Pre–Post group.

At Pretest, there was significance among T-L and M-L (T > L, M > L, $p<.05$), but none between T–M (T > M). At Posttest, also there was significance among TML (T > M, T > L, M > L, $p<.05$) (Figure 124).



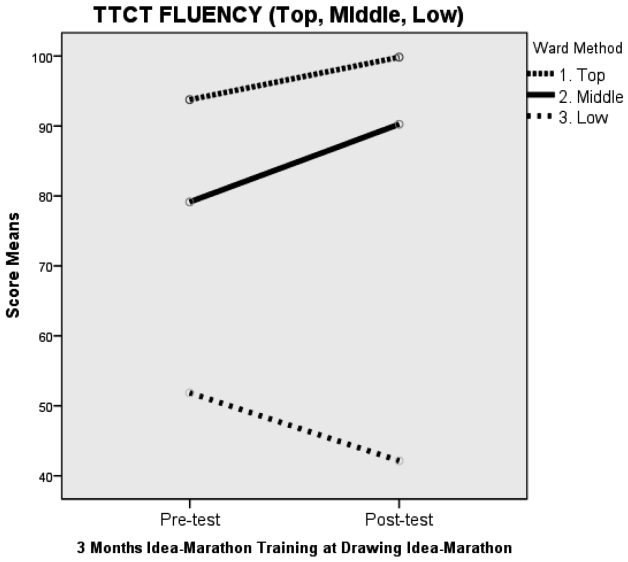
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	496.04	53.023	26
	2	337.96	61.090	28
	3	210.86	156.252	7
	Total	390.75	123.174	61
STL-Post	1	502.04	96.111	26
	2	410.14	71.871	28
	3	171.29	71.888	7
	Total	421.90	129.866	61

Figure 124 T. Kindergarten Score Total among TML

(2) Fluency

Concerning Fluency, there were significant main effects among TML ($F(1,58) = 40.700$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 125).



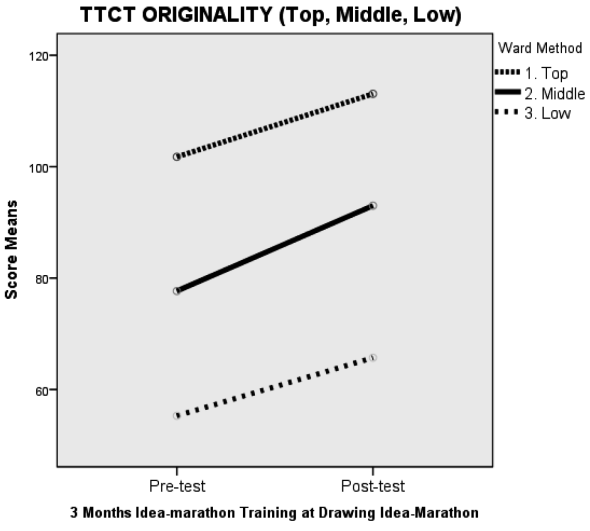
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	93.77	10.305	26
	2	79.14	8.022	28
	3	51.86	35.821	7
	Total	82.25	19.269	61
FLU-Post	1	99.85	19.685	26
	2	90.25	17.587	28
	3	42.14	30.196	7
	Total	88.82	26.451	61

Figure 125 T. Kindergarten Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects within Pre-Posttest ($F(1,58)=11.704$, $p<.01$) and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). Among TML ($F(1,58)=25.597$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 126).



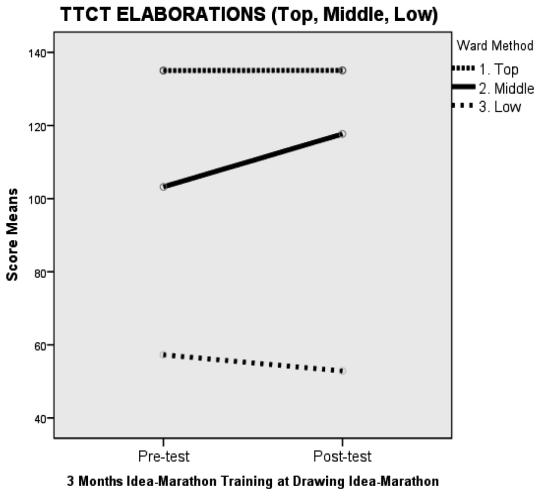
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	101.77	12.117	26
	2	77.68	24.198	28
	3	55.29	38.621	7
	Total	85.38	26.899	61
ORI-Post	1	113.08	21.707	26
	2	93.00	16.729	28
	3	65.71	8.920	7
	Total	98.43	23.703	61

Figure 126 T. Kindergarten Originality among TML

(4) Elaborations

Concerning Fluency, there were significant main effects among TML ($F(1,58)=56.124$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 127).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	135.04	15.011	26
	2	103.21	25.501	28
	3	57.29	41.056	7
	Total	111.51	34.207	61
ELA-Post	1	135.08	19.910	26
	2	117.68	22.442	28
	3	52.86	20.029	7
	Total	117.66	32.455	61

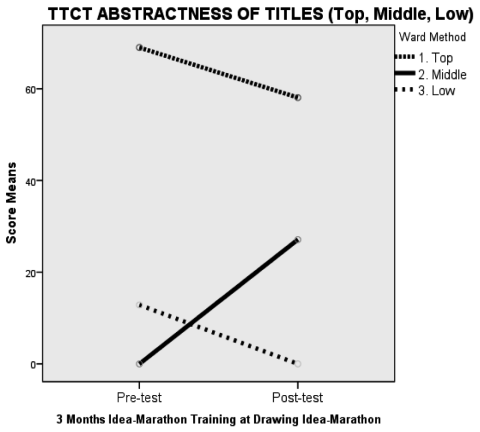
Figure 127 T. Kindergarten Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,58) = 30.890$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L and T-M ($p<.05$), but there was no significant effects between M–L.

An interaction was found within Pre-Posttest and among TML ($F(2,58)=3.600$, $p<.05$, $MSE = 1555.805$). The Bonferroni multiple comparison test confirmed a significant main effect for the Middle group within Pre-Posttest (Pretest<Posttest, p<.05), while there were no significant results for Top or Low within the Pre-Posttest.

At Pretest, there was significance between T-M and T–L (T > M, T > L, $p<.05$), but not significant between M–L (M < L). At Posttest there was significance between T-M (T > M, $p<.05$) and T–L (T > L, $p<.05$), indicating no difference between M–L (M > L) At Posttest, there was no significance among TML. Middle got higher than Low (Figure 128).



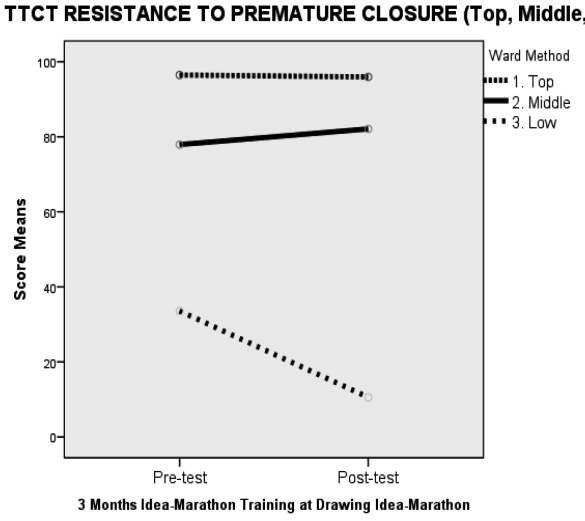
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	69.00	48.147	26
	2	0.00	0.000	28
	3	12.86	34.017	7
	Total	30.89	46.842	61
ABT-Post	1	58.08	47.422	26
	2	27.11	40.223	28
	3	0.00	0.000	7
	Total	37.20	45.419	61

Figure 128 T. Kindergarten Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects among TML ($F(1,58)=69.459$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results ($p<.05$). No interaction was found (Figure 129).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	96.46	13.219	26
	2	77.93	16.883	28
	3	33.57	42.284	7
	Total	80.74	27.390	61
RPC-Post	1	95.96	25.968	26
	2	82.11	10.203	28
	3	10.57	27.969	7
	Total	79.80	32.876	61

Figure 129 T. Kindergarten Resistance to Premature Closure among TML

7.1.8.5 T Kindergarten Drawing Idea-Marathon Studies Discussion

(1) t-Test Analysis of TTCT Pre-Posttest for the Five Norms Referenced Measures and Score Total

The two TTCT Figural tests shown in Table 24 indicate that the Drawing Idea-Marathon effectively improves kindergartener's creative powers of Score Total, Fluency and Originality. This is also reflected by the Total Score. Originality and Fluency likely improved due to possible strengthened observational powers, as was pointed out by parents in the questionnaire.

Strengthened observational powers help children notice previously unseen object details. After gaining this ability through the Drawing Idea-Marathon, children apply similar observation methods toward other objects and activities. Such heightened sensitivity to and awareness of detail increases Fluency and Originality.

(2) 13 Item Creative Strength Criterion-Referenced Measures Pre-Posttest

Besides the TTCT Figural Test's five Norm-Referenced Measures, we examined 13 creative strength Criterion-Referenced Measures. Among these, there was significant advancement in the Story-telling Articulateness, Movement and Action, Synthesis of Lines or Circles, Unusual Visualization, Humor, and Colorfulness of Imagery items.

(3) ANOVA Analysis of TTCT Pre-Posttest Between Genders

Although test scores by gender seemed to show that there was no statistical significance nor interactions, girls scores are higher than boys' for all five Norms and Score Total. Faster creativity gain in girls could be explained by their precocity at five years age compared to boys.

(4) ANOVA Analysis of TTCT Pre-Posttest Score with Top, Middle and Low Groups

When contrasting the pretest and posttest results with regard to the Top, Middle, and Low score results, the Middle group in all five Norms and Score Total came closer to the Top, but there was no difference in significance nor interactions.

Five months of the Drawing Idea-Marathon training and application of the TTCT with a Pretest and Posttest experiment indicated that the Drawing Idea-Marathon probably has a positive effect on the creativity of kindergarten-aged children. Results showing Middle group scores approaching those of the Top group might indicate increased confidence in drawing ability among the Middle group (28 children).

7.2 Two Nursery Schools E. and F.

7.2.1 Nursery Schools E & F Summary

In this chapter, an additional TTCT Pre-Posttests were administered for a With D-IMS (With Drawing Idea-Marathon System: experimental) group and a Without D-IMS (Without Drawing Idea-Marathon System: control) group at the same timing for the same period of 3 months for 5 years old children at two different nursery schools.

The t-test results for the Five Norms Referenced Measures Pre-Posttests showed significant improvement for the With D-IMS and the Without D-IMS groups were checked.

The scores for the 13 Item Creative Strength Criterion-Referenced Measures were also tested. The score results between the With D-IMS and the Without D-IMS groups were analyzed by ANOVA within the Pre-Posttest. Scores by Genders were also analyzed by ANOVA within the Pre-Posttest. Furthermore, Top, Middle and Low group of Score Total were divided by Cluster Analysis was tested by ANOVA.

7.2.2 Derivation

The results of the TTCT tests for five year old children at Kindergarten T. in Tokyo (Chapter 7-1) indicated that the five month Drawing Idea-Marathon was probably contributing to the improvement of creativity of those children.

But we understand that all children at this age (three to five years old) are busy obtaining new knowledge and experience, encountering various stimuli and learning every day. Their lives are so exciting as they start understanding their own language, which their parents are normally talking. At these ages, they start reading and some even start writing. They are so sensitive that even a few event or one day experience by chance can affect their creativity level.

With only the experimental case of T Kindergarten with the Drawing Idea-Marathon lessons, it was not easy to refute to the opinion that the improvement in the TTCT scores of those children might have been influenced, magnified or reinforced by many outer factors including events in their homes.

It was important to design additional TTCT test plans for kindergarten (or nursery school) children both for experimental group and for the control group over the same period, such as three months.

But actually it was impossible to divide the children into these two groups in the same kindergarten (or nursery school) as it might cause dividing educational discrimination in the same school.

To solve this question, we requested Nursery School E. (head office in Osaka) if they can arrange two separate nursery schools under their same management, one in Osaka for experimental group of Drawing Idea-Marathon and another one in Tokyo, Nursery School F. for control group without practicing Drawing Idea-Marathon for the same timing and period by the same grade of five year old children.

7.2.3 t-Test Analysis of TTCT Pre-Posttest Results

7.2.3.1 With D-IMS[9] (experimental) group

All the test procedures at both nurseries were same except the three month period of the Drawing Idea-Marathon was five months in Kindergartens T. (Chapter 7-1).

The t-test results of the TTCT tests of With D-IMS (experimental) group showed a significant effect on Fluency ($t(24)=2.459$, $p<.05$). (Table 25)

[9] D-IMS: Drawing Idea-Marathon

	Change of Scores between Pre-Post tests			
	Pre-test	Post-test	*t* value	Sig
Measurement	M(SD)	M(SD)		
Total Score	448(118)	475(107)	1.386	*n.s.*
Fluency	91(13)	100(18)	2.459	*p<.05*
Originality	99(17)	105(16)	1.911	*n.s.*
Elaborations	119(28)	121(25)	0.401	*n.s.*
Abstractness of Titles	59(54)	69(40)	1.011	*n.s.*
RPC	80(33)	79(28)	0.154	*n.s.*
M=Score Means SD=Standard Deviation				
df=24, $p<.05$ $p<.01$ (Two sided t-test)				

Table 25 t-Test Result of TTCT Scores Pre-Posttest for With-Drawing Idea-Marathon (Experimental) for three months at Nursery School E.

7.2.3.2 Without D-IMS[10] (control) Group

The t-test results of the TTCT tests of the Without D-IMS (control) group showed a significant **decrease** in all the Norm Referenced Measures like Total Score ($t(17)=3.981$, $p<.01$), Originality ($t(17)=2.364$, $p<.05$), Elaborations ($t(17)=3.480$, $p<.01$), Abstractness of Titles ($t(17)=2.562$, $p<.05$), RPC ($t(17)=3.440$, $p<.01$), except Fluency($t(17)=0.457$, *n.s.*)(Table 26).

Change of Scores between Pre-Post test				
	Pre-test	Post-test	*t* value	Sig.
Measurement	M(SD)	M(SD)		
Total Score	462(106)	388(96)	3.981	*p<.01*
Fluency	91(10)	89(17)	0.457	*n.s.*
Originality	97(15)	91(20)	2.364	*p<.05*
Elaborations	112(22)	99(22)	3.480	*p<.01*
Abstractness of Titles	75(50)	45(47)	2.562	*p<.05*
RPC	87(28)	65(37)	3.444	*p<.01*
M=Score Means SD=Standard Deviation				
df=17 $p<.05$ $p<.01$ (Two sided t-test)				

Table 26 t-Test Results of TTCT Scores Pre-Posttest for three month Without D-IMS (control) at Nursery School F.

7.2.3.3 13 Item Creative Strength Criterion-Referenced Measures for Experimental Group

The 13 item Creative Strength Criterion-Referenced Measures were compared between Pre-Posttest for With IMS (experimental) group and showed significant change only in Synthesis of Lines or Circles ($p<.05$) (Table 27).

[10] Without D-IMS : Without Drawing Idea-Marathon

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	26	27		*n.s.*
2	Story-telling Articulateness	26.75	26.25		*n.s.*
3	Movement and action	25.96	27.04		*n.s.*
4	Expressiveness of Titles	28.73	24.27		*n.s.*
5	Synthesis of Incomplete Figures				*n.s.*
6	Synthesis of Lines or Circles	23.08	29.92		*p<.05*
7	Unusual Visualization	23.78	29.21		*n.s.*
8	Internal Visualization	28.54	24.46		*n.s.*
9	Extending or Breaking Boundaries	27.38	25.62		*n.s.*
10	Humor	27.5	25.5		*n.s.*
11	Richness of Imagery	26.35	26.65		*n.s.*
12	Colorfulness of Imagery	23.42	29.58		*n.s.*
13	Fantasy	26	27		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	5.85(5)	6.04(3)	3.160	*n.s.*

Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided)
df=24, *n.s.*:no significant, p<.01,p<.05

Table 27 13 Items Creative Strength Criterion-Referenced Measures at Nursery School E.

7.2.4 ANOVA Analysis for Comparison of TTCT Norm-referenced Measures Between With D-IMS (experimental: E. Nursery School) and Without D-IMS (control: F. Nursery School)

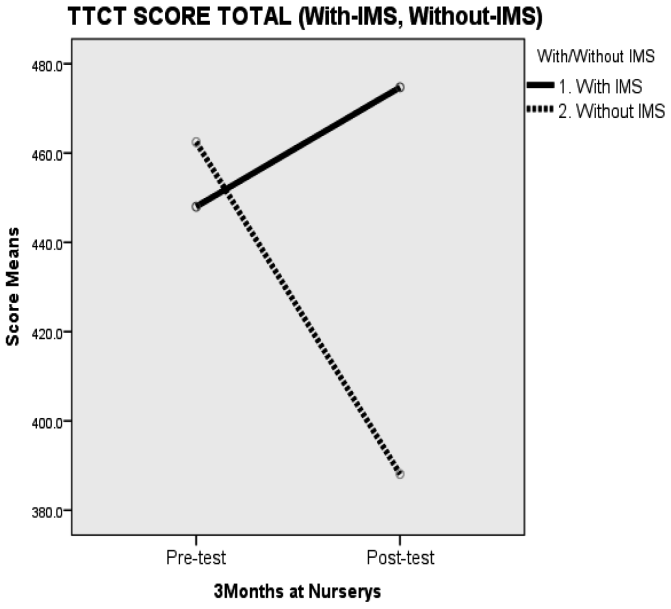
Abbreviations and Acronyms

IMS: Idea Marathon System
With D-IMS: With Drawing Idea-Marathon: The experimental group of children who are practicing Drawing Idea Marathon
Without D-IMS: Without Drawing Idea-Marathon: The control group of children who are not practicing Drawing Idea Marathon
Pre-Posttest: Pretest and Posttest
MSE: Mean Square Error

(1) Score Total

ANOVA analysis of Score Total indicated no significant result for a main effect within Pre-Posttest With D-IMS and Without D-IMS.

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41)=13.296$, $p<.01$, $MSE = 4018.744$). A simple main effect was confirmed as significant by Bonferroni multiple comparison for Without D-IMS within Pre-Posttest (Pretest>Posttest, $p<.05$). Between With D-IMS and Without D-IMS, there was no significant results at Pretest (Without D-IMS > With D-IMS), but there was a significant effect between With D-IMS and Without D-IMS at Posttest (Without D-IMS < With D-IMS, $p<.05$) (Figure 130).



Descriptive Statistics

With IMS/Without IMS		Mean	Std. Deviation	N
STL-Pre	With IMS	448.000	118.2413	25
	Without IMS	462.444	105.6822	18
	Total	454.047	112.0795	43
STL-Post	With IMS	474.720	106.9815	25
	Without IMS	388.111	96.0036	18
	Total	438.465	110.1800	43

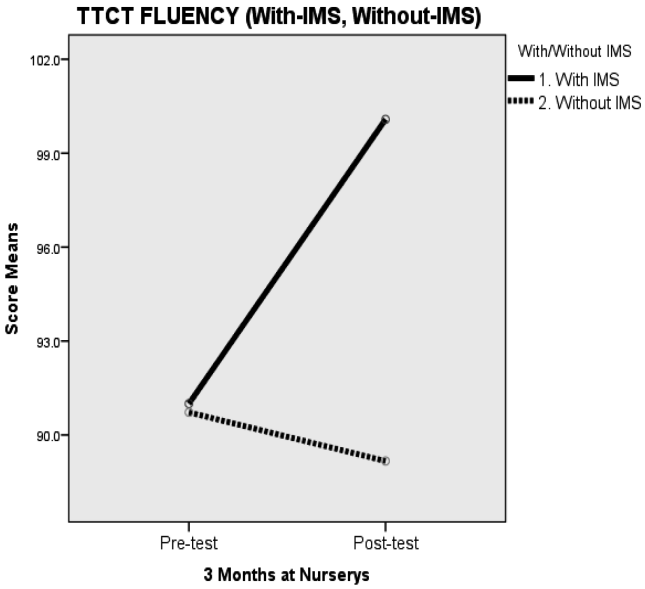
Figure 130 E. and F. Nursery School Score Total With/Without IMS

(2) Fluency

ANOVA analysis of Fluency indicated no significant result for a main effect within Pre-Posttest With D-IMS and Without D-IMS.

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41) = 4.137$, $p<.05$, $MSE=143.077$). A simple main effect was confirmed as significant by Bonferroni multiple comparison for With D-IMS within Pre-Posttest (Pretest<Posttest, $p<.05$) (Figure 131).

