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STUDIES OF CREATIVE THINKING IN 1990S

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Abstract: Creative thinking and different thinking programs are attracting much attention since Singapore launched its Thinking Schools – Learning Nation vision for the new millennium. As teachers and researchers we can learn better teaching strategies and new research directions in the area of creative thinking by examining previous writings. The present study is an archival study focusing on different publications and research papers on creative thinking in the Psychological List and the Education Resources Information Center from 1990 to 1998. By using quantitative methods, this paper organizes and summarizes these publications and papers by different dimensions. A global picture of creative thinking studies in 1990 is presented by category of publication, the nation of the authors, and the study details of these materials.

Introduction

*It sounded an excellent plan, no doubt, and very neatly and simply arranged.
The only difficulty was, she had not the smallest idea how to set about it.*

Lewis Carrol, Alice in Wonderland

Similar to the quotation by Carrol, creativity seems to be an excellent plan for the new millennium, but how to set about it? We need a definition before we set about it. From the Heritage Illustrated Dictionary, creativity is to bring into being, originate or an original product of human invention or imagination. In the Australian Macquarie Dictionary, it is to evolve from one's own thought or imagination. Related words are innovation, inventiveness and originality. Although a definition of creativity is not agreed on by everyone, at least three aspects of creativity have drawn much attention: (1) the creative process which focuses on the mechanisms and phases in a creative act, (2) the creative person with personality attributes in an environmental atmosphere which nurtures creativity, and (3) the creative product.

However, defining creativity to include application throws the whole subject into a different light because while ideas can come in seconds, application can take days or a lifetime to become a reality.

Torrance (1988) asserted that Wallas' model is the basis for most of the creative thinking training programs available today. The first and last phases of creative thinking begins with purposeful preparation and ends with critical verification. This suggests that creative and analytical thinking is complementary, rather than opposing. In contrast to Wallas, Gestalt philosophers like Wertheimer (1966) assert that the process of creative thinking is an integrated line of thought that does not lend itself to steps of a model.

As teachers and researchers we can learn new teaching strategies and new research directions in creative thinking by examining previous writings. The present paper is an archival study of various publications and research papers on creative thinking. Data come from a comprehensive list of material in the Psychological List (PsycLIT) and the Education Resources Information Center list (ERIC) from 1990-1998.

Method

Material

This is an archival study based on materials drawn from electronic resources namely the CD-ROM and online databases. The two databases are the PsycLIT and ERIC which are considered valuable resources to provide a global view of psychological and educational studies. PsycLIT is compiled by the American Psychological Association and provides abstracts from over 1,300 journals in psychology and the behavioural sciences. The materials basically come from journal articles, book chapters and whole books. The ERIC Database contains over 900,000 citations and abstracts of primary documents and journal articles. It includes entries from Resources in Education and Current Index to Journals in Education. Publication types include books, journal articles, conference papers, unpublished papers, research reports, school or teacher guides, and other ERIC specific materials.

In PsycLIT the journals are mostly psychological journals which are published in different countries and in different languages around world. In contrast, the ERIC list consists of mostly journals published in the United States and generally written in English. The types of journals in the ERIC list include educational journals, industrial journals, psychological journals, and non-academic journals. Thus, the materials in the ERIC list are more closely related to education and daily life while PsycLIT are related more closely to academic studies.

Procedures

A keyword, *creative thinking*, was used in basic searching of the databases. The publication years selected ranging from 1990 to 1998. For each publication or material, the citation, author, source, language of material, keywords, and abstract were collected as the basic data for this study.

After all relevant information was keyed in, an analysis of the data proceeded on three levels:

- Analysis of the basic information, for example, the numbers of the publication in each year, in different countries, and by different journals.
- Analysis of the first 3 keywords from the two lists.
- Based on the abstracts of the journal article in PsycLIT, a summary about the content of the research, different types of research methods and different types of creative thinking tests is produced.

Results And Discussion

Analysis of General Information

Table 1 shows the number of publications or materials in the two lists from 1990 to 1998. Table 2 and 3 show the number of different types of publications or materials in the two lists across different years.

For the moment, we will ignore the 1998 numbers of publications or materials because both PsycLIT and ERIC continuously update their lists for about one more year. In the ERIC list about 100 materials are related to creative thinking every year. In the PsycLIT list, a smaller number, 290, are related to creative thinking in the 1990s. To be specific, they include 217 research papers, 32 books and 41 book chapters. In comparison, during the same period of time publications related to critical thinking are over 400.