No significance at Pre-Posttest between With IMS and Without IMS



Descriptive Statistics

With/Without IMS		Mean	Std. Deviation	N
FLU-Pre	With IMS	91.000	12.6326	25
	Without IMS	90.722	9.9812	18
	Total	90.884	11.4688	43
FLU-Post	With IMS	100.080	17.7739	25
	Without IMS	89.167	17.4567	18
	Total	95.512	18.2631	43

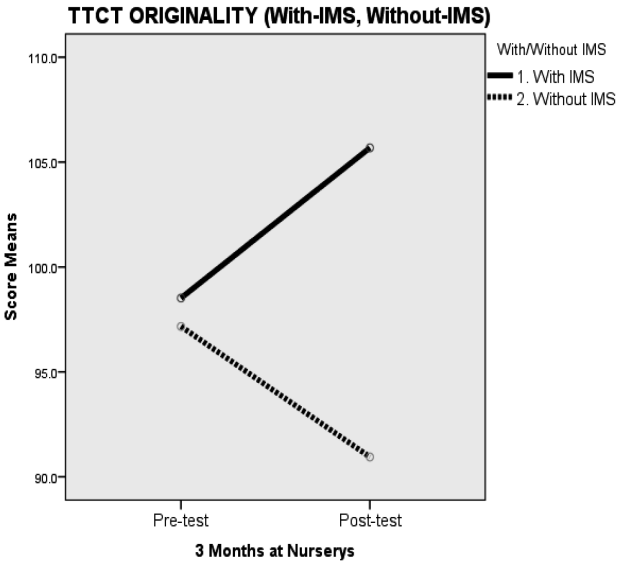
Figure 131 E. and F. Nursery School Fluency With/Without IMS

(3) Originality

ANOVA analysis of Originality indicated no significant result for a main effect within Pre-Posttest With D-IMS and Without D-IMS.

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41) = 7.290$, $p<.05$, $MSE = 128.542$). A simple main effect was confirmed as significant by Bonferroni multiple comparison for With D-IMS within Pre-Posttest (Pretest<Posttest, $p<.05$)

At Pretest, there was no significance between With D-IMS and Without D-IMS. But at Posttest, a significance was confirmed between With D-IMS and Without D-IMS (With D-IMS>Without D-IMS, $p<.05$) (Figure 132).



Descriptive Statistics

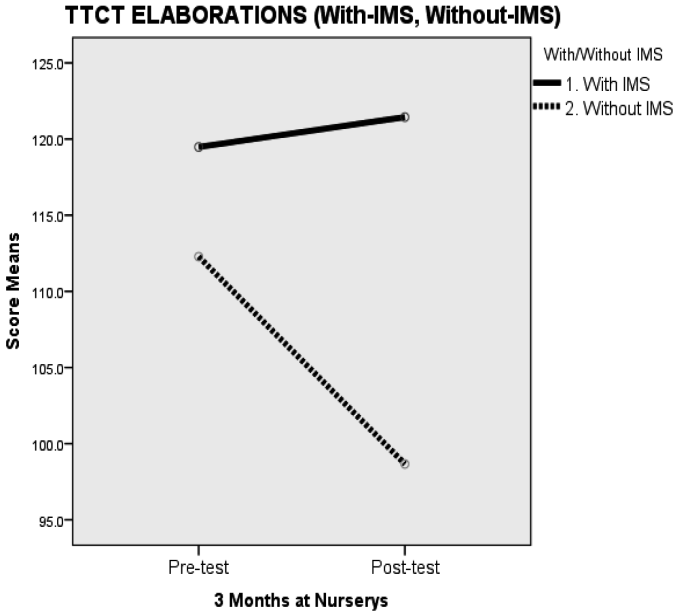
With/Without IMS		Mean	Std. Deviation	N
ORI-Pre	With IMS	98.520	16.6486	25
	Without IMS	97.167	14.7219	18
	Total	97.953	15.7025	43
ORI-Post	With IMS	105.680	16.2191	25
	Without IMS	90.944	20.0102	18
	Total	99.512	19.1440	43

Figure 132 E. and F. Nursery Schools Originality With/Without IMS

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for With D-IMS and Without D-IMS ($F(1,41) = 4.589$, $p<.05$) and the Bonferroni multiple comparison test confirmed significant results ($p<.05$).

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41) = 5.468$, $p<.01$, $MSE = 232.015$). A simple main effect was confirmed as significant by the Bonferroni multiple comparison for Without D-IMS within Pre-Posttest (Pretest >Posttest, $p <.05$), and also between With D-IMS and Without D-IMS at Posttest (With D-IMS > Without D-IMS, $p <.05$) (Figure 133).



Descriptive Statistics

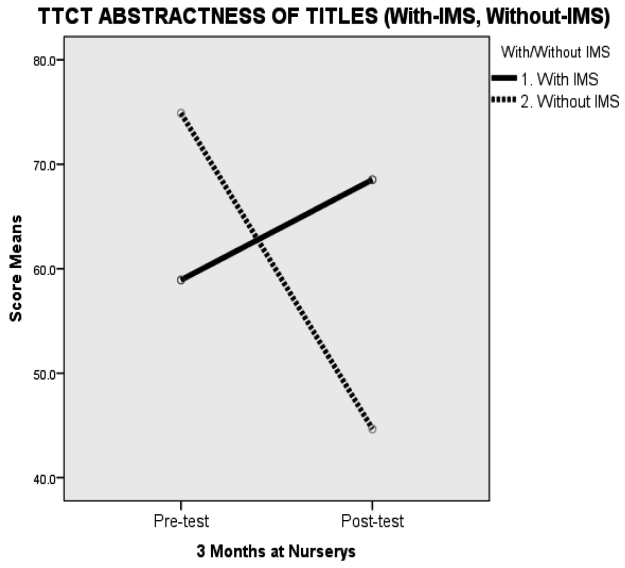
With/Without IMS		Mean	Std. Deviation	N
ELA-Pre	With IMS	119.480	28.0314	25
	Without IMS	112.278	22.2468	18
	Total	116.465	25.7343	43
ELA-Post	With IMS	121.440	25.9183	25
	Without IMS	98.667	21.8605	18
	Total	111.907	26.5803	43

Figure 133 E. and F. Nursery Schools Elaborations With/Without IMS

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated no significant result for a main effect within Pre-Posttest With D-IMS and Without D-IMS.

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41)=7.039$, $p<.05$, $MSE=1178.770$). A simple main effect was confirmed as significant by Bonferroni multiple comparison for Without D-IMS within Pre-Posttest (Pretest >Posttest, $p <.05$) There was no significance at Pre-Posttest between With D-IMS and Without D-IMS. (Figure 134).



Descriptive Statistics

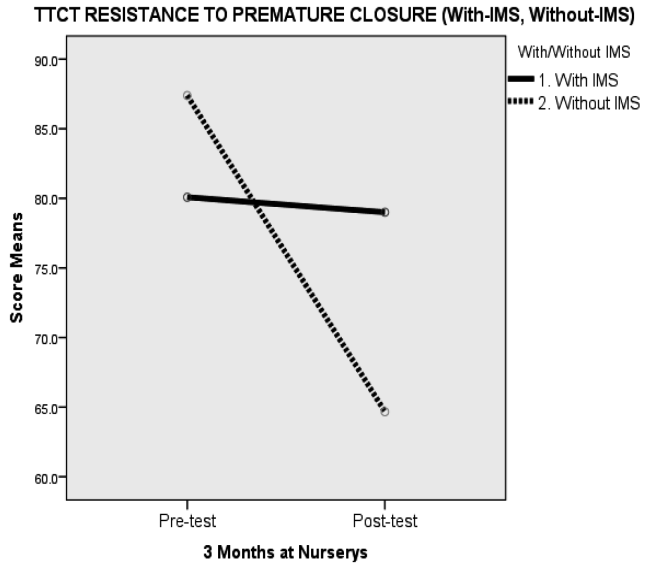
With/Without IMS		Mean	Std. Deviation	N
ABT-Pre	With IMS	58.920	54.2094	25
	Without IMS	74.889	49.6113	18
	Total	65.605	52.3355	43
ABT-Post	With IMS	68.520	40.4270	25
	Without IMS	44.667	46.7471	18
	Total	58.535	44.2742	43

Figure 134　E. and F. Nursery Schools Abstractness of Titles With/Without IMS

(6)　Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,41)=5.701$, $p<.05$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest＞Posttest, $p<.05$).

An interaction was found within Pre-Posttest and between With D-IMS and Without D-IMS ($F(1,41)=4.713$, $p<.05$, $MSE=520.018$). A simple main effect was confirmed as significant by the Bonferroni multiple comparison for Without D-IMS within Pre-Posttest (Pretest>Posttest, $p<.05$) (Figure 135).



Descriptive Statistics

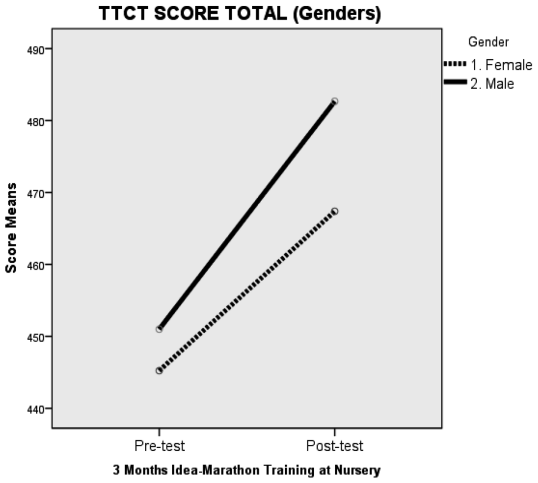
With/Without IMS		Mean	Std. Deviation	N
RPC-Pre	With IMS	80.080	33.3091	25
	Without IMS	87.389	28.3469	18
	Total	83.140	31.1858	43
RPC-Post	With IMS	79.000	28.0327	25
	Without IMS	64.667	37.0485	18
	Total	73.000	32.4932	43

Figure 135　E. and F. Nursery School Resistance to Premature Closure With/Without IMS

7.2.5 ANOVA Analysis for Comparison of TTCT Norm-referenced Measures in Genders in E. Nursery Schools

(1) Score Total, Originality, Elaborations, Abstractness of Titles and Resistance to Premature Closure

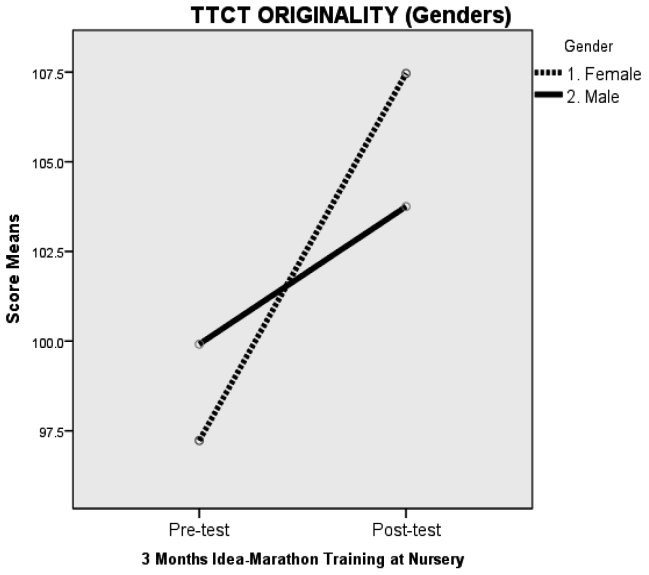
ANOVA analysis of TTCT 5 Norms-referenced measures of Originality, Elaborations, Abstractness of Titles, Resistance to Premature Closure and Score Totals, indicated no interaction or significant main effect within Pre-Posttest or between Genders except Fluency (Figure 136,137,138,139,140).



Descriptive Statistics

Gender		Mean	Std. Deviation	N
STL-Pre	F	445.23	128.480	13
	M	451.00	111.703	12
	Total	448.00	118.241	25
STL-Post	F	467.38	111.662	13
	M	482.67	106.003	12
	Total	474.72	106.982	25

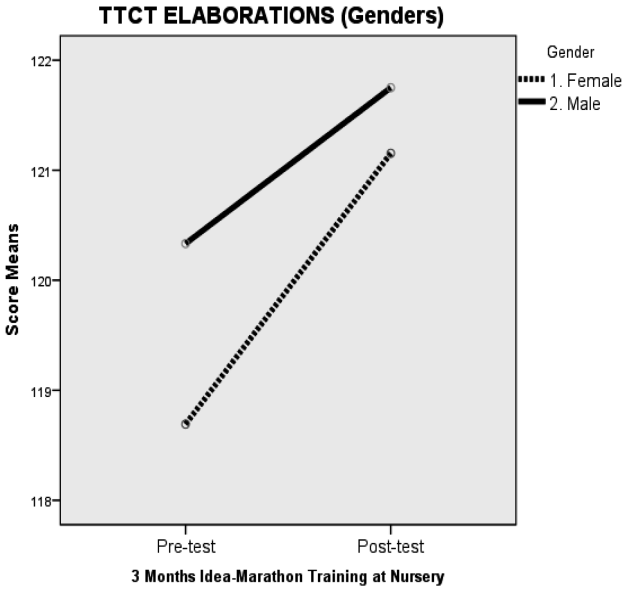
Figure 136 E. Nursery Schools Score Total in Genders



Descriptive Statistics

Gender		Mean	Std. Deviation	N
ORI-Pre	F	97.23	18.882	13
	M	99.92	14.551	12
	Total	98.52	16.649	25
ORI-Post	F	107.46	15.053	13
	M	103.75	17.859	12
	Total	105.68	16.219	25

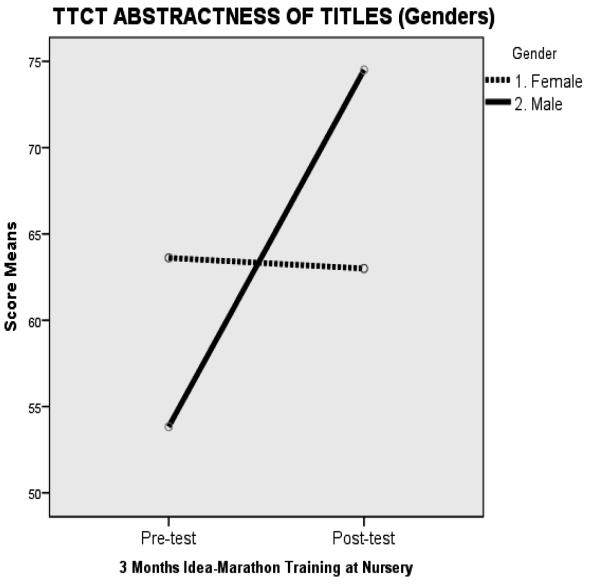
Figure 137 E. Nursery School Originality in Genders



Descriptive Statistics

Gender		Mean	Std. Deviation	N
ELA-Pre	F	118.69	30.712	13
	M	120.33	26.151	12
	Total	119.48	28.031	25
ELA-Post	F	121.15	29.317	13
	M	121.75	22.975	12
	Total	121.44	25.918	25

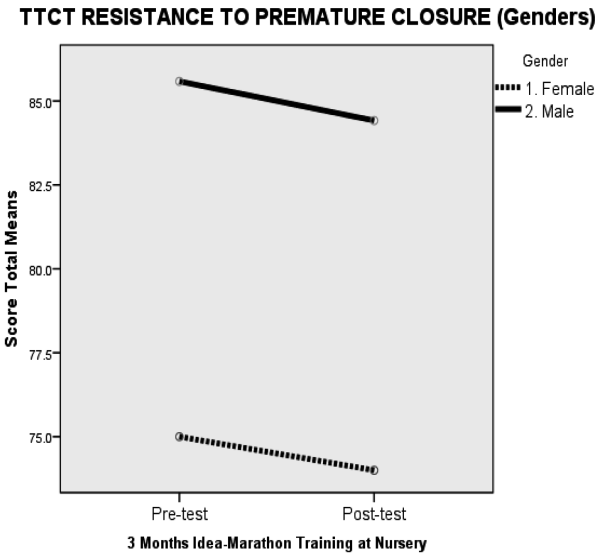
Figure 138 E. Nursery School Elaborations in Genders



Descriptive Statistics

Gender		Mean	Std. Deviation	N
ABT-Pre	F	63.62	52.802	13
	M	53.83	57.583	12
	Total	58.92	54.209	25
ABT-Post	F	63.00	44.699	13
	M	74.50	36.210	12
	Total	68.52	40.427	25

Figure 139 E. Nursery School Abstractness of Titles in Genders



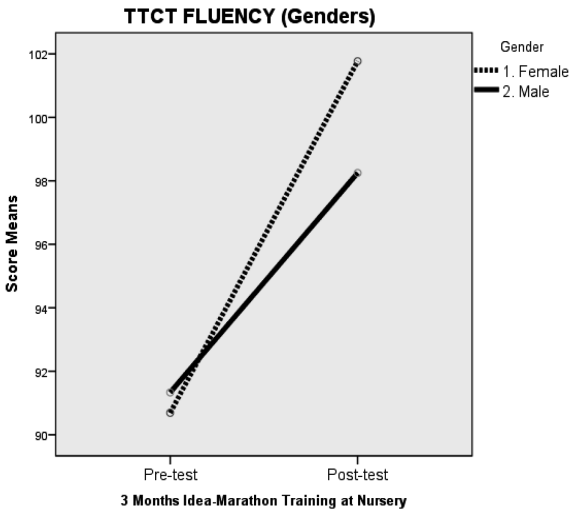
Descriptive Statistics

Gender		Mean	Std. Deviation	N
RPC-Pre	F	75.00	36.835	13
	M	85.58	29.614	12
	Total	80.08	33.309	25
RPC-Post	F	74.00	24.870	13
	M	84.42	31.277	12
	Total	79.00	28.033	25

Figure 140 E. Nursery School Resistance to Premature Closure in Genders

(2) Fluency

ANOVA analysis of Fluency indicated significant results for main effects within Pre-Posttest ($F(1,23) = 5.757$, $p < .05$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest, $p<.05$). No interaction was found (Figure 141).



Descriptive Statistics

Gender		Mean	Std. Deviation	N
FLU-Pre	F	90.69	15.272	13
	M	91.33	9.670	12
	Total	91.00	12.633	25
FLU-Post	F	101.77	14.066	13
	M	98.25	21.596	12
	Total	100.08	17.774	25

Figure 141 E. Nursery School Fluency in Genders

7.2.6 ANOVA Analysis for Comparison of TTCT Norm Referenced Measures in Pre-Posttest and Top, Middle, Low Groups in E. Nursery Schools

Abbreviations and Acronyms

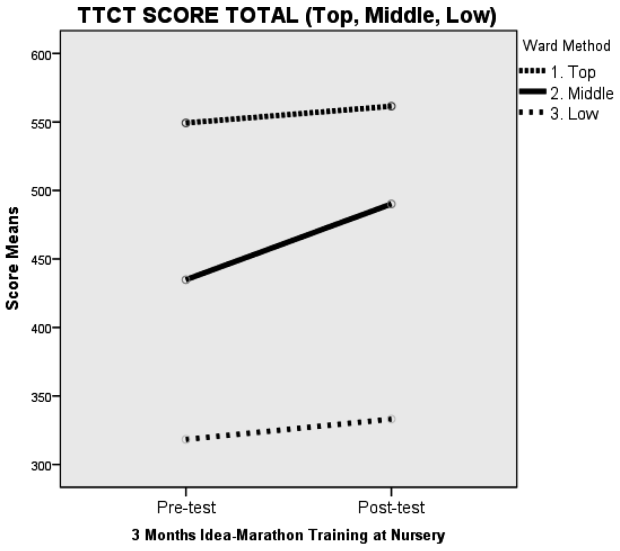
Pre-Posttest: Pretest and Posttest
TML: Top-, Middle-, and Low-scoring groups
T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top, Middle, and Low Score groups by Ward's method for cluster analysis as follows:

Top	10 children
Middle	8 children
Low	7 children
Total	25 children

(1) Score Total

Concerning Score Total, there were significant main effects among TML ($F(1,22) = 74.330$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 142).



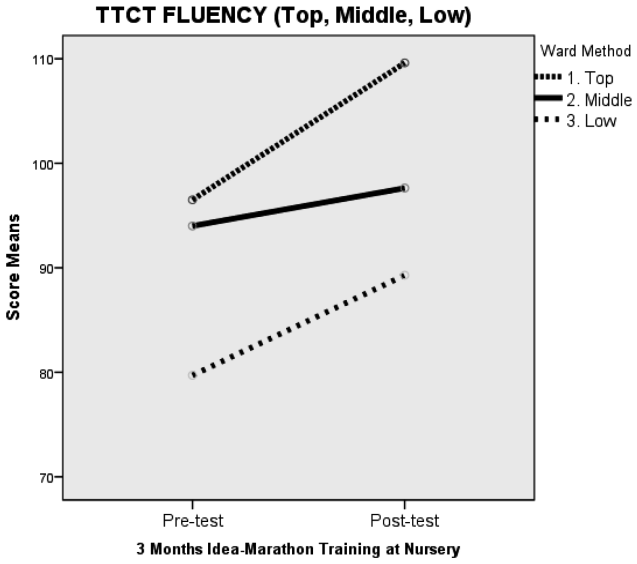
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	549.30	42.419	10
	2	434.88	26.335	8
	3	318.29	124.311	7
	Total	448.00	118.241	25
STL-Post	1	561.50	48.335	10
	2	490.13	38.647	8
	3	333.14	65.428	7
	Total	474.72	106.982	25

Figure 142 E. Nursery School Score Total among TML

(2) Fluency

Concerning Fluency, there were significant main effects within Pre-Posttest ($F(1,22) = 5.317$, $p<.05$) and among TML ($F(1,22) = 6.952$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and between T-L ($p<.05$). No interaction was found (Figure 143).



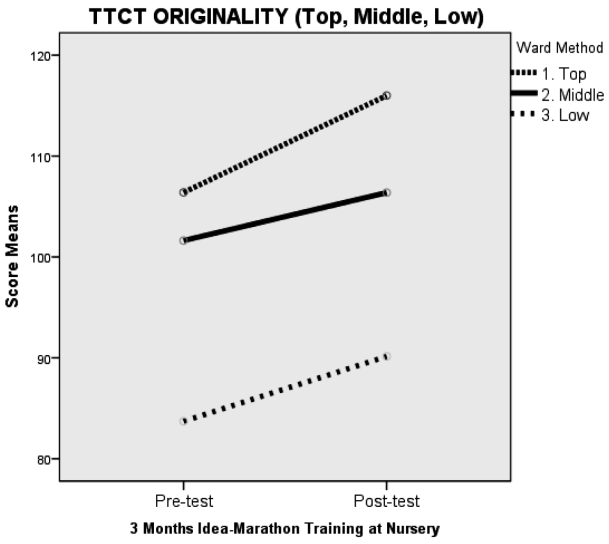
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	96.50	6.980	10
	2	94.00	13.438	8
	3	79.71	11.982	7
	Total	91.00	12.633	25
FLU-Post	1	109.60	17.753	10
	2	97.63	16.300	8
	3	89.29	13.635	7
	Total	100.08	17.774	25

Figure 143 E. Nursery School Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects among TML ($F(1,22) = 14.220$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L and M-L ($p<.05$). No interaction was found (Figure 144).



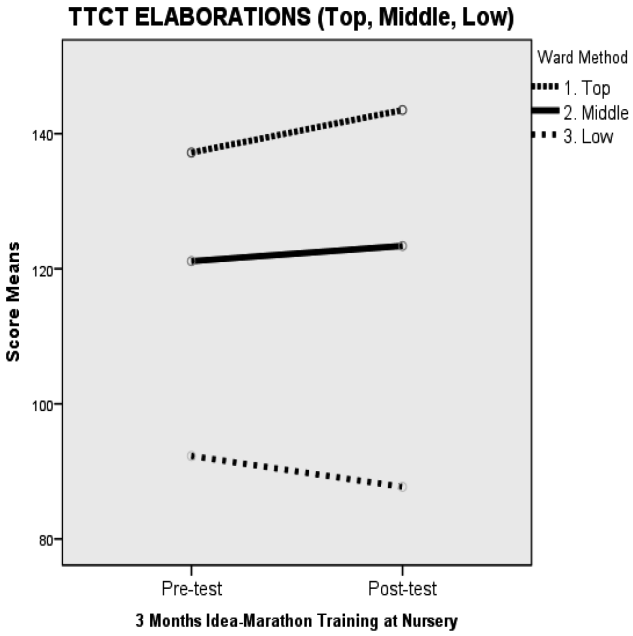
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	106.40	10.564	10
	2	101.63	16.767	8
	3	83.71	15.532	7
	Total	98.52	16.649	25
ORI-Post	1	116.00	14.337	10
	2	106.38	10.542	8
	3	90.14	12.429	7
	Total	105.68	16.219	25

Figure 144 E. Nursery School Originality among TML

(4) Elaborations

Concerning Elaborations, there were significant main effects among TML ($F(1,22) = 33.617$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$). No interaction was found (Figure 145).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	137.20	16.725	10
	2	121.13	12.403	8
	3	92.29	33.974	7
	Total	119.48	28.031	25
ELA-Post	1	143.50	9.180	10
	2	123.38	16.621	8
	3	87.71	9.759	7
	Total	121.44	25.918	25

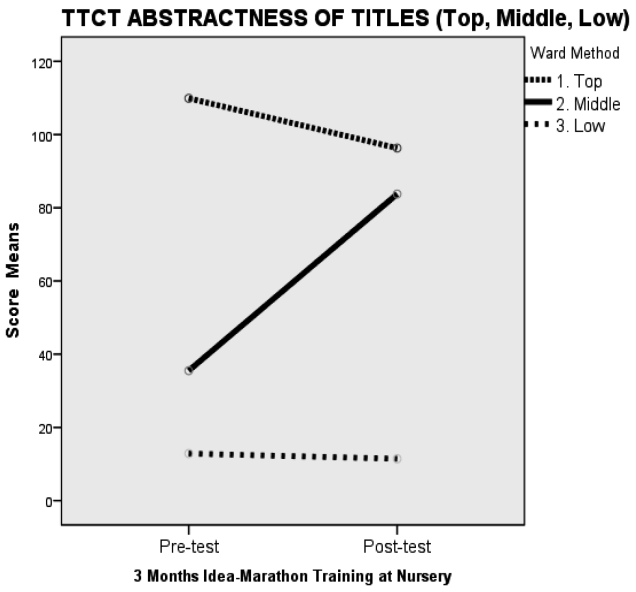
Figure 145 E. Nursery School Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects among TML ($F(1,22) = 53.143$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results among TML ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,22) = 5.572$, $p<.05$, $MSE = 815.855$). The Bonferroni multiple comparison test confirmed a significant main effect for the Middle group within Pre-Posttest (Pretest <Posttest, $p<.05$), while there were no significant results for Top or Low within the Pre–Post group.

At Pretest, there was significance between T-M and T–L (T > M, T > L, $p<.05$), but none between M-L. At Posttest, however, there was significance between T-L and M-L (T > L, M > L, $p<.05$). Middle got closer to the Top (Figure 146).



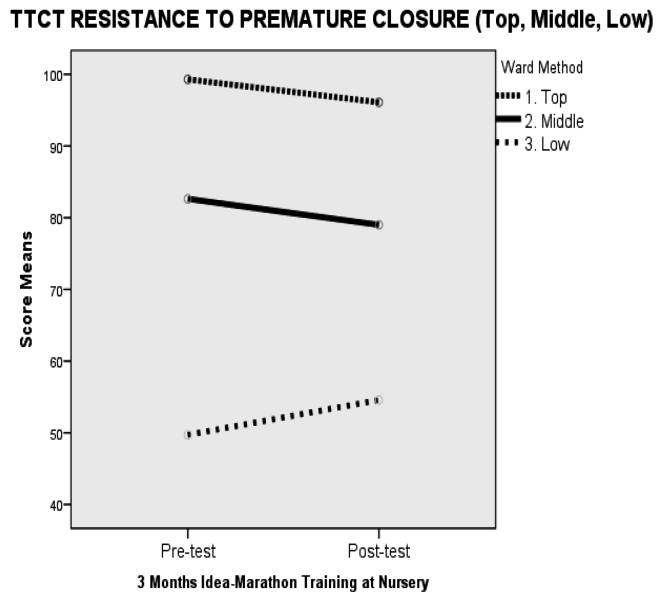
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	109.90	12.565	10
	2	35.50	49.185	8
	3	12.86	34.017	7
	Total	58.92	54.209	25
ABT-Post	1	96.30	10.605	10
	2	83.75	6.944	8
	3	11.43	30.237	7
	Total	68.52	40.427	25

Figure 146　E. Nursery School Abstractness of Titles among TML

(6)　Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects among TML ($F(1,22) = 13.758$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results between T-L and M-L ($p<.05$). No Interaction was found. (Figure 147).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	99.30	15.875	10
	2	82.63	7.425	8
	3	49.71	47.912	7
	Total	80.08	33.309	25
RPC-Post	1	96.10	16.231	10
	2	79.00	11.314	8
	3	54.57	37.620	7
	Total	79.00	28.033	25

Figure 147　E. Nursery School Resistance to Premature Closure among TML

7.2.7 E & F Nurseries Drawing Idea-Marathon Study Discussion

Comparison between the With D-IMS and Without D-IMS groups suggest that the Drawing Idea-Marathon effectively improves creativity in children.

7.2.7.1 t-Test Results for the With D-IMS and Without D-IMS

A *t*-test analysis of the TTCT Pre–Post score indicated significant improvement only in Fluency only, but as Torrance said, "Fluency is the gatekeeper [15]." Significant improvement in Fluency could therefore be a first step in growing children's creativity.

Without Drawing Idea-Marathon (control group), the t-test differences in Pre-Posttest results showed a clearly significant score **decrease** in all Norm Referenced Measure items except Fluency.

7.2.7.2 First Experience of Everyday Creative for Five Year Old Children

The Drawing Idea-Marathon and the TTCT Figural Test might be the first quantitative measurements of creativity for five years old children. Many participants experienced for the first time in their lives daily drawing of objects and writing of titles, dates, and their own names on drawing sheets over three months, while the control group of children did not have such daily creative stimuli.

7.2.7.3 ANOVA Analysis of With D-IMS and Without D-IMS

ANOVA analysis indicated that the With Drawing Idea-Marathon (experimental) group improved significantly with interactions over the Without Drawing Idea-Marathon (control) group regarding all the items of TTCT Figural Pre-Posttest Norms Referenced Measures.

7.2.7.4 ANOVA Analysis of Genders

ANOVA analysis of genders did not indicate any significance for any Norms nor interactions.

7.2.7.5 ANOVA Analysis of Top, Middle and Low

ANOVA analysis of the Top, Middle, and Low groups divided by cluster analysis within Pre-Posttest indicated no interactions except Abstractness of Titles, for which the Middle group increased significantly.

7.2.7.6 Can Creativity Go down if We do not Continue Creative Efforts

Control group TTCT scores decreased significantly, suggesting that creativity levels can vary up and down. For example, scores might increase when the examinee is trying to be more creative, and decrease when no such efforts are made.

Variation of creativity level can occur for students, business persons, and researchers. Such creativity fluctuation provide an area for future research, such as verification of decreased creativity in the absence of continued effort. Idea-Marathon may present a protective measure for maintaining levels of creativity.

7.3 The Topic Idea-Marathon at Kindergarten T.

7.3.1 T Kindergarten The Topic Idea-Marathon Summary

The Topic Idea-Marathon was developed for kindergarten children in 2011. For this Idea-Marathon, the teacher supplies children with one topic per day for thinking purposes (or for solving problems). The children create an idea and record it in their notebooks along with an accompanying sketch or drawing and simple explanation.

They are given 15 minutes daily to think and write, and they are supplied with a notebook specially designed for this activity.

The kindergarten children's training of the Topic Idea-Marathon begins four months before they enter elementary school. The Topic Idea-Marathon gives children an opportunity to think, draw, and write ideas. The children are provided with extra topics to take home on weekends and holidays so that they can perform the daily exercise with their parents. At a Tokyo kindergarten, the Topic Idea-Marathon was conducted for three months and then the results of the training were tested by t-Test quantitatively via the TTCT Figural pretest and posttest [76].

The results showed significant improvement in four of the Norms (excluding Originality) and in the Score Total. When scores were separated by Genders, the Score Total showed significant positive change in both Genders.

Score Total of the TTCT Figural pretests were divided into Top, Middle and Low categories by the Ward method through cluster analysis. Then the deviations in score were examined via the posttest after the three month project period.

The result showed that Low-scorers rose to almost the same level as the Middle scores over the course of the training. From all the above-mentioned results, the Topic Idea-Marathon was found to be effective for the improvement of creativity in of five years old kindergarten children.

7.3.2 Derivation

Children of preschool age are inquisitive and ask many questions. They ask lots of why's and how's to parents and teachers. These questions include various things about causes, results, and reasons. The ages of three to six years are called the "Ages of Questions." A genius like Edison asked many questions to teachers and adults, and there is a thesis in the USA, supported by scholars and parents, that asks, "How can we raise inquisitive children?"

Kindergarten teachers and parents do their best to answer these young children's questions. However, questions from kindergarten children are often too basic, primitive, vague, illogical, and repetitive so adults become weary and annoyed. Some parents handle the answers poorly. Even if adults explain nicely, children repeat the same questions, and finally, the moment of shutdown occurs. Children may feel as if they were scolded and stop asking questions altogether.

When a child asks a question of an adult, and he gets an answer, he may ask a follow-up question, and the nature of this new question reveals the child's understanding of the issue. The adult then judges whether the child understands the essence of his/her original question and the given answer.

Even if kindergarten children receive detailed explanation from adults, he/she might just repeat the same question without trying to understand the answer. If this process is repeated too often, the adult might become frustrated with the apparent uselessness of the discussion and want to stop the child from asking any more questions.

The kindergarten children asking without basic knowledge or understanding are called "Invalid Questions" or "Questions without understanding." If these Invalid Questions are repeated many times, adults stop answering or tell the child, "You will understand when you are older."

Saito (2006) said that if this unwelcoming attitude repeats, the child might stop asking questions or lose their interest in asking questions. Since the power of questions is considerable [77], we have to think about how we can conserve and foster children's power to question.

7.3.3 Valid Questions

If a child is thinking even a little or showing an acquired knowledge reflected in his questions, we call it "Valid Questions." If Valid Questions come from the child again, teachers and parents should be more willingly to respond. To increase the Valid Questions of kindergarten children, we assume that we can teach them how to ask questions by giving them easy and reasonable questions.

Such appropriate questions to kindergarten children give intellectual stimuli and help them grow. If these children can think more, they will be able to understand more and can ask good questions. At the same time, they will be more flexible and get knowledge from formal education. With the principles of the Idea-Marathon, their development may be more effective. We prepared easy and reasonable questions for kindergarten children in five years old.

When the children think and write their ideas in their notebooks with drawings and a little sentences every day, they can enhance their creativity. One question per day to be thought about and written about in their notebooks is called the Topic Idea-Marathon. It is a shower of questions to children. They have it in kindergarten every day in their class on weekdays and they have it at home on weekends and holidays.

The Topic Idea-Marathon was proposed to a Tokyo kindergarten. It started in January 2011 for senior children and it had been continued until they graduated kindergarten. To quantitatively analyze the Topic Idea-Marathon's effects on creativity, the TTCT Figural tests were introduced.

7.3.4 The Topic Idea-Marathon for Kindergarten Pupils

7.3.4.1 The Topic Idea-Marathon

The method of the Topic Idea-Marathon is to prepare one notebook for the Topic Idea-Marathon (Figure 148)

Figure 148 Prepare One Notebook for the Topic Idea-Marathon

7.3.4.2 Thinking Themes

(1) Children are given one topic to consider every day.

A sample of topics: Draw a bag and put any animal tails to the bag. What animal?

(2) Children create ideas and write them in their notebooks (Figure 149)

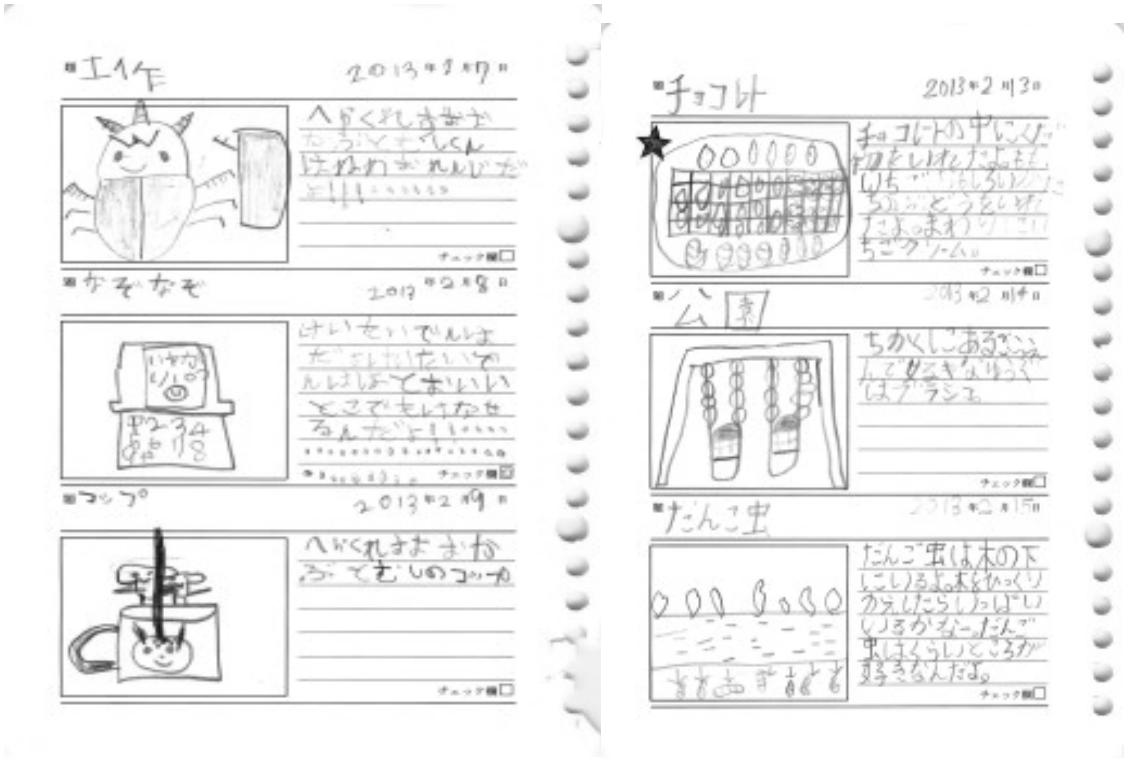


Figure 149　The Topic Idea-Marathon Example

(3) For the Topic Idea-Marathon, easy, interesting questions are given to the kindergarten children over a three month period every day. Teachers write and explain the topic of the day on the white-board.

(4) Children copy the topic into their notebooks. Topic examples include: “Think of a new design or shape for a futon (a thick warm Japanese sleeping quilt).” “Think of a funny umbrella.” “If you are alone with a pencil and notebook for a day, what would you do with them?”

The children are given every day one topic either in kindergarten class or at home in order to stimulate their creativity and imagination. They work with it for about fifteen minutes per day, and the training lasts until they leave kindergarten three months later.

7.3.5　The Topic Idea-Marathon and the TTCT

The essential concepts of the Idea-Marathon are (1) thinking something out of any theme given, (2) writing the ideas down instantly, (3) using a notebook and (4) continuing the practice every day.

Children of five to six years old are not yet ready to find a topic for themselves every day. Therefore, the teacher provides a topic to the children every day from a large stock of hints that the Idea-Marathon Institute provides in advance.

This study is based on the hypothesis that if children create ideas in response to daily questions, they will become more creative. Since the children are inexperienced with the idea of creating their own daily topics, we provide them with hint questions so that they can play with their ideas immediately.

7.3.5.1　The Topic Idea-Marathon and the TTCT Figural Pretest and Posttest

In two classes at T kindergarten, the first TTCT pretest was given on December 4, 2012, and the Topic Idea-Marathon started on the same day. The Topic Idea-Marathon continued until March 7, 2013, when the TTCT posttest was given. A total of 66 children participated in these classes. The number of

children who took both the pretest and posttest was 55. We analyzed those 55 children in this study (Table 29t).

	Class 1	Class 2	
Boys	12	12	Boys Total 24
Girls	16	15	Girls Total 31
Class Total	28	27	
2 Classes Total	55		

Table 28　Number of Boy and Girl Pupils in Class 1 and 2 at Kindergarten T.

7.3.5.2　t-Test of Creative Effects of the Topic Idea-Marathon

After three months of the Topic Idea-Marathon, the resulting scores from the two TTCT Figural Pre- and Post tests were analyzed via a t-test. There was significant positive deviation found in the Total Score（$t(54)=5.855$, $p<.01$）, Fluency ($t(54)=2.420$, $p<.05$）, Elaborations ($t(54)=5.010$, $p<.01$), Abstractness of Titles（$t(54)=4.430$, $p<.01$） and RPC（$t(54)=4.304$, $p<.01$） No significance was found in Originality (Table29).

Change of Scores between Pre-& Post test				
	Pre-test	Post-test	*t* value	Sig
Measurement	M(SD)	M(SD)		
Total Score	468(118)	542(91)	5.855	*p<.01*
Fluency	93(20)	98(13)	2.420	*p<.05*
Originality	102(22)	106(15)	1.409	*n.s.*
Elaborations	125(29)	139(21)	5.010	*p<.01*
Abstractness of Titles	67(53)	100(39)	4.430	*p<.01*
RPC	81(32)	99(26)	4.304	*p<.01*
M=Score Means SD=Standard Deviation				
df=54 *p*<.05 *p*<.01(Two sided t-test)				

Table 29　t-Test Analysis of TTCT Figural Pretest(Type B) and Posttest (Type A) of the Topic Idea-Marathon at Kindergarten T.

7.3.5.3　13 Items Creative Strength Criterion-Referenced Measures Between the Pretest and Posttest

Score results between the Pretest and Posttest of the TTCT Figural test for Thirteen Creative Strength Criterion-reference measures were tested and found via the Mann-Whitney U-test. As a result, out of the thirteen items of Creative Strength, there was significance in Story-telling Articulateness ($p<.05$), Expressiveness of Titles ($p<.01$), Synthesis of Lines and Circles ($p<.01$), and Extending or Breaking the boundaries ($p<.01$). The Total Score for the Thirteen Creative Strength Criteri-on-Referenced Measures was checked by t-test and also showed significance ($t(54)=3.438$, $p<.01$).(Table 31)

		Pre-test	Post-test	*t* Value	*Sig.*
	Criterion Reference Measure	Mean Average	Mean Average		
1	Emotional Expressiveness	0.24	0.16		*n.s.*
2	Story-telling Articulateness	0.51	0.87		*p<.05*
3	Movement and action	0.58	0.76		*n.s.*
4	Expressiveness of Titles	0.64	1.09		*p<.01*
5	Synthesis of Incomplete Figures	0	0.05		*n.s.*
6	Synthesis of Lines or Circles	0.31	0.07		*p<.01*
7	Unusual Visualization	0.64	0.82		*n.s.*
8	Internal Visualization	0.15	0.27		*n.s.*
9	Extending or Breaking Boundaries	0.47	1.05		*p<.01*
10	Humor	0.53	0.51		*n.s.*
11	Richness of Imagery	1.45	1.71		*n.s.*
12	Colorfulness of Imagery	1.49	1.75		*n.s.*
13	Fantasy	0.6	0.62		*n.s.*
14	Score Total of 13 Creative Strength M(SD)	8(5)	10(4)	3.438	*p<.01*
	Item 1-13 Mann-Whitney U-test. Item 14 t-test (two-sided) *df*=54, *n.s.*:no significant, *p*<.01,*p*<.05				

Table 30　13 Items Creative Strength Criterion-Referenced Measures for the Topic Idea-Marathon at Kindergarten T.