From the two columns in Table 1 indicate that there are more creative thinking publications in PsycLIT each year from 1991 to 1995 than the year of 1997. However, in the ERIC list, the number of materials related to creative thinking for each year does not change that much. From the columns of journal papers in Table 2 and 3, we find a similar trend. In PsycLIT, there is a tendency that the number of published journal papers decreased since 1997, at the same time, there is no significant decrease of journal papers in the ERIC list. In addition, there is no decrease in the publications related to critical thinking in 1997.

Two possible reasons for the decrease in creative thinking publications are less investigation into the structure of creative thinking and no new research directions were proposed during the 1990s. Ford & Harries (1992) suggest that although psychological tests are used to define creative thinking, researchers face the difficulty of agreeing on an operational definition. On the other hand, practical studies on understanding creative thinking skills and using them in teaching continue to be of interest to researchers, teachers and practitioners.

Table 1: Number of publications or materials from 1990 to 1998 in PsycLIT and ERIC list

Year	PsycLIT	ERIC
1990	28	111
1991	49	100
1992	29	76
1993	38	93
1994	37	119
1995	41	95
1996	30	92
1997	22	92
1998	16(2)	42
Total	290	820

Table 2: Number of different types of publications from 1990 to 1998 in PsycLIT

Year	Journal article	Book	Book Chapter	Total
1990	15	5	8 (2)	28
1991	35	7	7 (3)	49
1992	21	7	1	29
1993	32	3	3 (2)	38
1994	25	3	9 (7)	37
1995	33	2	6 (2)	41
1996	24	3	3 (1)	30
1997	17	1	4	22
1998	15	1	0	16
Total	217	32	41(17)	290

Note: in the brackets, the numbers show the book chapters were selected from the books which were already listed in Book column.

Table 3: Number of different types of materials from 1990 to 1998 in ERIC list

Year	Journal article	Book	Conference paper	Research report	Guide	ERIC Others	Total
1990	68	2	6	7	13	15	111
1991	57	0	14	8	13	8	100
1992	37	6	17	4	8	4	76
1993	54	4	11	7	9	8	93
1994	67	6	10	5	24	7	119
1995	44	2	8	5	31	5	95
1996	58	6	12	8	5	3	92
1997	51	7	11	4	15	4	92
1998	23	9	5	1	2	2	42
Total	426	40	91	43	108	54	820

Note: ERIC others include collected work, viewpoint, dissertation, ERIC digest.

The results of this study reveal in which country or part of the world researchers organized different study results, developed theories or models, and conducted studies on creative thinking. In PsycLIT the authors are from 32 countries around the world. However, from the frequency distributions of the publications, a different picture emerges. In Table 4, the publications in PsycLIT are organized by countries of the authors. This table shows the frequency of different types of publications by countries where the authors belonged to. In the ERIC list most of the 820 publications and materials come from the United States while only 26 are from 11 other countries. Thus, we will consider material from the PsycLIT list only.

From Table 4, we see that in PsycLIT most journal papers (81%) and books (94%) related to creative thinking are published by the authors from ten countries. This indicates the researchers in these countries, who have conducted studies and developed or discussed recent models or theories, have played most important roles in this research area. The data show that in PsycLIT there is only one research paper written by a Singapore author. Out of the ten countries, the authors from the United States (US) have published the most journal articles (36.4%) and books (71.9%). No doubt, the data show a dominant position of the US researchers in studying creative thinking. From the table we see that although a large number of research papers are published by the authors from some countries, the books are written by the authors from three countries namely the United States, United Kingdom and Germany. It seems that a higher level of analysis and synthesis of this research area is conducted in a few countries. An interesting result is although German authors published only two papers, they published two books during the same period of time. This may be because of the German tradition of philosophical thinking and theoretical thinking.

Table 4: Numbers of publications from ten countries published most PsycLIT

Country	Journal article	Book	Book Chapter	Total
US	79	23	25	127
Slovak	28	0	0	28
UK	10	5	6	21
Russia	15	0	0	15
Canada	10	0	0	10
Poland	10	0	0	10
India	10	0	0	10
Australia	6	0	0	6
Germany	2	2	2	6
Romania	6	0	0	6
...				
(Singapore)	(1)	0	0	(1)
Total	176(81%)	30(94)	33 (81%)	211(82%)

Table 5 shows the number of journal articles published by the authors from different regions in different years. From the table, we find that, except for the United States, East European countries published a rather large number of research papers. In Asia every year at least one related paper was listed in PsycLIT. However, related to the requirement of our society and education, more studies are expected. Connected to the previous discussion, from the results in Table 5 indicate that since 1997 the paper publications decrease mainly from the United States and Asia my causes the total number of paper publication to decrease.