7.3.5.4　ANOVA Analysis for Comparison of TTCT Norm-referenced Measures Pre-Posttest in Genders at T. Kindergarten

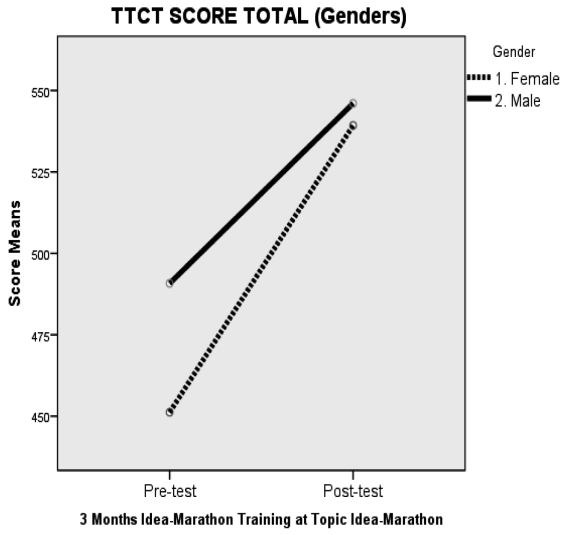
Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest tests

T-IMS: the Topic Idea-Marathon

(1)　Score Total

ANOVA analysis of Score Total indicated significant results for main effects for Pre-Posttest ($F(1,53)=32.246$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest, $p<.05$). No interaction was found (Figure 150).



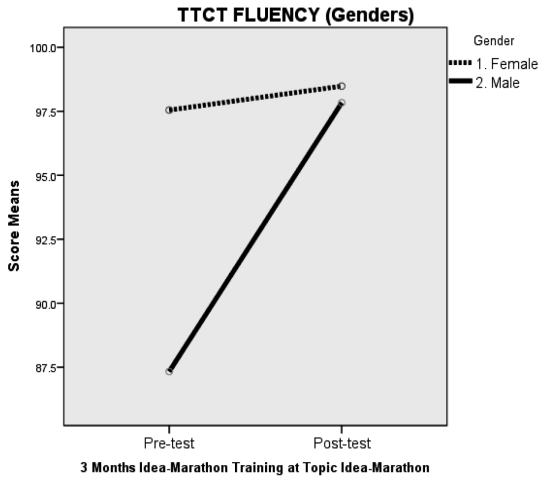
Descriptive Statistics				
Gender		Mean	Std. Deviation	N
STL-Pre	F	451.19	131.389	31
	M	490.79	95.375	24
	Total	468.47	117.719	55
STL-Post	F	539.29	88.511	31
	M	546.04	96.646	24
	Total	542.24	91.335	55

Figure 150 T. Kindergarten Score Total in Genders

(2) Fluency

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,53)=7.827$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest, $p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(1,53)=5.476$, $p<.05$, $MSE=112.999$). The Bonferroni multiple comparison test confirmed a significant main effect for Male within Pre-Posttest (Pretest < Posttest, $p<.05$). In either Pretest and Posttest, there was no significant result between Male and Female (Figure 151).

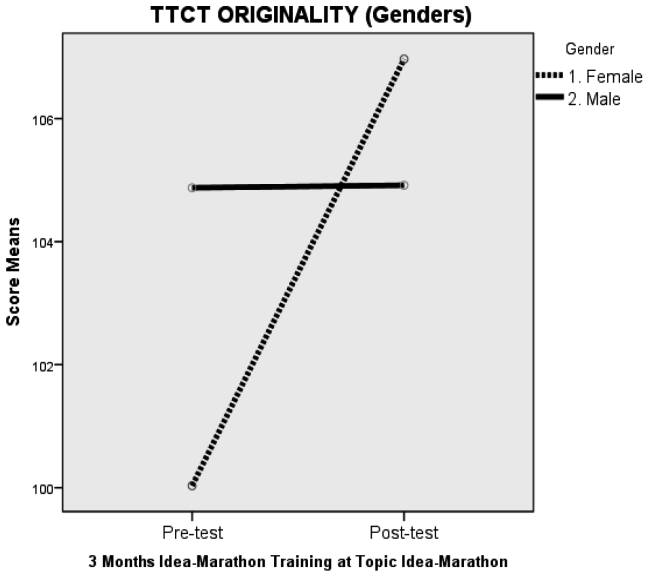


Descriptive Statistics				
Gender		Mean	Std. Deviation	N
FLU-Pre	F	97.55	21.137	31
	M	87.33	15.830	24
	Total	93.09	19.521	55
FLU-Post	F	98.48	12.853	31
	M	97.83	13.180	24
	Total	98.20	12.879	55

Figure 151 T. Kindergarten Fluency in Genders

(3) Originality

ANOVA analysis of Abstractness of Titles indicated no interaction or significant main effect within Pre-Posttest or between Genders (Figure 152).



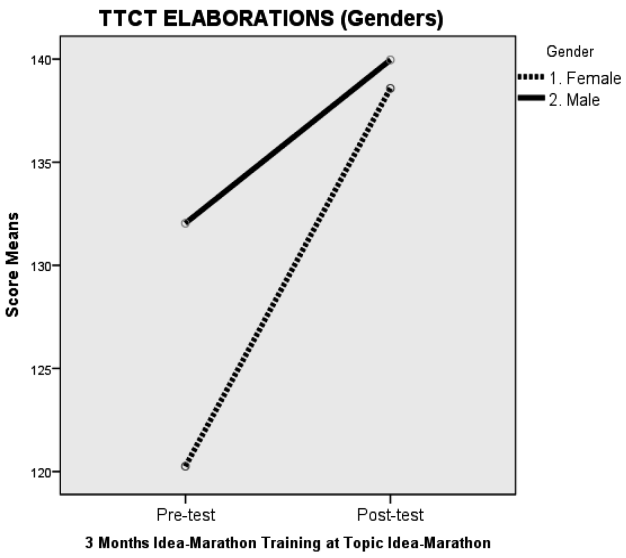
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ORI-Pre	F	100.03	21.897	31
	M	104.88	21.780	24
	Total	102.15	21.779	55
ORI-Post	F	106.97	14.251	31
	M	104.92	15.817	24
	Total	106.07	14.847	55

Figure 152 T. Kindergarten Originality in Genders

(4) Elaborations

ANOVA analysis of Elaborations indicated significant results for main effects for Pre-Posttest ($F(1,53)=23.487$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 153).



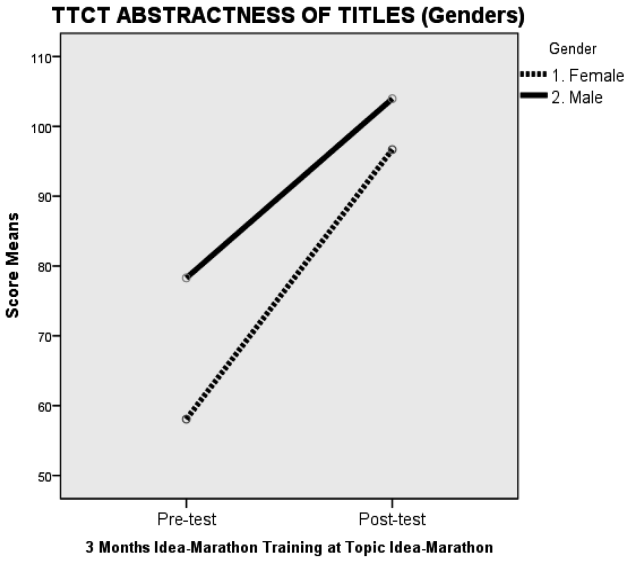
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ELA-Pre	F	120.26	30.944	31
	M	132.04	25.381	24
	Total	125.40	29.002	55
ELA-Post	F	138.58	18.567	31
	M	139.96	24.271	24
	Total	139.18	21.045	55

Figure 153 T. Kindergarten Elaborations in Genders

(5) Abstractness of Titles

ANOVA analysis of Abstractness of Titles indicated significant results for main effects for Pre-Posttest ($F(1,53)=18.265$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 154).



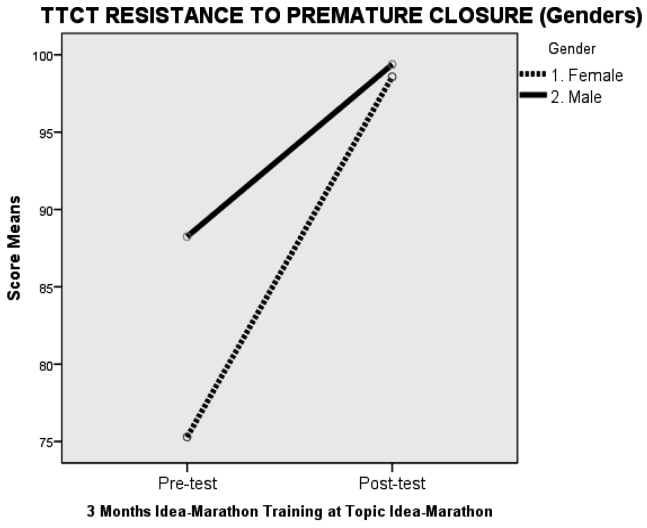
Descriptive Statistics

Gender		Mean	Std. Deviation	N
ABT-Pre	F	58.06	53.189	31
	M	78.29	50.831	24
	Total	66.89	52.675	55
ABT-Post	F	96.68	40.635	31
	M	103.96	37.903	24
	Total	99.85	39.275	55

Figure 154 T. Kindergarten Abstractness of Titles in Genders

(6) Resistance to Premature Closure

ANOVA analysis of Resistance to Premature Closure indicated significant results for main effects for Pre-Posttest ($F(1,53)=17.034$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results (Pretest<Posttest, $p<.05$). No interaction was found (Figure 155).



Descriptive Statistics

Gender		Mean	Std. Deviation	N
RPC-Pre	F	75.29	36.575	31
	M	88.25	23.007	24
	Total	80.95	31.792	55
RPC-Post	F	98.58	24.926	31
	M	99.38	26.818	24
	Total	98.93	25.528	55

Figure 155 T. Kindergarten Resistance to Premature Closure in Genders

7.3.5.5 ANOVA Analysis for Comparison of TTCT Norm-referenced Measures Pre-Posttest among Top, Middle, Low Groups at T. Kindergarten

Abbreviations and Acronyms

Pre-Posttest: Pretest and Posttest

TML: Top-, Middle-, and Low-scoring groups
T: Top-scoring group, M: Middle-scoring group, L: Low-scoring group
T–M: Top- and Middle-scoring groups
M–L: Middle- and Low-scoring groups
T–L: Top- and Low-scoring groups

The Score Total of the TTCT test results of Pre-Posttest was divided into Top-, Middle-, and Low-scoring groups by Ward's method for cluster analysis as follows:

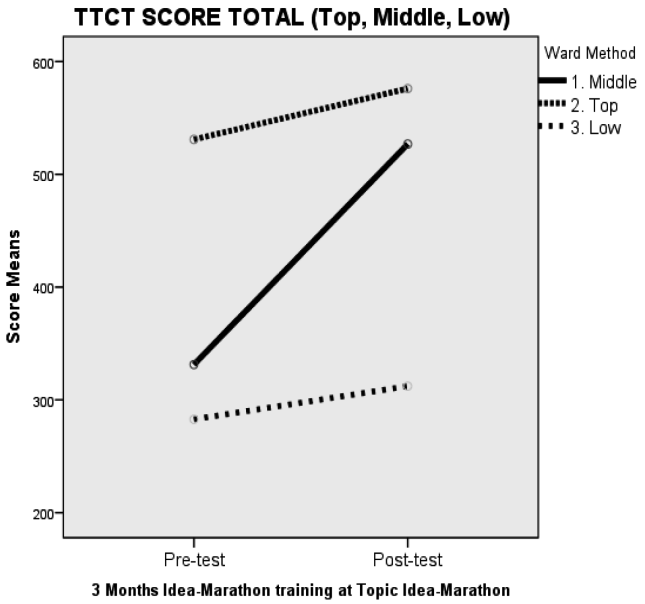
Top	39 children
Middle	11 children
Low	5 children
Total	55 children

(1) Score Total

Concerning Score Total, there were significant main effects within Pre-Posttest ($F(1,52)=44.889$, $p<.01$) and among TML ($F(1,52)=86.703$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and among TML (T>M>L, $p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,52)=19.954$, $p<.01$, $MSE=2564.830$). The Bonferroni multiple comparison test confirmed a significant main effect among Top and Middle within Pre-Posttest (Pretest < Posttest, $(p<.05)$.

At Pretest, there was significance among T-M and T-L (T > M and T > L, $p<.05$). At Posttest, there was significance among TML (T>M>L, $p<.05$). (Figure 156).



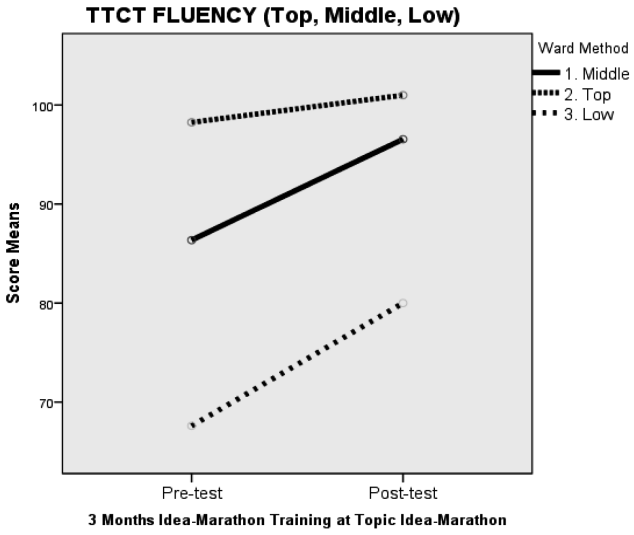
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
STL-Pre	1	331.36	60.087	11
	2	530.95	64.493	39
	3	282.80	75.453	5
	Total	468.47	117.719	55
STL-Post	1	526.82	34.327	11
	2	576.08	51.130	39
	3	312.20	82.899	5
	Total	542.24	91.335	55

Figure 156 T. Kindergarten Score Total among TML

(2) Fluency

Concerning Fluency, there were significant main effects within Pre-Posttest ($F(1,52)=8.464$, $p<.01$) and among TML ($F(1,52)=10.059$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest (Pretest<Posttest, $p<.05$) and among T-L and M-L ($p<.05$). No interaction was found (Figure 157).



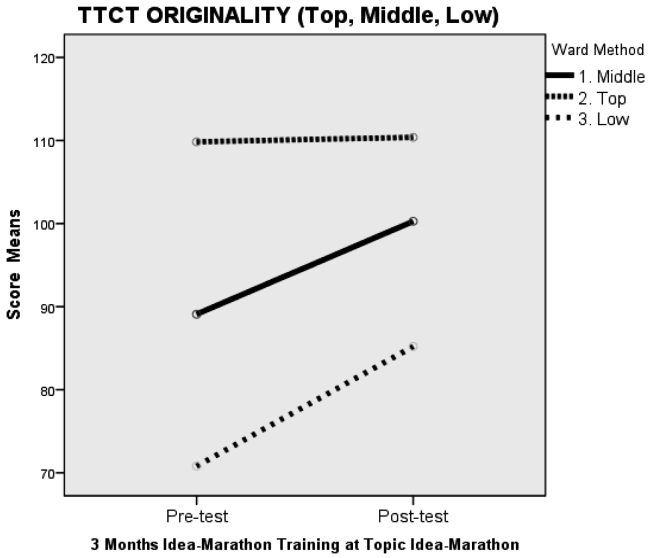
Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
FLU-Pre	1	86.36	16.543	11
	2	98.26	18.450	39
	3	67.60	5.459	5
	Total	93.09	19.521	55
FLU-Post	1	96.55	11.361	11
	2	101.00	11.776	39
	3	80.00	10.050	5
	Total	98.20	12.879	55

Figure 157 T. Kindergarten Fluency among TML

(3) Originality

Concerning Originality, there were significant main effects within Pre-Posttest ($F(1,52)=5.213$, $p<.05$) and among TML ($F(1,52)=20.930$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and among TML (T>M>L $p<.05$). No interaction was found (Figure 158).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ORI-Pre	1	89.09	15.228	11
	2	109.85	18.941	39
	3	70.80	11.841	5
	Total	102.15	21.779	55
ORI-Post	1	100.27	14.029	11
	2	110.38	12.411	39
	3	85.20	14.220	5
	Total	106.07	14.847	55

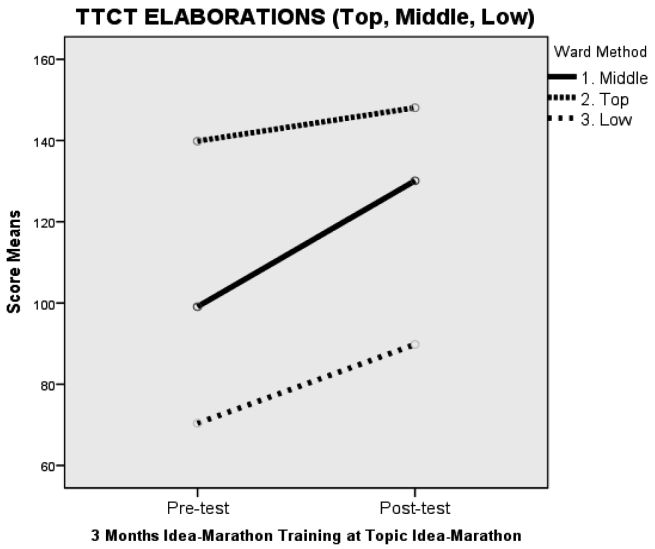
Figure 158 T. Kindergarten Originality among TML

(4) Elaborations

Concerning Elaborations, there were significant main effects within Pre-Posttest ($F(1,52)=31.609$, $p<.01$) and among TML ($F(1,52)=87.418$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and between TML (T>M>L, $p<.05$)

An interaction was found within Pre-Posttest and among TML ($F(2,52)=6.747$, $p<.01$, $MSE=171.630$). The Bonferroni multiple comparison test confirmed a significant main effect for TML within Pre-Posttest (Pretest<Posttest, $p<.05$).

At both Pretest and Posttest, there was significance among TML (T>M>L, $p<.05$) (Figure 159).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ELA-Pre	1	99.09	14.432	11
	2	139.87	17.337	39
	3	70.40	15.884	5
	Total	125.40	29.002	55
ELA-Post	1	130.09	12.341	11
	2	148.08	8.474	39
	3	89.80	29.482	5
	Total	139.18	21.045	55

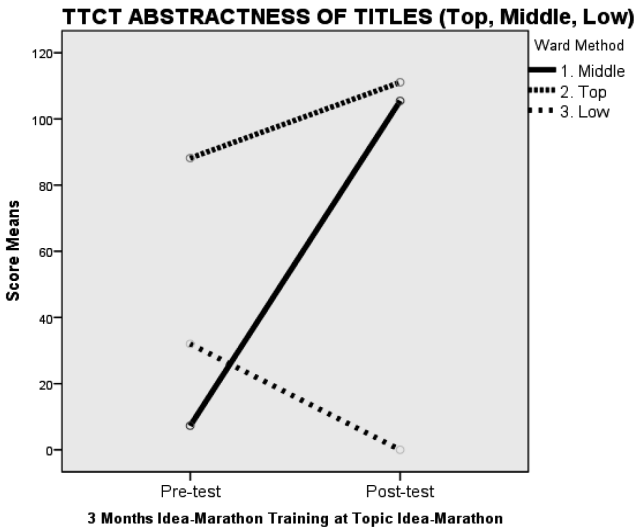
Figure 159 T. Kindergarten Elaborations among TML

(5) Abstractness of Titles

Concerning Abstractness of Titles, there were significant main effects within Pre-Posttest ($F(1,52)=14.074$, $p<.01$) and among TML ($F(1,52)=30.984$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and between TML ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,52)=20.168$, $p<.01$, $MSE = 890.531$). The Bonferroni multiple comparison test confirmed a significant main effect for Top and Middle group within Pre-Posttest (Pretest < Posttest, $p<.05$), while there were no significant results for Low group within the Pre-Posttest.

At Pretest, there was significance T-M and T-L (T > M and T > L, $p<.05$), but none between M–L (M < L). At Pretest, Middle was lower than Low. At Posttest, there was significance M-L and T-L(M > L, T > L, $p<.05$). Middle got higher than Low (Figure 160).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
ABT-Pre	1	7.27	24.121	11
	2	88.18	43.972	39
	3	32.00	43.818	5
	Total	66.89	52.675	55
ABT-Post	1	105.45	10.680	11
	2	111.08	26.678	39
	3	0.00	0.000	5
	Total	99.85	39.275	55

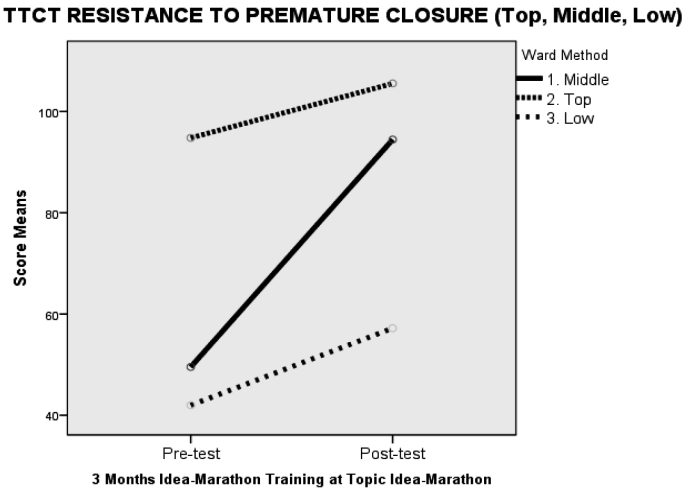
Figure 160 T. Kindergarten Abstractness of Titles among TML

(6) Resistance to Premature Closure

Concerning Resistance to Premature Closure, there were significant main effects within Pre-Posttest ($F(1,52) = 19.731$, $p<.01$) and among TML ($F(1,52) = 25.341$, $p<.01$), and the Bonferroni multiple comparison test confirmed significant results within Pre-Posttest(Pretest<Posttest, $p<.05$) and between T-M and T-L ($p<.05$).

An interaction was found within Pre-Posttest and among TML ($F(2,52) = 6.257$, $p<.01$, $MSE = 401.876$). The Bonferroni multiple comparison test confirmed a significant main effect for Top and Middle group within Pre-Posttest (Pretest<Posttest, $p<.05$).

At Pretest, there was significance T-M and T-L (T > M and T > L, $p<.05$), but none between M–L (M > L). At Posttest, there was significance between M-L and T-L (M > L. T > L, $p<.05$) (Figure 161).



Descriptive Statistics

Ward Method		Mean	Std. Deviation	N
RPC-Pre	1	49.55	40.406	11
	2	94.79	12.998	39
	3	42.00	38.477	5
	Total	80.95	31.792	55
RPC-Post	1	94.45	10.875	11
	2	105.54	17.607	39
	3	57.20	53.844	5
	Total	98.93	25.528	55

Figure 161 T. Kindergarten Resistance to Premature Closure among TML

7.3.6 T Kindergarten the Topic Idea-Marathon Studies Discussion

7.3.6.1 Can Reading be Taught before Writing?

The Japanese language requires the use of two syllabaries (the *hiragana* and *katakana*) and thousands of Chinese characters (the *kanji*) for reading and writing. Japanese language lessons start in elementary school with learning the *hiragana* and *katakana*, and then some easy *kanji*. The Japanese Ministry of Education establishes a list of *kanji* that all elementary school pupils should learn to read and write each year through sixth grades.

However, many people now believe that the reading and writing of *kanji* can be taught separately, teaching children to read first and write later. In this IT and media age, being able to read more *kanji* allows one to read more books and newspapers and leads to even better enjoyment of TV, PC and other media. As a result, recently many kindergartens and nursery schools start teaching even preschool children how to read some *kanji*.

7.3.6.2 Creativity Effects of the Topic Idea-Marathon

The Topic Idea-Marathon is a training method especially designed for kindergarten children who have only recently learned to read the *hiragana*, *katakana*, and basic *kanji*.

After three months of the Topic Idea-Marathon training just before graduating from kindergarten, TTCT Figural test scores significantly improved for Score Total and all Norms except "Originality." the Topic Idea-Marathon training may therefore improve pupil creativity, or at least positively impact and stimulate creativity.

"Fluency" likely improved via the Topic Idea-Marathon for kindergarten pupils due to the method's process, in which students keep "writing" ideas every day through both drawings and sentences. In the Drawing Idea-Marathon children were asked to sketch objects in pencil on drawing sheets, but in the Topic Idea-Marathon every day they were given a question to think about and requested to draw their own ideas and to write simple sentences. For many of the children, these daily activities were their first experiences of both drawing and writing sentences.

The effects of the Topic Idea-Marathon extended not only to the Norm-Referenced Measures of the TTCT test, but also to the four strengths of Story-telling Articulateness, Expressiveness of Titles, Synthesis of Lines or Circles, and Extending or Breaking Boundaries among the thirteen Creative Strength Criterion-Referenced Measures. The Topic Idea-Marathon was thus effective on all aspects and varieties of creativity in kindergarten children.

7.3.6.3 Writing by Reading

When the Topic Idea-Marathon was developed, there was a misunderstanding of the basic point about T. Kindergarten's *Kanji* teaching method. When T. Kindergarten teachers said they taught *Kanjis*, we thought that they were teaching not only reading *Kanji*'s but also writing basic *Kanji*s. Actually, however, T. Kindergarten teachers teach only reading *Kanjis* but never teach writing *Kanji*'*s*.

But through the Topic Idea-Marathon, almost all the children in T. Kindergarten are writing easy sentences in their notebooks copying, remembering the shape of easy *Kanjis* along with *Hiragana* and *Katakana* syllabaries. Of course, these children will ask the teacher how to write a certain *Kanjis* and their teachers will teach case by case. Writing by reading *Kanjis* is quite unique in children's language education.

The Topic Idea-Marathon consists of Drawing and Writing, and the writing can be started from reading. This is something of which the Japanese Ministry of Education is not aware of this method yet. In my estimation, since the power of memory is quite strong in children, they can remember the

easy *Kanjis'* shapes in their imaginations. If this power is proven in children, then we can make some innovations in our language education method.

7.3.6.4 The Topic Idea-Marathon Can Be a Gate-keeper of the Primary Education

The Topic Idea-Marathon might have opened children's intellectual windows and widened their perception of the world. The daily Topic Idea-Marathon practice over three months could thus represent a breakthrough in creative growth for these children, and confirmation of this remains as a topic for future study.

We expect that writing sentences every day as a part of the Topic Idea-Marathon will positively impact the level of Abstractness of Titles. These daily writing experiences probably especially contributed to the increase in scores for "Abstractness of Titles" among the Norm-Referenced Measures.

7.3.6.5 ANOVA Analysis of TTCT Tests Between Genders

There were no significant differences nor interactions Pre-Posttest between Genders.

7.3.6.6 ANOVA Analysis of TTCT Tests Among Top, Middle and Low Score Groups

ANOVA analysis of TTCT scores for Top, Middle, and Low groups as divided by cluster analysis (Ward method) indicated upward movement of Middle and Low group scorers toward the Top scoring group. The Middle group in particular significantly improved their Score Total, Abstractness of Titles, and Resistance to Premature Closure. The Middle group was made up of 39 children, more than 70% of the total of 56 children participating. Since the scores of such a large percentage of the children increased, the overall results increased as well.

Chapter 8 Discussion and Conclusion

8.1 Universities and Colleges

8.1.1 Discussion About TTCT Tests Results at Universities and Colleges

Experiments at O College and K University show that the experimental groups made significant increases on many Norm Referenced Measures while the control groups, without the Idea-Marathon training, did not show positive results regarding increased creativity.

The Japanese higher education system is based on the following:

(1) In order to pass the entrance examinations of major universities, students must show an accumulation of specific knowledge and go through severe competition.

(2) In order to attend less competitive universities, students may not have to take examinations, but they are often selected by way of interviews and/or essay writing.

Those who have accumulated smartly the required "specific knowledge" can enter famous major universities. After entering the famous major universities, these students still push forward with the same studying attitude of more accumulation as required. With such a vast accumulation, they will be graduated and entering the famous companies and government but with the same belief that their hard study is consisting of memorized knowledge.

These who enter the famous companies and government, will more-or-less manage to solve problems as they can pull out a part of their accumulated knowledge which can be called as "pseudo-creativity".

But these knowledge based persons cannot create completely new concepts nor products. And they will not dare to search to explore their creativity crushed by solid knowledge. They come to believe that they do not have good creativity but they have management power. Though they are usually placed in the higher management, they are likely to have complex in creativity.

Those knowledge-based persons will take the management of innovative persons who have less knowledge but more flexible creativity. Furthermore, they will oppose to innovative movement from their conservative experience and knowledge. This is the up-to-date situation inside the major companies, laboratories and government offices in Japan.

Not opposing the knowledge, it is good to have deep knowledge if knowledge is always cooked by creative thinking. The idea-Marathon can stimulate their creativity and motivation through strengthening their curiosity. Their learning and knowledge transformed by Idea-Marathon training can serve as fuel for the development of wisdom. This accumulated knowledge can result in laser-like "emissions of wisdom" stimulated by the Idea-Marathon training. Simple practice of daily Idea-Marathon, thinking and immediately writing will change the solid accumulated knowledge into active wisdom.

Those students who attend less competitive universities may need to study more, knowing that they need more confidence in creativity. During their stay in the universities, students are expected to develop their own style of studying in order to establish their own creative interests (Ref. 1.5).

All of the universities in Japan have a different ranking for entrance. But as for the creativity level, as seen in our experiments in universities, the universities can gain a quick improvement of creativity if they start and continue the Idea-Marathon as the whole university where all the students in all faculties keep their notebooks, think and write their notions, thinking and ideas into their notebooks every day. If this creativity improvement can be maintained until their graduation, many of the graduates from these universities might become known for their higher creativity and eventually the university will receive such a high reputation in business circles and from the society as a whole.

For this purpose, there are three points to be recommended to maintain:

(1) Even after the completion of a certain period of the Idea-Marathon training for the students and confirmation of making the Idea-Marathon as a habit, they are still supposed to continue to do the Idea-Marathon every day. If they just stop thinking and writing in notebooks, their creativity level will probably decrease.

(2) Faculty teachers and staffs are also supposed to practice the Idea-Marathon together with their students, giving ETS and Support to the new students.

(3) If all the students and the faculty gather in good communication with the Idea-Marathon, the Large Scale Idea-Marathon can demonstrate the synergistic effects on creativity.

8.1.2 The Large Scale Idea-Marathon

Recently, many Japanese universities have been trying to develop Career Design Education for students. Career Design Education is also highly recommended by the Japanese Ministry of Education.

In December 2006 the Japanese Association of National Universities published a set of guidelines, "Career Design Education in Universities – The Way It Should Be" (in Japanese), classifying Career Design Education in Universities as consisting of:

(1) Internships

(2) Conventional lectures that include more Career Design oriented contents

(3) Original Career Design lectures [78].

The Idea-Marathon training has been included in (3) in the case of D University. But in the case of very large scale Idea-Marathon training, there is a problem in how to provide the training to hundreds or even thousands of students, which is how to provide the ETS (e-Training System) support system to so many students. The core of the ETS support is based on the concept of comments and advice provided by a Human Handling Education System (HHES), not by robots.

As explained in all the chapters on the Idea-Marathon in Universities, Companies and Laboratories, the ETS support system is absolutely necessary in order to enable the participants to continue the Idea-Marathon for the months at a time necessary to establish a new habit.

For this reason, Team Teaching Assistants (TTAs) are a good solution for providing the ETS to large numbers of students. However, even utilizing TTAs will not be adequate for supporting thousands of students in one grade, so there will be a limit on the number of students who can be supported.

In the case of really large scale Idea-Marathon trainings in Universities, senior students, graduates students and/or outside citizens might be selected to serve as ETS advisors or experts in the future.

8.2 Laboratories and Companies

An Idea-Marathon training session with TTCT tests was conducted in the laboratory of a food company in Tokyo in 2012. Significant creative effects were shown for all five Norm Referenced Measures, clearly indicating the positive impact of the Idea-Marathon training on creativity.

After the experiment at the laboratory, Idea-Marathon trainings evaluated by TTCTs were conducted in several other laboratories and companies, and in every case significant positive creativity effects were confirmed using the TTCT Pre-Posttest.

The number and variety of laboratories and companies interested in Idea-Marathon creativity training is increasing year by year, and the same problem as with large scale Idea-Marathon training in universities is also increasing.

Over a certain number of participants at one time, the ETS support system becomes very difficult to be managed by hands. If ETS support is handled by giving exactly the same comment or advice to each participant, then many participants would be dropping out accordingly.

To respond to the need for an Idea-Marathon support system for a whole company, where all the staff in the company keep thinking and writing ideas every day, the ETX mentor system can be proposed. The ETX mentor system is an ETS expert system.

After participating for six months in an Idea-Marathon training course, several participants who routinely produce both excellent number of ideas and contents are recommended to be ETX mentors/advisers. These ETX advisers would then be in charge of five staff members in the next Idea-Marathon training group, giving advice and encouragement so this next group of trainees can successfully complete the Idea-Marathon training.

This ETX concept can also be applied to other kinds of training.

8.3 Kindergartens and Nursery Schools

8.3.1 Discussion of the "Drawing Idea-Marathon" and of the "the Topic Idea-Marathon"

(1) The Drawing Idea-Marathon

The plan to provide the Idea-Marathon training to the younger generation has been attempted several times. One such attempt occurred in 2007 with the support of one teacher in charge of the 4th grade of one elementary school on an island south of Tokyo.

This attempt was very successful. In this children's Idea-Marathon the children were given one thinking hint question every day first thing in the morning by the teacher in charge. The teacher himself participated the Idea-Marathon with the pupils. This was how the pupils and the teacher himself joined together to create ideas every day for one year.

There were many educational effects during this trial but the most important and impressive effect which the teacher mentioned was that he found more children to praise than usual when only an intellectual result was the basis of his praising children. In creative activity, he found the gem stones in many other children. The teacher was happier than before.

Through this experience, we found that several quiet children before the Idea-Marathon training started creating ideas actively after they became used to the method. After this elementary school, there were a few high schools that showed some interest. However, most of the high schools were facing the issue of coping with university entrance examinations. Both students and teachers were so focused on existing-knowledge-oriented academic endeavors that the concept of "creativity as everyday practice" was completely out of the question.

They were not interested in improvements in creativity as a means to be successful in the entrance examinations.

Junior high schools and elementary schools are even less interested in creativity. It is difficult to persuade teachers in Japan to begin the Idea-Marathon in their classes and engage in the practice of "everyday thinking and immediately writing in a notebook."

For elementary schools in Japan, there are guidance and instructions from the Ministry of Culture, Science and Sports that steer a course to knowledge-based study rather than creativity education. It is almost impossible to add even 10 minutes of Idea-Marathon everyday activity to their fixed curriculum. Furthermore, teachers in Japan are too busy with various meetings, different kinds of paper preparations and sport activities to start a new program like the Idea-Marathon.

In spite of the lack of interest for creativity found in high-schools, junior high schools and elementary schools, the Idea-Marathon found a fertile ground in kindergartens and nursery schools in their willingness to apply the new method to the younger generation.

The Drawing Idea-Marathon was first designed and proposed to T. kindergarten in Tokyo, and it has been used there for the last four years. In the second year, we incorporated TTCT Figural Pre-Posttest tests into the Idea-Marathon to measure the pupils' progress in creativity.

The creative impact of the simple Drawing Idea-Marathon on the kindergarten children was documented by the TTCT results (see Chapter 7.1)

For pupils of this age, the TTCT tests showed significant progress in Fluency and Originality but not in the other Norms of Elaborations, Abstractness of Titles, or Resistance to Premature Closure.

Most five-year-old children of T. Kindergarten start learning how to read, but very few can write. Therefore, they primarily express their creativity by talking, handcrafting, and drawing, but not by writing. Their conventional large size drawings are usually simple and not expressive in terms of details as they are not making detailed observation for what they are drawing and lack of drawing techniques.

Because they were not able to express themselves in writing, it is natural that these children did not show, in the TTCT results, significant improvement in Abstractness of Titles that requires thought and writing within their limited knowledge and experience. Thus, the Drawing Idea-Marathon is for children who are not able to write well yet, and it focuses on developing creativity by way of a short drawing activity every day. After children had practiced the Drawing Idea-Marathon for five to six months, their parents noticed improvement in the level of their drawings and reported this awareness via a questionnaire (Ref 7.1.7).

Five-year-olds have a keen sensitivity. Whatever they see, hear, or feel is quickly absorbed as information through the senses, and they use it for creative motivation. Drawing and writing similarly impact and stimulate younger children. The Drawing Idea-Marathon, therefore, can be recommended to any Kindergarten or Nursery Schools of four to five year old children to develop their initial creativity.

(2) The Topic Idea-Marathon

The Topic Idea-Marathon is based on easy, prepared questions that allow children to think their ideas into both drawings and sentences.

The Topic Idea-Marathon requires children to read and write in the Japanese languages (using Hiragana and Katakana phonemes as well as Kanji, Chinese characters). The Preschoolers' Topic Idea-Marathon is only practiced for the three months just before the children graduate from their kindergartens.

The TTCT test results for the Preschoolers' Topic Idea-Marathon extends positively to all the Norm Referenced Measures excepting Originality. This shows that writing sentences every day has a very strong creative influence on children. The increased scores for Abstractness of Titles should be paid attention to since this item evaluates the use of language creativity.

The results for Abstractness of Titles seems to be influenced by the children's daily writing which does not happen in their usual life before they enter elementary school. From the experiments described in Chapter 7.3, the Topic Idea-Marathon seems to be the most powerful method for providing creative influence to any children.

The statistical analysis of the TTCT Pre-Posttest result for the Drawing Idea-Marathon and the Topic Idea-Marathon might show the strong necessity for teaching children at this stage how to read and write. They need to learn the three forms of the Japanese reading and writing system, Hiragana, Katakana and Kanji, in order to expand the map of their living world.

8.4 To Do or Not To Do the Idea-Marathon

In this dissertation, all the experiments presented in Chapters 5 to 7 showed some significant results for various factors among the TTCT Figural Pre-Posttest Norm Referenced Measures and the 13 Criterion-Referenced Measures.

Here we can directly compare the experimental group and the control group via an ANOVA analysis with Top, Middle and Low groups identified by Cluster Analysis (Ward Method).

From (1) O College, (2) K University and (3) E&F Nursery School, the experimental groups are clearly more improving in many factors of creativity than the control groups.

(1) O College (Table 31)

		"O" College Experimental		"O" College Control	
		With Idea-Marathon		Without Idea-Marathon	
Score Total & 5 Norms	Top, Middle, Low	Up or Down	Sig	Up or Down	Sig
Score Total	Top	↗	*	↗	n.s.
	Middle	↗	n.s.	↗	n.s.
	Low	↗	*	↘	*
Fluency	Top	↗	*	↗	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	*	↘	n.s.
Originality	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Elaborations	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Abstractness of Titles	Top	↘	*	↘	n.s.
	Middle	↗	n.s.	↗	n.s.
	Low	↗	n.s.	↘	*
Resistance to Premature Closure	Top	↗	n.s.	↗	n.s.
	Middle	↗	n.s.	↗	n.s.
	Low	↗	n.s.	↘	n.s.

↗(Score Means up in Posttest), ↘(Score Means down in Posttest), *<.05, n.s. =non-significant

Table 31 TTCT Score Comparison of O College Top, Middle and Low between

(2) K University (Table 32)

		"K" Univ Experimental		"K" Univ Control	
		With Idea-		Without Idea-	
Score Total & 5 Norms	Top, Middle, Low	Up or Down	Sig	Up or Down	Sig
Score Total	Top	↘	n.s.	↗	*
	Middle	↗	*	↘	n.s.
	Low	↘	n.s.	↘	n.s.
Fluency	Top	↘	n.s.	↗	n.s.
	Middle	↗	*	↗	n.s.
	Low	↗	n.s.	↘	n.s.
Originality	Top	↗	n.s.	↗	n.s.
	Middle	↗	*	↗	n.s.
	Low	↗	n.s.	↗	n.s.
Elaborations	Top	↘	n.s.	↗	n.s.
	Middle	↗	*	↘	n.s.
	Low	↘	n.s.	↗	n.s.
Abstractness of Titles	Top	↘	n.s.	↗	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Resistance to Premature Closure	Top	↗	*	↗	*
	Middle	↗	*	↗	n.s.
	Low	↗	n.s.	↘	*

↗(Score Means up in Posttest), ↘(Score Means down in Posttest), *<.05, n.s. =non-significant

Table 32　TTCT Score Comparison of K University Top, Middle and Low between

(3) E. Nursery School and F. Nursery School (Table 33)

		E. Nursery School (Experimental)		F. Nursery School (Control)	
		Drawing Idea-Marathon		Without Drawing Idea-Marathon	
Score Total & 5 Norms	Top,Middle, Low	Up or Down	Sig.	Up or Down	Sig.
Score Total	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Fluency	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↗	n.s.
	Low	↗	n.s.	↘	n.s.
Originality	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Elaborations	Top	↗	n.s.	↘	n.s.
	Middle	↗	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.
Abstractness of Titles	Top	↘	n.s.	↘	n.s.
	Middle	↗	*	↘	n.s.
	Low	↘	n.s.	↘	n.s.
Resistance to Premature Closure	Top	↘	n.s.	↘	n.s.
	Middle	↘	n.s.	↘	n.s.
	Low	↗	n.s.	↘	n.s.

↗(Score Means up in Posttest), ↘(Score Means down in Posttest), *<.05, n.s. non-significant

Table 33　TTCT Score Comparison of Top, Middle and Low Groups in E. Nursery (With D-IMS)

8.5　Comparison of TTCT Figural Norms Referenced Measures Between Genders

The females seem to be getting higher score in Total Scores, Fluency, Elaborations and RPC of TTCT Figural Norms Reference Measures than the male, the reason of which will be studied in future.