Table 5: Number of journal articles publications by the authors from different regions in different years in PsycLIT

Year	US	East Europe	Asia	Other country	Total
1990	6	2	2	5	15
1991	11	13	2	9	35
1992	12	3	2	4	21
1993	13	9	6	4	32
1994	12	4	3	6	25
1995	10	10	4	9	33
1996	7	9	1	7	24
1997	3	6	1	7	17
1998	5	5	1	4	15
Total	79	61	22	55	217

Table 6 and Table 7 show the English journal names which published the majority of papers related to creative thinking during 1990s. In PsycLIT there are over 60 English journals which published relevant papers, but only 10 English journals published at least three articles and these journal names are listed in the table. In these journals over 50 percent of the English articles are published. In the ERIC list there are about 170 different English journals publishing articles related to creative thinking, but only 17 journals have published at least 5 articles in this area. These journal names are listed in Table 7. In the ERIC list, these journals have published over 40 percent of the articles related to creative thinking. The results indicate that although a large number of journals publish articles related to creative thinking, most articles have been published in particular journals.

From the journal names listed in these two tables we find that “*Journal of Creative Behavior*” published the most articles on creative thinking. Other journal names in PsycLIT are related to research, review, ability, educational or instruction psychology, development and the gifted child. In the ERIC list, there are more journals related to education or curriculum, such as mathematics, music, art, and educational leadership. An analysis of these journal names supports the point that publications in PsycLIT focus more on psychological theories and processes and in ERIC list they focus more on education and practice. In PsycLIT there are 63 articles (29%) published in non-English journals which indicates that a rather large number of studies were conducted in different countries.

Another interesting finding about journal names is that there is no article which was published in any of Journal of Experimental Psychology series. Could this be that the quality of studies on creative thinking is not very high in the 1990s?

Table 6: Journal names with most publications in PsycLIT

Journal name	Numbers
Journal of Creative Behavior	28
Creative Research Journal	20
Roeper Review	8
European Journal of High Ability	5
Educational Psychology Review	4
Journal of Instructional Psychology	4
Perceptual and Motor Skills	3
Early Child Development & Care	3
Gifted Child Quarterly	3
Studia Psychology	3
...	
Published not by English Journals	63

Table 7: Journal names with most publications in ERIC list

Journal name	Numbers
Journal of Creative Behavior	54
Roeper Review	20
Mathematics Teacher	18
Gifted Child Today	16
NASSP Bulletin	11
Educational Leadership	10
Teaching Children Mathematics	8
Music Education Journal	7
Gifted Child Quarterly	7
Arithmetic Teacher	6
Phi Delta Kappan	6
Counseling and Values	5
Early Child Development and Care	5
Theory into Practice	5
New Directions for Child Development	5
Art Education	5
Gifted Education international	5

Analysis of Keywords

In PsycLit, the publications usually have three to six keywords. There are only a few publications which have more than six keywords. In the ERIC list, the materials usually have at least seven to nine keywords. About half of them have 15 to 17 keywords and some materials even have 25 or 26 keywords.

In the keywords of an articles or material, the first few keywords usually are most important since they provide the basic concepts and main focus of the study or material. Then the rest of the keywords provide the details about the materials. In the present study, from the two lists we combined the first three keywords together and performed a frequency count. Table 8 and Table 9 show the counting results of the first three keywords in PsycLIT and ERIC list. Since there are too many different keywords, only high frequency of keywords were presented in the tables.

Table 8: Frequency of Key words 1-3 in PsycLIT

Key word	Frequency
Thinking	33
Gifted	32
Cognitive processes	25
Divergent thinking	25
Problem solving	18
Teaching methods	16
Personality trait	13
School age children	13
Intelligence	12
Cognitive style	10

Table 9: Frequency of Key words 1-3 in ERIC list

Key word	Frequency
Creativity	132
Critical thinking	66
Problem solving	51
Creative development	42
Cognitive process	38
Gifted	30
Curriculum development	23
Learning activities	22
Cooperative learning	22
Mathematics instruction	21
Basic skills	20
Imagination	19
Competency based education	19
Classroom environment	17
Cognitive style	17
Learning strategies	17
Classroom techniques	16
Cognitive development	15
Creative activities	15

In Table 8 and Table 9, some common keywords are found, such as gifted, cognitive style, problem solving, cognitive process. This shows that in studying creative thinking, most studies or applications were related to these processes or concepts. In the studies of creative thinking, the interest has been on gifted children, problem solving processes and cognitive processes and styles.