	O College			K Uni			A Labo			N Company			K Drawing			N Drawing			K Topic		
	Pretest		Posttest	Pretest		Posttest	Pretest		Posttest	Pretest		Posttest	Pretest		Posttest	Pretest		Posttest	Pretest		Posttest
Score Total	F			M	⇒	F	M	⇒	F	F			F			M			M		
Fluency	F			M			F			M	⇒	F	F			M	⇒	F	F		
Originality	F	⇒	M	M	⇒	F	M	⇒	F	F			F			M	⇒	F	M	⇒	F
Elaborations	F			F			F			F			F			F	⇒	M	M		
Abstractness of Titles	M			M	⇒	F	M	⇒	F	F	⇒	M	M	⇒	F	F	⇒	M	M		
RPC	F			M	⇒	F	M	⇒	F	M			F			M			M		

Colored cells were Female or Male which is either higher score in Posttest or both Pre-Posttest. There were three interactions at A Laboratory Abstractness of Titles (Female), at N Company Fluency (Female) and at T Kindergarten Abstractness of Titles (Male). Female higher score 29 cells out of 42 cells and :

Table 34 Comparison of TTCT Figural Norms Between Genders Covering all the Experiments

8.6 Important Observation About the Idea-Marathon and the TTCT Figural Tests

Since 2010, we have been administering and scoring many TTCT Figural tests in universities, companies, laboratories, kindergartens and nursery schools. When we submitted the scores and their analyses, professors and teachers showed two kinds of surprise: one was because the TTCT Figural test results exactly pointed out the bright children, and the other, with more interesting kind of surprise, was when teachers and professors said, “How can this boy (or girl) ever get such a high score in Originality?” Even in universities and companies, we have had similar experiences where training supervisors or personnel managers have used similar words of surprise due to unexpected positive results regarding some staff.

The value of finding such unexpected creative ability among participating staff, researchers, students and children is so important, not only for the person, but also for the organization and for society as a whole. Thus, the Idea-Marathon - TTCT Figural test results can sometimes reveal a most valuable asset, in that they enable us to identify hidden talent among the examinees.

8.7 Overall Merits of the Idea-Marathon Practice

Although all the experiments performed in this dissertation indicated some significant improvement in creativity in laboratories, companies, universities, kindergartens and nursery schools, it is necessary to discuss the reason why these positive creativity effects were obtained through the practice of the Idea-Marathon for three months.

What are the common factors that pushed up the creativity level in all the studied groups?

8.7.1 Arousing and Diversifying Curiosity

The basic rule of the Idea-Marathon impressed upon the participants is to look for ideas every day, to find themes “to think into writing,” whatever, whenever and wherever the ideas come into the brain. In the early stages, they must wake themselves up in order to be conscious of the Idea-Marathon in daily action before starting to look for themes, cues and causes. Since the Idea-Marathon is a daily activity, the participants are quite busy looking for these cues. This naturally widens and diversifies their curiosity.

After they get used to the habit of doing the Idea-Marathon, they just get ideas looking at everything, as they go into the office, as they go outside or as they are simply at home, and eventually they find themes and cues automatically wherever they are and whatever they are doing.

8.7.2 The Possibility of Reviewing One’s Ideas

The ideas in our brain can disappear at any moment after they are imagined if they are not written down. But if such ideas are written down in notebooks without losing time, the ideas written down can be reviewed later at any time. Reviewing ideas is quite useful in order to revise, refine and improve their quality.

Since one cannot identify one's best idea quickly on the spot, it is best to accumulate ideas in notebooks. Then these ideas can be reviewed again and again, and with careful thought, repeated consideration and timely, delayed judgment, the best ideas can finally be identified.

8.7.3 The Gradual Increase of Accumulated Ideas

If the daily ideas are written in one notebook, the number of the ideas increases day by day. By reviewing old ideas and selecting the best ideas, the quality of the ideas is enhanced. By obtaining more and more ideas in their notebooks, the Idea-Marathon participants become more confident in their own creative power.

8.7.4 Cognitive Improvement

The main reason why the Idea-Marathon can be quite effective for the improvement of creativity might be the power of cognitive awareness.

To continue the Idea-Marathon, a participant's high motivation and strong willpower is the absolute key. Sometimes motivation and willpower may be even more important factors than the accumulated knowledge sometimes. Without motivation and willpower, the Idea-Marathon cannot be continued for more than a week, nor can it even be started. These powers of motivation and willpower keep participants conscious of the necessity of continuing to create ideas every day.

If creating ideas is a part of cognitive activity, the rule of the Idea-Marathon to create ideas every day in any category might be a process of managing cognitive activity, that is, it is a meta-cognitive process.

The definition of metacognition by Flavell (1987) is:

Metacognition is usually defined as knowledge and cognition about cognitive objects, that is, about anything cognitive [79].

But this is too ambiguous. Sannomiya (2008) mentioned the definition and the classification criterion for meta-cognition as (1) Meta-cognitive knowledge and (2) Meta-cognitive activities [80].

Whether in universities, companies or laboratories, the Idea-Marathon training efforts have been concentrated on enabling every participant to establish a natural habit of daily creating some ideas every day, which is very similar to "Meta-cognitive activities."

Uebuchi (2007) explains that self-regulated learning is defined as the process of metacognition, a kind of motivation and positive participation for study [81]. The Idea-Marathon is also basically a form of daily self-regulated learning. In order to continue the Idea-Marathon, high motivation is maintained through lectures and positive support systems like the ETS (the e-Training System).

If we try to create ideas on any subject, we try to recall all kinds of memories, associations, knowledge and impressions in our brain. Also, once an idea emerges in our brain, we might easily forget it if we do not write it down in our notebook immediately. However, immediately after forgetting an idea, we sometimes still remember the shadow or trace of the idea. Trying to remember, we are rerouting back our action or memory to revive the lost idea. These actions resemble "Source Monitoring."

Kinjo (2008) and Gassner (2009) said that "Source Monitoring" is a process of meta-cognition [82] and also of meta-memory [83]. Source Monitoring can be obtained from either Internal or External Monitoring, which corresponds to the methods of the Idea-Marathon.

In this way, many of the attributes of the effects on creativity of the Idea-Marathon are similar to meta-cognitive activities.

As examples of metacognitive activities, Sannomiya describes metacognitive monitoring as getting meta-level information from “awareness,” “feeling,” “prediction,” “checking” and “evaluation”.

Metacognitive control is the meta-level revision of the “goal setting,” “planning” and “revision”.

All of these factors of meta-cognitive monitoring and control are characteristics of the Idea-Marathon Method process [79, pp. 10].

Many scholars have been trying to improve teaching methods for teachers and learning methods for students, and through the Idea-Marathon students are encouraged to think in a metacognitive way [81]. Sannomiya explains that scholars have been trying to establish a measuring method for meta-cognition effects [79, pp. 14].

8.8 Invited Serendipity

Serendipity is quite often mentioned around the time the Nobel Prize is announced every year. Meyers (2007) explains the role in which serendipity played how penicillin was discovered by Alexander Fleming [84].

Fleming’s curiosity about one petri dish in which yellow-green mold was disintegrating and dissolving bacteria eventually saved the lives of many millions of soldiers, citizens and us.

I was born in 1946, and the next year I caught a cold that turned into pneumonia. I had a very high temperature for two days. At that time, just after the war, there were not enough medical supplies, and my doctor could get only one portion of a penicillin injection for me from the US Occupation Forces.

My doctor told my parents that I, their baby, probably would not live through the night but that this one penicillin injection was the only hope. After the injection, the high temperature went down drastically, and I survived. Without Fleming and his serendipity, I would not be writing this dissertation.

Thus, I do believe in serendipity, and I do believe in the necessity of encouraging scientists to encounter serendipity, for which I am trying to expand the practice of the Idea-Marathon practice as my life’s work. As Meyers wrote at the end of his book, “What they discover may just save our lives” (ibid, pp. 320).

There are five different types of definitions for “serendipity”:

The first type construes serendipity as fortune that occurs simply by chance. In the Oxford Dictionary, serendipity is defined as: ***“The occurrence and development of events by chance in a happy or beneficial way.”*****[87]** The second type is: Catching serendipity while or after looking for something similar in particular or if someone is expecting in their mind some similar target or effect, even hypothetically.

As examples of this second type Roberts (1989) gave the invention of the Goodyear Tire and of Dynamite. Although the inventors were originally looking for such solutions, these excellent solutions were actually found by chance. This is sometimes referred to as Pseudo-Serendipity [85].

The third kind is Genuine Serendipity. If somebody is looking for something, he or she finds something else much better or much more revolutionary, like the invention of the X-ray, of Penicillin, and of many other important inventions [Roberts, ibid].

The fourth kind is disguised serendipity. Hoffman (2013) was invited to make a presentation in MIT’s “Media Labo” by Mr. Ito, insisted on keeping the possibility of “Turnabout” at any time in order to accept serendipity. Serendipity in this case is conceived of as an example of “an evil may sometimes turn out to be a blessing in disguise [86].”

A fifth kind is the enthusiastically and consciously inviting serendipity by increasing the self-strength of detecting, selecting and sensing serendipity through wide curiosity. Sawaizumi (2007)

says that people often overlook very important bits of wisdom. They are not watching carefully, even if by serendipity or chance, good ideas are passing right in front of them [88, pp73-75].

In order to "invite" serendipity, Sawaizumi proposes the following points:

(1) Do not disregard even trivial or subtle things.

(2) It is not necessary to have full insight about the watched object or phenomenon. If you just catch the tail of the object or subject, secure your hold.

(3) Record your observation/intuition for future review and processing.

(4) Take enough time so that the observation/idea can be refined into a valuable discovery or invention [88, pp74].

Sawaizumi (2009) advises paying attention to the trivial [89]. What Sawaizumi insists on is exactly the same as the focus of the process of the Idea-Marathon Method, since in the Idea-Marathon Method, all ideas or findings are written down in notebooks for future review and implementation.

Meyers (2007) also explains, "Such (medical) investigations were driven by curiosity, creativity and, often, a disregard for conventional wisdom" [85, pp. 300-301].

Simple ideas, if accumulated over a long time, while always being added to, repeatedly being reviewed and talked over with colleagues, seem to enhance serendipitous chance discoveries in the long run.

Sawaizumi (2009) insists that there are two ways to encounter fortune. One way is just to wait for fortune to visit by chance, which is called "Visited Fortune." Another way is to prepare for, to expect and to prospect for fortune, which is called "Invited Fortune."[90]

The posture and process of the Idea-Marathon, always looking for any kind of thing to note everyday, will *invite* more Fortune than if one just waits.

8.9 Final Conclusion

From the results of the TTCT tests for various generations, including laboratory researchers, university and college students, and kindergarten/nursery school children, we can positively say that the Idea-Marathon Training Method results in significant impacts for improving creativity (Table 35, 36).

	All Significant items of t-test for TTCT 5 Norms and Score Total								
	"O" College	"D" Univ.	"K" Univ.	A. Labo	P. Co.	N. Co.	T. Kinder	E. Nursery	T. Kinder Topic
STL	**	**	*	**	*	**	*		**
FLU	**		**	**		**	*	*	*
ORI	**	**		**	**	**	**		
ELA		**		*					**
ABT				**					**
PRC	**	**	**	**		**			**
		Avobe t-test of all experimental cases, *p<.05, **p<.01							
		STL: Score Total, FLU:Fluency, ORI:Originality, ELA:Elaborations,							
		ABT:Abstractness of Titles, RPC:Resistance to Premature Closure							

Table 35 Significant Results for the TTCT Figural Pre-Posttest for Norms Referenced Measures of All the Idea-Marathon Experiments

	All Significant items of t-test for TTCT 5 Norms and Score Total								
	"O" College	"D" Univ.	"K" Univ.	A. Labo	P. Co.	N. Co.	T. Kinder	E. Nursery	T. Kinder Topic
Emotion									
Storytelling							**		*
Movement or Action		**					**		
Expressiveness of Titles		**							**
Synthesis of Incomplete Figures									
Synthesis of Lines/Circles	**	*	*	**	**	**	**	*	**
Unusual Visualization				**			*		
Internal Visualization	**								
Extending Boundaries		**		*					**
Humor							**		
Richness					*	*			
Colorfulness	**						*		
Fantasy			*	**					
Total of 13 Items		**		*			**		**

Table 36 Significant Results for the 13 Item Creative Strength of All the Idea-Marathon Experiments

8.10 Future Studies

8.10.1 Study of ETS

The ETS (e-Training System) is a key not only to the Idea-Marathon System, but it can also be a key to all kinds of teaching, coaching, training and education. The purpose of the ETS is to provide the participants, students and trainees the maximum and continuous motivation and willpower through very personal advice.

(1) The effects of the ETS on creativity must be studied separately from the Idea-Marathon lectures and workshops. Since the ETS has been administered and proven quite powerful and effective in many Group Idea-Marathon trainings in order to maintain the motivation so that participants can continue and practice positively, further studies of the ETS from the viewpoint of the educational psychology and motivation maintenance are required.

(2) The interruption of participation in training or the fading out of practice for various reasons are the main and usual problems in any kind of group trainings or education, even when started aggressively. The ETS might be used to support the many different kinds of educational and training programs.

8.10.2 Meta-Cognitive Studies

The study of the relationship between the Idea-Marathon and meta-cognition was undertaken and once explained here in the final discussion but this relationship will be studied more in the future because it is clear that the Idea-Marathon has a deeper, wider, more complex relationship with Meta-Cognition than presently imagined. From various activities in the practice of the Idea-Marathon, we can sort out more of the meta-cognitive phenomena, which have to study in the future.

8.10.3 Serendipity

We explained in the above discussion that Higuchi could survive pneumonia thanks to the serendipity of Alexander Fleming and that, furthermore Higuchi has experienced many small serendipity effects due to the Idea-Marathon practice. But since the Idea-Marathon has been expanded, thousands of people are continuing today the Idea-Marathon in Japan and in the world. More cases of serendipity will be found and reported in the future. This issue will be corroborated by identifying these actual cases.

8.10.4 Willpower

Although the Idea-Marathon System is not difficult from the viewpoint of idea creation and anybody can participate in this marathon, there is, however, only one inhibitory factor, which is the lack of the power of continuity. If the Idea-Marathon is adopted in more educational institutions, research

laboratories and companies, we are sure to open a new door for new inventions, discoveries, innovations and stronger curiosities in the future.

Chapter 9 Appendix ANOVA Statistical Data Tables

9.1.1 O College ANOVA With IMS/ Without IMS x Pre-Posttest

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	8277.726	1.000	8277.726	0.838	*n.s*
Error	375330.461	38.000	9877.117		
Within-Subjects					
Pre/Posttest (a)	30752.868	1.000	30752.868	11.189	*p<.01*
Pre/Posttest X With/Without IMS (a)	20764.568	1.000	20764.568	7.555	*p<.01*
Error(Pre/Posttest) (a)	104439.619	38.000	2748.411		
Total	539565.243	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	707.143	1.000	707.143	1.161	*n.s*
Error	23139.845	38.000	608.943		
Within-Subjects					
Pre/Posttest (a)	3898.309	1.000	3898.309	16.774	*p<.01*
Pre/Posttest X With/Without IMS (a)	2381.609	1.000	2381.609	10.248	*p<.01*
Error(Pre/Posttest) (a)	8831.378	38.000	232.405		
Total	38958.284	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	518.951	1.000	518.951	0.759	*n.s*
Error	25969.799	38.000	683.416		
Within-Subjects					
Pre/Posttest (a)	1081.685	1.000	1081.685	3.268	*n.s*
Pre/Posttest X With/Without IMS (a)	3233.885	1.000	3233.885	9.772	*p<.01*
Error(Pre/Posttest) (a)	12576.115	38.000	330.950		
Total	43380.435	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Elaborations

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	247.900	1.000	247.900	0.467	*n.s*
Error	20192.987	38.000	531.394		
Within-Subjects					
Pre/Posttest (a)	23.441	1.000	23.441	0.126	*n.s*
Pre/Posttest X With/Without IMS (a)	1220.241	1.000	1220.241	6.554	*p<.05*
Error(Pre/Posttest) (a)	7074.747	38.000	186.178		
Total	28759.316	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Abstractness of Titles

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	372.669	1.000	372.669	0.299	*n.s*
Error	47325.318	38.000	1245.403		
Within-Subjects					
Pre/Posttest (a)	3.069	1.000	3.069	0.010	*n.s*
Pre/Posttest X With/Without IMS (a)	36.069	1.000	36.069	0.123	*n.s*
Error(Pre/Posttest) (a)	11173.318	38.000	294.035		
Total	58910.444	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

O College Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Resistance to Premature Closure

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	2040.254	1.000	2040.254	4.325	*p<.05*
Error	17925.496	38.000	471.724		
Within-Subjects					
Pre/Posttest (a)	5921.288	1.000	5921.288	19.251	*p<.01*
Pre/Posttest X With/Without IMS (a)	6.288	1.000	6.288	0.020	*n.s*
Error(Pre/Posttest) (a)	11687.912	38.000	307.577		
Total	37581.238	79.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

9.1.2 O College ANOVA Genders x Pre-Posttest

O College Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	3865.719	1.000	3865.719	0.398	*n.s*
Error	184467.900	19.000	9708.837		
Within-Subjects					
Pre/Posttest (a)	40824.686	1.000	40824.686	13.996	*p<.01*
Pre/Posttest X Genders (a)	78.019	1.000	78.019	0.027	*n.s*
Error(Pre/Posttest) (a)	55421.600	19.000	2916.926		
Total	284657.924	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1137.507	1.000	1137.507	2.721	*n.s*
Error	7942.969	19.000	418.051		
Within-Subjects					
Pre/Posttest (a)	2940.015	1.000	2940.015	15.572	*p<.01*
Pre/Posttest X Genders (a)	768.586	1.000	768.586	4.071	*n.s*
Error(Pre/Posttest) (a)	3587.319	19.000	188.806		
Total	16376.396	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	433.586	1.000	433.586	0.524	*n.s*
Error	15708.319	19.000	826.754		
Within-Subjects					
Pre/Posttest (a)	5113.400	1.000	5113.400	13.808	*p<.01*
Pre/Posttest X Genders (a)	937.686	1.000	937.686	2.532	*n.s*
Error(Pre/Posttest) (a)	7036.219	19.000	370.327		
Total	29229.210	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	2063.300	1.000	2063.300	4.614	*p*<.05
Error	8497.319	19.000	447.227		
Within-Subjects					
Pre/Posttest (a)	599.274	1.000	599.274	2.883	*n.s*
Pre/Posttest X Genders (a)	0.036	1.000	0.036	0.000	*n.s*
Error(Pre/Posttest) (a)	3948.869	19.000	207.835		
Total	15108.798	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

O College Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	342.657	1.000	342.657	0.359	*n.s*
Error	18146.819	19.000	955.096		
Within-Subjects					
Pre/Posttest (a)	0.000	1.000	0.000	0.000	*n.s*
Pre/Posttest X Genders (a)	24.857	1.000	24.857	0.090	*n.s*
Error(Pre/Posttest) (a)	5274.619	19.000	277.612		
Total	23788.953	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

O College Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	499.886	1.000	499.886	0.917	*n.s*
Error	10361.400	19.000	545.337		
Within-Subjects					
Pre/Posttest (a)	2685.719	1.000	2685.719	7.377	*p*<.05
Pre/Posttest X Genders (a)	123.433	1.000	123.433	0.339	*n.s*
Error(Pre/Posttest) (a)	6916.900	19.000	364.047		
Total	20587.338	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

9.1.3 O College ANOVA Top, Middle, Low x Pre-Posttest

O College Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	163971.251	2.000	81985.625	60.575	*p<.01*
Error	24362.368	18.000	1353.465		
Within-Subjects					
Pre/Posttest (a)	64110.290	1.000	64110.290	34.561	*p<.01*
Pre/Posttest X TML (a)	22109.727	2.000	11054.863	5.960	*p<.05*
Error(Pre/Posttest) (a)	33389.892	18.000	1854.994		
Total	307943.528	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	3571.003	2.000	1785.502	5.833	*p<.05*
Error	5509.473	18.000	306.082		
Within-Subjects					
Pre/Posttest (a)	6028.672	1.000	6028.672	35.142	*p<.01*
Pre/Posttest X TML (a)	1267.937	2.000	633.968	3.695	*p<.05*
Error(Pre/Posttest) (a)	3087.968	18.000	171.554		
Total	19465.053	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	6844.476	2.000	3422.238	6.626	*p<.01*
Error	9297.429	18.000	516.524		
Within-Subjects					
Pre/Posttest (a)	4841.175	1.000	4841.175	13.381	*p<.01*
Pre/Posttest X TML (a)	1461.765	2.000	730.883	2.020	*n.s*
Error(Pre/Posttest) (a)	6512.140	18.000	361.786		
Total	28956.985	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

O College Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	6975.241	2.000	3487.621	17.509	*p*<.01
Error	3585.378	18.000	199.188		
Within-Subjects					
Pre/Posttest (a)	1107.117	1.000	1107.117	5.825	*p*<.05
Pre/Posttest X TML (a)	527.648	2.000	263.824	1.388	*n.s*
Error(Pre/Posttest) (a)	3421.257	18.000	190.070		
Total	15616.641	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

O College Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	9450.841	2.000	4725.421	9.410	*p*<.01
Error	9038.635	18.000	502.146		
Within-Subjects					
Pre/Posttest (a)	168.831	1.000	168.831	0.867	*n.s*
Pre/Posttest X TML (a)	1793.762	2.000	896.881	4.605	*p*<.05
Error(Pre/Posttest) (a)	3505.714	18.000	194.762		
Total	23957.784	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