On the other hand, in Table 8 most of the other keywords in PsycLIT are related to psychological process or concepts, such as intelligence, personality trait and divergent thinking. These keywords seem to show that in theoretical or psychological research, the relationship between creative thinking and personality, intelligence, or divergent thinking has attracted more interest. In the ERIC list there are more keywords related to education, teaching, learning, skills, activities and classroom. These keywords suggest that creative thinking has also been related to the practice area of using creative thinking and developing creative thinking skills in education. In PsycLIT, "teaching methods" as a keyword appears often which shows the tendency of psychologists to connect creative thinking to teaching and education as well.

Another interesting finding in the keyword analysis is that in PsycLIT critical thinking was not often studied or discussed together with creative thinking. However, in the ERIC list critical thinking was related to creative thinking in a rather large number of materials. This seems to show that in theoretical or psychological studies, researchers usually separate creative and critical thinking, but in practice they are more often to connect and discuss them together.

More Details of the Published Journal Papers in PsycLIT

Based on the study content shown in the abstracts of journal articles from PsycLIT, these studies are classified into different categories. Then for each study, the research method is identified. Table 10 shows the frequencies of different types of studies and the relevant research methods used in these studies.

Table 10: Number of different research methods used for different types of journal articles related in PsycLIT

Related content	Exp.	Test	Exp. + Test	Inter + Test	Obs.	Case	Test + Fact.	Meta.	Dis.	Total
Age difference	0	1	0	0	0	0	0	0	0	1
Criticize other study	0	0	0	0	0	0	0	0	1	1
Cross cultural study	0	1	0	0	0	0	0	0	0	1
Transfer of creative thinking	0	0	1	0	0	0	0	0	0	1
Organization of creative thinking	0	0	0	0	0	0	0	0	2	3
Gender difference	0	2	2	0	0	0	0	0	0	4
Structure of creative thinking	0	2	1	0	0	0	2	0	1	6
Theory	0	0	2	0	0	0	0	0	4	6
Assessment of creative thinking	1	8	1	0	0	0	0	0	7	17
Creative thinking in teaching	0	0	5	2	1	1	0	1	14	24
Training creative thinking	13	1	6	0	0	0	0	0	5	25
Relationship with other area	13	71	22	2	1	1	0	0	18	128
Total	27	86	40	4	2	2	2	1	53	217

Note: Exp. = Experiment, Inter. = Interview, Obs. = Observation, Case = Case study, Meta.= Meta analysis, Dis. = Discussion.

From Table 10 we find that in PsycLIT most creative thinking studies (59%) in 1990s were conducted to find a relationship between creative thinking and other human characteristics or

environmental conditions. Usually, in these studies two or three psychological tests were used to measure a group of people and the relationship among these test results was identified. The next most often studied topics are “training creative thinking” and “using creative thinking in teaching”. The research method analysis indicates that for training studies, most of them were conducted by experiments which try to find a good way to develop people’s creative thinking. These studies often involved pretest and posttest and between them a training program was introduced. In “using creative thinking in teaching” most papers are only discussion. These papers usually present some theories or models about creative thinking in teaching, and then provide suggestions to use creative thinking in teaching. Another rather large number of publications in PsycLIT is related to assessment. Most of these papers are discussion or evaluations about some assessment issues. As previously stated, given the difficulty of a common operational definition, assessment of creative thinking is an important research issue which has attracted much interest.

From Table 10 we find that 132 journal papers used at least one type of test. Testing is a very important tool for measuring creative thinking and it is necessary to find out more about these tests. Table 11 shows the frequency of different tests which are related to creative thinking.

Table 11: Frequency of different type of creative thinking tests used in PsycLIT

Creative thinking test	Frequency
Torrance test	94
Test of creative thinking Urban	14
Group Embedded Figure test	8
Williams's Creative assessment packet	5
B. Mehdi test of creative thinking	3
Other tests used only once	13
Total	137

From Table 11, we find that the Torrance test has been used most often as a measurement of creative thinking. The high frequency of using tests or the Torrance test indicates that more research is needed to define a different way to measure creative thinking.

Summary

The present archival study shows that in the 1990s studies and discussions about creative thinking are in the area of psychological concepts and structures and in the area of education and practice. Although creative thinking has attracted attention around the world, most studies are conducted in a few countries; more work is needed for Asia and for Singapore. In the 1990s, many studies were conducted by using psychological testing that seems to show that we need to define creative thinking better to promote more studies.

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