O College Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	9047.441	2.000	4523.721	44.892	*p*<.01
Error	1813.844	18.000	100.769		
Within-Subjects					
Pre/Posttest (a)	3565.302	1.000	3565.302	12.379	*p*<.01
Pre/Posttest X TML (a)	1856.076	2.000	928.038	3.222	*n.s*
Error(Pre/Posttest) (a)	5184.257	18.000	288.014		
Total	21466.921	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

9.2.1 D University ANOVA Top, Middle, Low x Pre-Posttest

D University Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	38967.320	2.000	19483.660	19.267	*p*<.01
Error	14157.444	14.000	1011.246		
Within-Subjects					
Pre/Posttest (a)	11524.008	1.000	11524.008	25.734	*p*<.01
Pre/Posttest X TML (a)	11295.556	2.000	5647.778	12.612	*p*<.01
Error(Pre/Posttest) (a)	6269.444	14.000	447.817		
Total	82213.773	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

D University Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2831.771	2.000	1415.886	5.468	*p*<.05
Error	3625.111	14.000	258.937		
Within-Subjects					
Pre/Posttest (a)	7.627	1.000	7.627	0.027	*n.s*
Pre/Posttest X TML (a)	190.124	2.000	95.062	0.342	*n.s*
Error(Pre/Posttest) (a)	3893.111	14.000	278.079		
Total	10547.745	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

D University Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	1608.668	2.000	804.334	3.548	*n.s*
Error	3173.861	14.000	226.704		
Within-Subjects					
Pre/Posttest (a)	920.161	1.000	920.161	3.946	*n.s*
Pre/Posttest X TML (a)	422.819	2.000	211.409	0.907	*n.s*
Error(Pre/Posttest) (a)	3264.417	14.000	233.173		
Total	9389.925	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

D University Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	105.693	2.000	52.846	0.459	*n.s*
Error	1612.778	14.000	115.198		
Within-Subjects					
Pre/Posttest (a)	928.286	1.000	928.286	12.037	*p<.01*
Pre/Posttest X TML (a)	52.098	2.000	26.049	0.338	*n.s*
Error(Pre/Posttest) (a)	1079.667	14.000	77.119		
Total	3778.521	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

D University Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2551.250	2.000	1275.625	4.424	*p<.05*
Error	4036.750	14.000	288.339		
Within-Subjects					
Pre/Posttest (a)	306.446	1.000	306.446	0.987	*n.s*
Pre/Posttest X TML (a)	1693.583	2.000	846.792	2.728	*n.s*
Error(Pre/Posttest) (a)	4346.417	14.000	310.458		
Total	12934.446	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

D University Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2859.418	2.000	1429.709	5.554	*p<.05*
Error	3604.111	14.000	257.437		
Within-Subjects					
Pre/Posttest (a)	1011.500	1.000	1011.500	16.110	*p<.01*
Pre/Posttest X TML (a)	1035.941	2.000	517.971	8.250	*p<.01*
Error(Pre/Posttest) (a)	879.000	14.000	62.786		
Total	9389.971	33.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.3.1 K University ANOVA With IMS/ Without IMS x Pre-Posttest

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	105926.786	1.000	105926.786	7.845	*p<.01*
Error	540114.500	40.000	13502.863		
Within-Subjects					
Pre/Posttest (a)	11524.858	1.000	11524.858	2.345	*n.s*
Pre/Posttest X With/Without IMS (a)	3092.858	1.000	3092.858	0.629	*n.s*
Error(Pre/Posttest) (a)	196607.952	40.000	4915.199		
Total	857266.953	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	3217.858	1.000	3217.858	4.793	*p<.05*
Error	26855.952	40.000	671.399		
Within-Subjects					
Pre/Posttest (a)	3646.375	1.000	3646.375	11.300	*p<.01*
Pre/Posttest X With/Without IMS (a)	0.661	1.000	0.661	0.002	*n.s*
Error(Pre/Posttest) (a)	12907.577	40.000	322.689		
Total	46628.423	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	4462.859	1.000	4462.859	6.079	*p<.05*
Error	29366.808	40.000	734.170		
Within-Subjects					
Pre/Posttest (a)	1563.692	1.000	1563.692	4.759	*p<.05*
Pre/Posttest X With/Without IMS (a)	335.502	1.000	335.502	1.021	*n.s*
Error(Pre/Posttest) (a)	13142.308	40.000	328.558		
Total	48871.168	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	8792.090	1.000	8792.090	6.925	*p<.05*
Error	50782.577	40.000	1269.564		
Within-Subjects					
Pre/Posttest (a)	1327.935	1.000	1327.935	3.975	*n.s*
Pre/Posttest X With/Without IMS (a)	94.792	1.000	94.792	0.284	*n.s*
Error(Pre/Posttest) (a)	13363.875	40.000	334.097		
Total	74361.268	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	4966.640	1.000	4966.640	5.671	*p<.05*
Error	35030.026	40.000	875.751		
Within-Subjects					
Pre/Posttest (a)	487.176	1.000	487.176	1.205	*n.s*
Pre/Posttest X With/Without IMS (a)	2497.509	1.000	2497.509	6.176	*p<.05*
Error(Pre/Posttest) (a)	16176.776	40.000	404.419		
Total	59158.128	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

K University Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	1420.734	1.000	1420.734	2.735	*n.s*
Error	20779.219	40.000	519.480		
Within-Subjects					
Pre/Posttest (a)	4347.822	1.000	4347.822	15.052	*p<.01*
Pre/Posttest X With/Without IMS (a)	225.964	1.000	225.964	0.782	*n.s*
Error(Pre/Posttest) (a)	11553.988	40.000	288.850		
Total	38327.726	83.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

9.3.2 K University ANOVA Genders x Pre-Posttest

K University Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1582.363	1.000	1582.363	0.198	*n.s*
Error	191710.637	24.000	7987.943		
Within-Subjects					
Pre/Posttest (a)	2330.374	1.000	2330.374	9.187	*p<.01*
Pre/Posttest X Genders (a)	4.220	1.000	4.220	0.017	*n.s*
Error(Pre/Posttest) (a)	6087.857	24.000	253.661		
Total	201715.451	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	159.386	1.000	159.386	0.256	*n.s*
Error	14928.690	24.000	622.029		
Within-Subjects					
Pre/Posttest (a)	2330.374	1.000	2330.374	9.187	*p<.01*
Pre/Posttest X Genders (a)	4.220	1.000	4.220	0.017	*n.s*
Error(Pre/Posttest) (a)	6087.857	24.000	253.661		
Total	23510.527	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	7.385	1.000	7.385	0.011	*n.s*
Error	16431.923	24.000	684.663		
Within-Subjects					
Pre/Posttest (a)	325.389	1.000	325.389	0.875	*n.s*
Pre/Posttest X Genders (a)	135.004	1.000	135.004	0.363	*n.s*
Error(Pre/Posttest) (a)	8923.304	24.000	371.804		
Total	25823.004	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University　Genders X Pre/Posttest

Elaborations

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1216.529	1.000	1216.529	2.435	*n.s*
Error	11988.548	24.000	499.523		
Within-Subjects					
Pre/Posttest (a)	423.738	1.000	423.738	1.748	*n.s*
Pre/Posttest X Genders (a)	163.738	1.000	163.738	0.675	*n.s*
Error(Pre/Posttest) (a)	5819.262	24.000	242.469		
Total	19611.815	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University　Genders X Pre/Posttest

Abstractness of Titles

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	290.117	1.000	290.117	0.602	*n.s*
Error	11572.440	24.000	482.185		
Within-Subjects					
Pre/Posttest (a)	580.529	1.000	580.529	2.471	*n.s*
Pre/Posttest X Genders (a)	409.760	1.000	409.760	1.744	*n.s*
Error(Pre/Posttest) (a)	5638.798	24.000	234.950		
Total	18491.645	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University　Genders X Pre/Posttest

Resistance to Premature Closure

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	4.952	1.000	4.952	0.010	*n.s*
Error	11961.298	24.000	498.387		
Within-Subjects					
Pre/Posttest (a)	4468.579	1.000	4468.579	20.710	*p<.01*
Pre/Posttest X Genders (a)	354.579	1.000	354.579	1.643	*n.s*
Error(Pre/Posttest) (a)	5178.440	24.000	215.768		
Total	21967.848	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.3.3 K University ANOVA Top, Middle, Low x Pre-Posttest

K University Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	138568.000	2.000	69284.000	29.119	*p*<.01
Error	54725.000	23.000	2379.348		
Within-Subjects					
Pre/Posttest (a)	10528.024	1.000	10528.024	7.180	*p*<.05
Pre/Posttest X TML (a)	50838.010	2.000	25419.005	17.335	*p*<.01
Error(Pre/Posttest) (a)	33725.067	23.000	1466.307		
Total	288384.101	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	11813.210	2.000	5906.605	41.483	*p*<.01
Error	3274.867	23.000	142.386		
Within-Subjects					
Pre/Posttest (a)	1509.097	1.000	1509.097	9.963	*p*<.01
Pre/Posttest X TML (a)	2608.210	2.000	1304.105	8.610	*p*<.01
Error(Pre/Posttest) (a)	3483.867	23.000	151.472		
Total	22689.251	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	9561.908	2.000	4780.954	15.989	*p*<.01
Error	6877.400	23.000	299.017		
Within-Subjects					
Pre/Posttest (a)	38.788	1.000	38.788	0.152	*n.s*
Pre/Posttest X TML (a)	3195.241	2.000	1597.621	6.267	*p*<.01
Error(Pre/Posttest) (a)	5863.067	23.000	254.916		
Total	25536.403	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

K University　Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	3654.410	2.000	1827.205	4.400	*p*<.05
Error	9550.667	23.000	415.246		
Within-Subjects					
Pre/Posttest (a)	349.091	1.000	349.091	1.950	*n.s*
Pre/Posttest X TML (a)	1866.400	2.000	933.200	5.214	*p*<.05
Error(Pre/Posttest) (a)	4116.600	23.000	178.983		
Total	19537.168	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

K University　Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	967.641	2.000	483.821	1.021	*n.s*
Error	10894.917	23.000	473.692		
Within-Subjects					
Pre/Posttest (a)	248.523	1.000	248.523	1.185	*n.s*
Pre/Posttest X TML (a)	1226.908	2.000	613.454	2.926	*n.s*
Error(Pre/Posttest) (a)	4821.650	23.000	209.637		
Total	18159.638	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

K University　Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	7735.900	2.000	3867.950	21.030	*p*<.01
Error	4230.350	23.000	183.928		
Within-Subjects					
Pre/Posttest (a)	3654.256	1.000	3654.256	45.589	*p*<.01
Pre/Posttest X TML (a)	3689.403	2.000	1844.701	23.014	*p*<.01
Error(Pre/Posttest) (a)	1843.617	23.000	80.157		
Total	21153.525	51.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

9.4.1 Laboratory A ANOVA Genders x Pre-Posttest

Laboratory A Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	2486.807	1.000	2486.807	0.286	*n.s*
Error	173616.829	20.000	8680.841		
Within-Subjects					
Pre/Posttest (a)	91453.614	1.000	91453.614	52.246	*p<.01*
Pre/Posttest X Genders (a)	4042.705	1.000	4042.705	2.310	*n.s*
Error(Pre/Posttest) (a)	35008.932	20.000	1750.447		
Total	306608.887	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

Laboratory A Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	2210.010	1.000	2210.010	3.447	*n.s*
Error	12823.650	20.000	641.182		
Within-Subjects					
Pre/Posttest (a)	4846.547	1.000	4846.547	30.043	*p<.01*
Pre/Posttest X Genders (a)	19.274	1.000	19.274	0.119	*n.s*
Error(Pre/Posttest) (a)	3226.385	20.000	161.319		
Total	23125.865	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

Laboratory A Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	17.019	1.000	17.019	0.021	*n.s*
Error	15932.162	20.000	796.608		
Within-Subjects					
Pre/Posttest (a)	5036.609	1.000	5036.609	15.812	*p<.01*
Pre/Posttest X Genders (a)	144.336	1.000	144.336	0.453	*n.s*
Error(Pre/Posttest) (a)	6370.573	20.000	318.529		
Total	27500.700	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

Laboratory A Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	947.021	1.000	947.021	1.662	*n.s*
Error	11397.615	20.000	569.881		
Within-Subjects					
Pre/Posttest (a)	819.525	1.000	819.525	6.427	*p<.05*
Pre/Posttest X Genders (a)	6.434	1.000	6.434	0.050	*n.s*
Error(Pre/Posttest) (a)	2550.111	20.000	127.506		
Total	15720.707	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Laboratory A Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	76.122	1.000	76.122	0.086	*n.s*
Error	17782.060	20.000	889.103		
Within-Subjects					
Pre/Posttest (a)	2948.488	1.000	2948.488	11.660	*p<.01*
Pre/Posttest X Genders (a)	609.943	1.000	609.943	2.412	*n.s*
Error(Pre/Posttest) (a)	5057.239	20.000	252.862		
Total	26473.852	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Laboratory A Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	226.993	1.000	226.993	0.571	*n.s*
Error	7957.393	20.000	397.870		
Within-Subjects					
Pre/Posttest (a)	6225.121	1.000	6225.121	33.392	*p<.01*
Pre/Posttest X Genders (a)	825.121	1.000	825.121	4.426	*p<.05*
Error(Pre/Posttest) (a)	3728.538	20.000	186.427		
Total	18963.166	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

9.4.2 Laboratory A ANOVA Top, Middle, Low x Pre-Posttest

Laboratory A Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	153914.601	2.000	76957.300	65.897	*p<.01*
Error	22189.036	19.000	1167.844		
Within-Subjects					
Pre/Posttest (a)	89453.571	1.000	89453.571	48.256	*p<.01*
Pre/Posttest X TML (a)	3830.494	2.000	1915.247	1.033	*n.s*
Error(Pre/Posttest) (a)	35221.143	19.000	1853.744		
Total	304608.844	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

Laboratory A Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	3507.052	2.000	1753.526	2.890	*n.s*
Error	11526.607	19.000	606.664		
Within-Subjects					
Pre/Posttest (a)	5149.132	1.000	5149.132	30.554	*p<.01*
Pre/Posttest X TML (a)	43.623	2.000	21.812	0.129	*n.s*
Error(Pre/Posttest) (a)	3202.036	19.000	168.528		
Total	23428.450	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)

Laboratory A Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	11425.887	2.000	5712.944	23.997	*p<.01*
Error	4523.295	19.000	238.068		
Within-Subjects					
Pre/Posttest (a)	5017.090	1.000	5017.090	15.781	*p<.01*
Pre/Posttest X TML (a)	474.543	2.000	237.272	0.746	*n.s*
Error(Pre/Posttest) (a)	6040.366	19.000	317.914		
Total	27481.181	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

Laboratory A Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	8526.351	2.000	4263.175	21.214	*p*<.01
Error	3818.286	19.000	200.962		
Within-Subjects					
Pre/Posttest (a)	880.449	1.000	880.449	10.469	*p*<.01
Pre/Posttest X TML (a)	958.653	2.000	479.326	5.700	*p*<.05
Error(Pre/Posttest) (a)	1597.893	19.000	84.100		
Total	15781.631	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Laboratory A Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	6506.816	2.000	3253.408	5.446	*p*<.05
Error	11351.366	19.000	597.440		
Within-Subjects					
Pre/Posttest (a)	2695.351	1.000	2695.351	10.295	*p*<.01
Pre/Posttest X TML (a)	692.959	2.000	346.479	1.323	*n.s*
Error(Pre/Posttest) (a)	4974.223	19.000	261.801		
Total	26220.715	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Laboratory A Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	4066.672	2.000	2033.336	9.382	*p*<.01
Error	4117.714	19.000	216.722		
Within-Subjects					
Pre/Posttest (a)	5611.492	1.000	5611.492	25.566	*p*<.01
Pre/Posttest X TML (a)	383.338	2.000	191.669	0.873	*n.s*
Error(Pre/Posttest) (a)	4170.321	19.000	219.491		
Total	18349.538	43.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.5.1 Company P ANOVA Top, Middle, Low x Pre-Posttest

Company P Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	246159.631	2.000	123079.815	63.060	*p<.01*
Error	35132.274	18.000	1951.793		
Within-Subjects					
Pre/Posttest (a)	13866.086	1.000	13866.086	5.930	*p<.05*
Pre/Posttest X TML (a)	9356.310	2.000	4678.155	2.001	*n.s*
Error(Pre/Posttest) (a)	42089.595	18.000	2338.311		
Total	346603.896	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company P Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	9902.726	2.000	4951.363	23.660	*p<.01*
Error	3766.845	18.000	209.269		
Within-Subjects					
Pre/Posttest (a)	1167.804	1.000	1167.804	4.417	*p<.05*
Pre/Posttest X TML (a)	1326.964	2.000	663.482	2.509	*n.s*
Error(Pre/Posttest) (a)	4759.179	18.000	264.399		
Total	20923.519	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company P Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	16107.738	2.000	8053.869	28.747	*p<.01*
Error	5042.881	18.000	280.160		
Within-Subjects					
Pre/Posttest (a)	2371.000	1.000	2371.000	11.955	*p<.01*
Pre/Posttest X TML (a)	432.214	2.000	216.107	1.090	*n.s*
Error(Pre/Posttest) (a)	3569.929	18.000	198.329		
Total	27523.761	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company P Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	5340.012	2.000	2670.006	34.034	$p<.01$
Error	1412.131	18.000	78.452		
Within-Subjects					
Pre/Posttest (a)	540.183	1.000	540.183	5.745	$p<.05$
Pre/Posttest X TML (a)	695.917	2.000	347.958	3.701	$p<.05$
Error(Pre/Posttest) (a)	1692.417	18.000	94.023		
Total	9680.659	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Company P Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	13252.622	2.000	6626.311	8.016	$p<.01$
Error	14879.283	18.000	826.627		
Within-Subjects					
Pre/Posttest (a)	0.075	1.000	0.075	0.000	*n.s*
Pre/Posttest X TML (a)	24.836	2.000	12.418	0.038	*n.s*
Error(Pre/Posttest) (a)	5917.068	18.000	328.726		
Total	34073.885	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Company P Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	8144.717	2.000	4072.359	24.310	$p<.01$
Error	3015.283	18.000	167.516		
Within-Subjects					
Pre/Posttest (a)	129.320	1.000	129.320	0.680	*n.s*
Pre/Posttest X TML (a)	761.789	2.000	380.894	2.004	*n.s*
Error(Pre/Posttest) (a)	3420.783	18.000	190.043		
Total					

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.6.1 Company N ANOVA Genders x Pre-Posttest

Company N Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	3327.431	1.000	3327.431	1.399	*n.s*
Error	45185.569	19.000	2378.188		
Within-Subjects					
Pre/Posttest (a)	66447.161	1.000	66447.161	67.551	*p<.01*
Pre/Posttest X Genders (a)	665.161	1.000	665.161	0.676	*n.s*
Error(Pre/Posttest) (a)	18689.458	19.000	983.656		
Total	134314.780	41.000			

(a) As Mauchly's test of Sphericity was significant at p<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	243.056	1.000	243.056	0.560	*n.s*
Error	8250.278	19.000	434.225		
Within-Subjects					
Pre/Posttest (a)	6572.222	1.000	6572.222	48.007	*p<.01*
Pre/Posttest X Genders (a)	782.508	1.000	782.508	5.716	*p<.05*
Error(Pre/Posttest) (a)	2601.111	19.000	136.901		
Total	18449.175	41.000			

(a) As Mauchly's test of Sphericity was significant at p<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	864.286	1.000	864.286	1.694	*n.s*
Error	9692.333	19.000	510.123		
Within-Subjects					
Pre/Posttest (a)	5375.627	1.000	5375.627	23.091	*p<.01*
Pre/Posttest X Genders (a)	254.294	1.000	254.294	1.092	*n.s*
Error(Pre/Posttest) (a)	4423.278	19.000	232.804		
Total	20609.817	41.000			

(a) As Mauchly's test of Sphericity was significant at *p*<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N　Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	155.556	1.000	155.556	3.855	*n.s*
Error	766.778	19.000	40.357		
Within-Subjects					
Pre/Posttest (a)	155.556	1.000	155.556	3.905	*n.s*
Pre/Posttest X Genders (a)	0.508	1.000	0.508	0.013	*n.s*
Error(Pre/Posttest) (a)	756.778	19.000	39.830		
Total	1835.175	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Company N　Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	45.841	1.000	45.841	0.082	*n.s*
Error	10563.778	19.000	555.988		
Within-Subjects					
Pre/Posttest (a)	6.222	1.000	6.222	0.020	*n.s*
Pre/Posttest X Genders (a)	122.032	1.000	122.032	0.393	*n.s*
Error(Pre/Posttest) (a)	5901.111	19.000	310.585		
Total	16638.984	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

Company N　Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	42.875	1.000	42.875	0.129	*n.s*
Error	6330.125	19.000	333.164		
Within-Subjects					
Pre/Posttest (a)	7817.907	1.000	7817.907	49.653	*p<.01*
Pre/Posttest X Genders (a)	40.573	1.000	40.573	0.258	*n.s*
Error(Pre/Posttest) (a)	2991.569	19.000	157.451		
Total	17223.050	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.6.2 Company N ANOVA Top, Middle, Low x Pre-Posttest

Company N Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	33209.539	2.000	16604.769	19.531	*p<.01*
Error	15303.461	18.000	850.192		
Within-Subjects					
Pre/Posttest (a)	64532.217	1.000	64532.217	270.699	*p<.01*
Pre/Posttest X TML (a)	15063.586	2.000	7531.793	31.594	*p<.01*
Error(Pre/Posttest) (a)	4291.033	18.000	238.391		
Total	132399.836	41.000			

(a) As Mauchly's test of Sphericity was significant at p<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	1443.765	2.000	721.882	1.843	*n.s*
Error	7049.568	18.000	391.643		
Within-Subjects					
Pre/Posttest (a)	7455.623	1.000	7455.623	44.188	*p<.01*
Pre/Posttest X TML (a)	346.551	2.000	173.275	1.027	*n.s*
Error(Pre/Posttest) (a)	3037.068	18.000	168.726		
Total	19332.576	41.000			

(a) As Mauchly's test of Sphericity was significant at p<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2745.158	2.000	1372.579	3.163	*n.s*
Error	7811.461	18.000	433.970		
Within-Subjects					
Pre/Posttest (a)	5267.804	1.000	5267.804	31.951	*p<.01*
Pre/Posttest X TML (a)	1709.920	2.000	854.960	5.186	*p<.05*
Error(Pre/Posttest) (a)	2967.652	18.000	164.870		
Total	20501.994	41.000			

(a) As Mauchly's test of Sphericity was significant at *p*<.01, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	234.155	2.000	117.077	3.062	*n.s*
Error	688.179	18.000	38.232		
Within-Subjects					
Pre/Posttest (a)	121.738	1.000	121.738	4.811	*p<.05*
Pre/Posttest X TML (a)	301.821	2.000	150.911	5.964	*p<.05*
Error(Pre/Posttest) (a)	455.464	18.000	25.304		
Total	1801.357	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2968.440	2.000	1484.220	3.496	*n.s*
Error	7641.179	18.000	424.510		
Within-Subjects					
Pre/Posttest (a)	11.194	1.000	11.194	0.046	*n.s*
Pre/Posttest X TML (a)	1629.012	2.000	814.506	3.337	*n.s*
Error(Pre/Posttest) (a)	4394.131	18.000	244.118		
Total	16643.956	41.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

Company N Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	907.932	2.000	453.966	1.495	*n.s*
Error	5465.068	18.000	303.615		
Within-Subjects					
Pre/Posttest (a)	7642.021	1.000	7642.021	55.109	*p<.01*
Pre/Posttest X TML (a)	536.074	2.000	268.037	1.933	*n.s*
Error(Pre/Posttest) (a)	2496.068	18.000	138.670		
Total					

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

9.7.1 T Kindergarten Drawing ANOVA Genders x Pre-Posttest

T Kindergarten Drawing Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	22751.793	1.000	22751.793	0.875	*n.s*
Error	1533427.092	59.000	25990.290		
Within-Subjects					
Pre/Posttest (a)	27642.906	1.000	27642.906	4.616	*p<.05*
Pre/Posttest X Genders (a)	12726.873	1.000	12726.873	2.125	*n.s*
Error(Pre/Posttest) (a)	353316.963	59.000	5988.423		
Total	1949865.627	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	2003.548	1.000	2003.548	2.628	*n.s*
Error	44982.321	59.000	762.412		
Within-Subjects					
Pre/Posttest (a)	1206.832	1.000	1206.832	4.365	*p<.05*
Pre/Posttest X Genders (a)	956.996	1.000	956.996	3.461	*n.s*
Error(Pre/Posttest) (a)	16313.463	59.000	276.499		
Total	65463.160	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1439.693	1.000	1439.693	1.419	*n.s*
Error	59870.127	59.000	1014.748		
Within-Subjects					
Pre/Posttest (a)	5225.483	1.000	5225.483	19.545	*p<.01*
Pre/Posttest X Genders (a)	39.287	1.000	39.287	0.147	*n.s*
Error(Pre/Posttest) (a)	15774.140	59.000	267.358		
Total	82348.729	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	4814.948	1.000	4814.948	2.708	*n.s*
Error	104904.233	59.000	1778.038		
Within-Subjects					
Pre/Posttest (a)	1069.531	1.000	1069.531	2.734	*n.s*
Pre/Posttest X Genders (a)	601.465	1.000	601.465	1.537	*n.s*
Error(Pre/Posttest) (a)	23084.371	59.000	391.261		
Total	134474.547	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	431.812	1.000	431.812	0.166	*n.s*
Error	153557.483	59.000	2602.669		
Within-Subjects					
Pre/Posttest (a)	1044.410	1.000	1044.410	0.623	*n.s*
Pre/Posttest X Genders (a)	2577.328	1.000	2577.328	1.538	*n.s*
Error(Pre/Posttest) (a)	98861.213	59.000	1675.614		
Total	256472.246	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	381.145	1.000	381.145	0.263	*n.s*
Error	85573.428	59.000	1450.397		
Within-Subjects					
Pre/Posttest (a)	33.483	1.000	33.483	0.083	*n.s*
Pre/Posttest X Genders (a)	165.221	1.000	165.221	0.411	*n.s*
Error(Pre/Posttest) (a)	23745.648	59.000	402.469		
Total	109898.926	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.7.2 T Kindergarten Drawing ANOVA Top, Middle, Low x Pre-Posttest

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	1153979.194	2.000	576989.597	83.206	*p<.01*
Error	402199.691	58.000	6934.477		
Within-Subjects					
Pre/Posttest (a)	3433.837	1.000	3433.837	0.629	*n.s*
Pre/Posttest X TML (a)	49294.925	2.000	24647.463	4.513	*p<.05*
Error(Pre/Posttest) (a)	316748.911	58.000	5461.188		
Total	1925656.558	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	27436.453	2.000	13718.226	40.700	*p<.01*
Error	19549.416	58.000	337.059		
Within-Subjects					
Pre/Posttest (a)	128.546	1.000	128.546	0.465	*n.s*
Pre/Posttest X TML (a)	1219.482	2.000	609.741	2.203	*n.s*
Error(Pre/Posttest) (a)	16050.977	58.000	276.741		
Total	64384.874	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	28744.074	2.000	14372.037	25.597	*p<.01*
Error	32565.746	58.000	561.478		
Within-Subjects					
Pre/Posttest (a)	3163.742	1.000	3163.742	11.704	*p<.01*
Pre/Posttest X TML (a)	135.746	2.000	67.873	0.251	*n.s*
Error(Pre/Posttest) (a)	15677.680	58.000	270.305		
Total	80286.988	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	72340.086	2.000	36170.043	56.124	*p<.01*
Error	37379.095	58.000	644.467		
Within-Subjects					
Pre/Posttest (a)	233.810	1.000	233.810	0.621	*n.s*
Pre/Posttest X TML (a)	1845.016	2.000	922.508	2.450	*n.s*
Error(Pre/Posttest) (a)	21840.820	58.000	376.566		
Total	133638.827	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	79424.604	2.000	39712.302	30.890	*p<.01*
Error	74564.691	58.000	1285.598		
Within-Subjects					
Pre/Posttest (a)	25.499	1.000	25.499	0.016	*n.s*
Pre/Posttest X TML (a)	11201.850	2.000	5600.925	3.600	*p<.05*
Error(Pre/Posttest) (a)	90236.691	58.000	1555.805		
Total	255453.335	121.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Drawing Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	60637.490	2.000	30318.745	69.459	*p<.01*
Error	25317.084	58.000	436.501		
Within-Subjects					
Pre/Posttest (a)	860.048	1.000	860.048	2.284	*n.s*
Pre/Posttest X TML (a)	2072.565	2.000	1036.283	2.752	*n.s*
Error(Pre/Posttest) (a)	21838.304	58.000	376.522		
Total					

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.8.1 T Kindergarten Topic ANOVA Genders x Pre-Posttest

T Kindergarten Topic Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	14530.135	1.000	14530.135	0.812	*n.s*
Error	948532.538	53.000	17896.840		
Within-Subjects					
Pre/Posttest (a)	138981.213	1.000	138981.213	32.246	*p<.01*
Pre/Posttest X Genders (a)	7297.359	1.000	7297.359	1.693	*n.s*
Error(Pre/Posttest) (a)	228431.605	53.000	4310.030		
Total	1337772.850	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

T Kindergarten Topic Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	798.522	1.000	798.522	1.912	*n.s*
Error	22129.151	53.000	417.531		
Within-Subjects					
Pre/Posttest (a)	884.483	1.000	884.483	7.827	*p<.01*
Pre/Posttest X Genders (a)	618.737	1.000	618.737	5.476	*p<.05*
Error(Pre/Posttest) (a)	5988.935	53.000	112.999		
Total	30419.828	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

T Kindergarten Topic Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	52.712	1.000	52.712	0.108	*n.s*
Error	25925.979	53.000	489.169		
Within-Subjects					
Pre/Posttest (a)	329.258	1.000	329.258	1.556	*n.s*
Pre/Posttest X Genders (a)	321.440	1.000	321.440	1.519	*n.s*
Error(Pre/Posttest) (a)	11216.415	53.000	211.630		
Total	37845.804	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1171.594	1.000	1171.594	1.091	*n.s*
Error	56925.097	53.000	1074.058		
Within-Subjects					
Pre/Posttest (a)	4656.751	1.000	4656.751	23.487	*p<.01*
Pre/Posttest X Genders (a)	732.387	1.000	732.387	3.694	*n.s*
Error(Pre/Posttest) (a)	10508.304	53.000	198.270		
Total	73994.133	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	5118.000	1.000	5118.000	1.861	*n.s*
Error	145784.218	53.000	2750.646		
Within-Subjects					
Pre/Posttest (a)	27946.420	1.000	27946.420	18.265	*p<.01*
Pre/Posttest X Genders (a)	1133.620	1.000	1133.620	0.741	*n.s*
Error(Pre/Posttest) (a)	81094.344	53.000	1530.082		
Total	261076.601	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1279.500	1.000	1279.500	1.084	*n.s*
Error	62562.554	53.000	1180.426		
Within-Subjects					
Pre/Posttest (a)	8010.948	1.000	8010.948	17.034	*p<.01*
Pre/Posttest X Genders (a)	1000.985	1.000	1000.985	2.128	*n.s*
Error(Pre/Posttest) (a)	24925.506	53.000	470.293		
Total	97779.494	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.8.2 T Kindergarten Topic ANOVA Top, Middle, Low x Pre-Posttest

T Kindergarten Topic Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	740889.367	2.000	370444.684	86.703	*p<.01*
Error	222173.305	52.000	4272.564		
Within-Subjects					
Pre/Posttest (a)	115132.931	1.000	115132.931	44.889	*p<.01*
Pre/Posttest X TML (a)	102357.821	2.000	51178.910	19.954	*p<.01*
Error(Pre/Posttest) (a)	133371.143	52.000	2564.830		
Total	1313924.568	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Topic Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	6395.900	2.000	3197.950	10.059	*p<.01*
Error	16531.772	52.000	317.919		
Within-Subjects					
Pre/Posttest (a)	1013.072	1.000	1013.072	8.464	*p<.01*
Pre/Posttest X TML (a)	383.537	2.000	191.768	1.602	*n.s*
Error(Pre/Posttest) (a)	6224.136	52.000	119.695		
Total	30548.418	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Topic Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	11585.957	2.000	5792.978	20.930	*p<.01*
Error	14392.734	52.000	276.783		
Within-Subjects					
Pre/Posttest (a)	1077.663	1.000	1077.663	5.213	*p<.05*
Pre/Posttest X TML (a)	787.590	2.000	393.795	1.905	*n.s*
Error(Pre/Posttest) (a)	10750.264	52.000	206.736		
Total	38594.209	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (*e*)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	44778.524	2.000	22389.262	87.418	*p*<.01
Error	13318.167	52.000	256.119		
Within-Subjects					
Pre/Posttest (a)	5424.988	1.000	5424.988	31.609	*p*<.01
Pre/Posttest X TML (a)	2315.911	2.000	1157.956	6.747	*p*<.01
Error(Pre/Posttest) (a)	8924.779	52.000	171.630		
Total	74762.370	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	82050.409	2.000	41025.205	30.984	*p*<.01
Error	68851.809	52.000	1324.073		
Within-Subjects					
Pre/Posttest (a)	12533.740	1.000	12533.740	14.074	*p*<.01
Pre/Posttest X TML (a)	35920.351	2.000	17960.175	20.168	*p*<.01
Error(Pre/Posttest) (a)	46307.613	52.000	890.531		
Total	245663.921	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

T Kindergarten Topic　Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	31511.321	2.000	15755.661	25.341	*p*<.01
Error	32330.733	52.000	621.745		
Within-Subjects					
Pre/Posttest (a)	7929.396	1.000	7929.396	19.731	*p*<.01
Pre/Posttest X TML (a)	5028.918	2.000	2514.459	6.257	*p*<.01
Error(Pre/Posttest) (a)	20897.572	52.000	401.876		
Total	97697.941	109.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.9.1 E & F Nursery School ANOVA With IMS/ Without IMS x Pre-Posttest

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	27249.630	1.000	27249.630	1.411	*n.s*
Error	792008.742	41.000	19317.286		
Within-Subjects					
Pre/Posttest (a)	11862.364	1.000	11862.364	2.952	*n.s*
Pre/Posttest X With/Without IMS (a)	53433.713	1.000	53433.713	13.296	*p<.01*
Error(Pre/Posttest) (a)	164768.520	41.000	4018.744		
Total	1049322.968	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	655.331	1.000	655.331	2.163	*n.s*
Error	12419.809	41.000	302.922		
Within-Subjects					
Pre/Posttest (a)	296.253	1.000	296.253	2.071	*n.s*
Pre/Posttest X With/Without IMS (a)	591.881	1.000	591.881	4.137	*p<.05*
Error(Pre/Posttest) (a)	5866.142	41.000	143.077		
Total	19829.416	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	1354.460	1.000	1354.460	3.053	*n.s*
Error	18186.889	41.000	443.583		
Within-Subjects					
Pre/Posttest (a)	4.602	1.000	4.602	0.036	*n.s*
Pre/Posttest X With/Without IMS (a)	937.067	1.000	937.067	7.290	*p<.05*
Error(Pre/Posttest) (a)	5270.236	41.000	128.542		
Total	25753.253	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Elaborations

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	4701.631	1.000	4701.631	4.589	*p*<.05
Error	42005.392	41.000	1024.522		
Within-Subjects					
Pre/Posttest (a)	710.311	1.000	710.311	3.061	*n.s*
Pre/Posttest X With/Without IMS (a)	1268.683	1.000	1268.683	5.468	*p*<.05
Error(Pre/Posttest) (a)	9512.619	41.000	232.015		
Total	58198.637	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Abstractness of Titles

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	325.279	1.000	325.279	0.095	*n.s*
Error	140414.302	41.000	3424.739		
Within-Subjects					
Pre/Posttest (a)	2225.282	1.000	2225.282	1.888	*n.s*
Pre/Posttest X With/Without IMS (a)	8297.840	1.000	8297.840	7.039	*p*<.05
Error(Pre/Posttest) (a)	48329.556	41.000	1178.770		
Total	199592.258	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

E&F Nursery School Experimental (With IMS) and Control (Without IMS) X Pre/Posttest

Resistance to Premature Closure

Table of ANOVA

(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
With/Without IMS	258.189	1.000	258.189	0.173	*n.s*
Error	61161.392	41.000	1491.741		
Within-Subjects					
Pre/Posttest (a)	2964.484	1.000	2964.484	5.701	*p*<.05
Pre/Posttest X With/Without IMS (a)	2450.856	1.000	2450.856	4.713	*p*<.05
Error(Pre/Posttest) (a)	21320.726	41.000	520.018		
Total	88155.647	85.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)

(b) df Total: Total of Variation Factors

9.9.2 E & F Nursery School ANOVA Genders x Pre-Posttest

E Nursery School Genders X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1382.648	1.000	1382.648	0.064	*n.s*
Error	497404.872	23.000	21626.299		
Within-Subjects					
Pre/Posttest (a)	9037.541	1.000	9037.541	1.870	*n.s*
Pre/Posttest X Genders (a)	282.341	1.000	282.341	0.058	*n.s*
Error(Pre/Posttest) (a)	111155.179	23.000	4832.834		
Total	619262.581	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Genders X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	25.846	1.000	25.846	0.081	*n.s*
Error	7296.074	23.000	317.221		
Within-Subjects					
Pre/Posttest (a)	1010.160	1.000	1010.160	5.757	*p<.05*
Pre/Posttest X Genders (a)	54.000	1.000	54.000	0.308	*n.s*
Error(Pre/Posttest) (a)	4035.920	23.000	175.475		
Total	12422.000	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Genders X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	3.282	1.000	3.282	0.009	*n.s*
Error	8751.718	23.000	380.509		
Within-Subjects					
Pre/Posttest (a)	617.133	1.000	617.133	3.476	*n.s*
Pre/Posttest X Genders (a)	127.693	1.000	127.693	0.719	*n.s*
Error(Pre/Posttest) (a)	4082.987	23.000	177.521		
Total	13582.813	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Genders X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	15.616	1.000	15.616	0.013	*n.s*
Error	27793.304	23.000	1208.405		
Within-Subjects					
Pre/Posttest (a)	46.926	1.000	46.926	0.151	*n.s*
Pre/Posttest X Genders (a)	3.406	1.000	3.406	0.011	*n.s*
Error(Pre/Posttest) (a)	7168.074	23.000	311.655		
Total	35027.326	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Genders X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	9.208	1.000	9.208	0.003	*n.s*
Error	82701.872	23.000	3595.734		
Within-Subjects					
Pre/Posttest (a)	1254.408	1.000	1254.408	1.126	*n.s*
Pre/Posttest X Genders (a)	1413.128	1.000	1413.128	1.268	*n.s*
Error(Pre/Posttest) (a)	25627.872	23.000	1114.255		
Total	111006.488	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Genders X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
Genders	1375.920	1.000	1375.920	1.075	*n.s*
Error	29450.000	23.000	1280.435		
Within-Subjects					
Pre/Posttest (a)	14.647	1.000	14.647	0.023	*n.s*
Pre/Posttest X Genders (a)	0.087	1.000	0.087	0.000	*n.s*
Error(Pre/Posttest) (a)	14661.833	23.000	637.471		
Total	45502.487	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

9.9.3 E & F Nursery School ANOVA Top, Middle, Low x Pre-Posttest

E Nursery School Top, Middle, Low X Pre/Posttest
Score Total
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	434487.863	2.000	217243.931	74.330	*p<.01*
Error	64299.657	22.000	2922.712		
Within-Subjects					
Pre/Posttest (a)	9208.012	1.000	9208.012	1.900	*n.s*
Pre/Posttest X TML (a)	4802.541	2.000	2401.271	0.495	*n.s*
Error(Pre/Posttest) (a)	106634.979	22.000	4847.044		
Total	619433.052	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

E Nursery School Top, Middle, Low X Pre/Posttest
Fluency
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	2835.533	2.000	1417.766	6.952	*p<.01*
Error	4486.388	22.000	203.927		
Within-Subjects					
Pre/Posttest (a)	939.906	1.000	939.906	5.317	*p<.05*
Pre/Posttest X TML (a)	200.675	2.000	100.338	0.568	*n.s*
Error(Pre/Posttest) (a)	3889.245	22.000	176.784		
Total	12351.746	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

E Nursery School Top, Middle, Low X Pre/Posttest
Originality
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	4936.371	2.000	2468.186	14.220	*p<.01*
Error	3818.629	22.000	173.574		
Within-Subjects					
Pre/Posttest (a)	586.843	1.000	586.843	3.107	*n.s*
Pre/Posttest X TML (a)	54.873	2.000	27.436	0.145	*n.s*
Error(Pre/Posttest) (a)	4155.807	22.000	188.900		
Total	13552.523	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (ε)
(b) df Total: Total of Variation Factors

E Nursery School　Top, Middle, Low X Pre/Posttest
Elaborations
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	20952.870	2.000	10476.435	33.617	*p<.01*
Error	6856.050	22.000	311.639		
Within-Subjects					
Pre/Posttest (a)	21.515	1.000	21.515	0.068	*n.s*
Pre/Posttest X TML (a)	243.823	2.000	121.911	0.387	*n.s*
Error(Pre/Posttest) (a)	6927.657	22.000	314.894		
Total	35001.915	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School　Top, Middle, Low X Pre/Posttest
Abstractness of Titles
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	68526.816	2.000	34263.408	53.143	*p<.01*
Error	14184.264	22.000	644.739		
Within-Subjects					
Pre/Posttest (a)	1500.125	1.000	1500.125	1.839	*n.s*
Pre/Posttest X TML (a)	9092.193	2.000	4546.096	5.572	*p<.05*
Error(Pre/Posttest) (a)	17948.807	22.000	815.855		
Total	111252.205	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

E Nursery School Top, Middle, Low X Pre/Posttest
Resistance to Premature Closure
Table of ANOVA
(Two-ways One-way Repeated Measures) (Greenhouse-Geisser)

Variation factors	Type III Sum of Squares	df	Mean Square	F	
Between-Subjects					
TML	17130.068	2.000	8565.034	13.758	*p<.01*
Error	13695.852	22.000	622.539		
Within-Subjects					
Pre/Posttest (a)	5.264	1.000	5.264	0.008	*n.s*
Pre/Posttest X TML (a)	171.754	2.000	85.877	0.130	*n.s*
Error(Pre/Posttest) (a)	14490.166	22.000	658.644		
Total	45493.104	49.000			

(a) As Mauchly's test of Sphericity was significant at $p<.01$, we used Greenhouse-Geisser (e)
(b) df Total: Total of Variation Factors

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