





**Structured programming  
learning through  
the use of information channeling  
of information using servo  
technology education  
and paintings in their steps fractals**



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of information channeling of information using servo  
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## **PREFACE**

The art organizes everything by parts. The authors of this work are implacable authors of some dawns, evenings and nightfalls that bring a fresh change to the Homo Sapiens at any place of the planet. Their valleys, volcanoes, atmospheres, are not only theirs, they are of all of us. They are of the whole world. They will be of the future world. The future generations will enjoy their discoveries, of what today they copy from the nature that surrounds us. The landscape, suddenly becomes difficult to rescue but with the knowledge and dexterity characteristic of the authors of this beautiful book, one proves that, in all the five continents, new aesthetics and semiology transformations, are generated.

Structured programming learning through the use of information channeling of information using servo technology education and paintings in their steps fractalsdemands an imagination effort. The authors go developing dimensions with colors and give organic forms arranged to them while they paint. They recognize that the essence of life, increases, it transform and changes in the synergetic objects that they paint in the solid, liquid and gaseous states. They allow in their representations that those parts are logically adequate, so that there is harmony in their painting. The parts that they organize, require a structural setting that is adapted to the variations of functional requests and allows to give extension and relation to the organic structures that the authors paint in the pattern, continuity that they search and study in the nature.

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Writer  
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## DEDICATION

To family.

To my brothers, my sister, friends, grand- fathers (Roberto Arturo Vasquez Pereira, Victor Ceron Martinez Madrigal), grandmothers (Laura Escobar Henao, Francisca Rosa Vasquez Perez), great-great-grand-fathers, great-great-grandmothers, relatives, family, humanity, cosmos. To Dr. Fabio Vasquez Escobar To the Most Excellent Bishop Gerardo Martinez Madrigal. To the Most Excellent Bishop Guillermo Escobar Velez. To the Excellent Ambassador Raul Vasquez Velez. To the Excellent Ambassador Lucelly Garcia Tobon.

To Marco Tulio Duque's School, Conrado Gonzalez Institute, IDEM Fray Julio Tobon Betancu, Colombian Polytechnic, National University, Autonomous Latin-American University, SEP, University of Antioch, Bolivian Pontifical University, UNAM, UAG, UNISARC, Sao Paulo University, Free University, Salvador Duque School, University EAFIT, University of Sydney, University of Helsinki, University of Tampere, University of Cape Town, TEC; University of Guadalajara, UCLA, MIT, University of Houston, Harvard University, Yale University, Oxford University, Linguaphone Institute, Cambridge University, Scranton University, UNESCO, DOMETAL, RIOTEX, COLTEPUNTO, Company of Packings S.A., Technological Institute. Pascual Bravo., Modern Institute of Education, ASSTI, ESAP, Colombian Polytechnic Jaime Isaza Cadavid, Montessori School, SENA, University de San Buenaventura, International Center of Cambridge, The St. Lukas Academy, Bamberg University, Pekin Normal University, Who's Who in the World, American Biographical Institute, The Marquis Publications, Editorial Papiro, Colombian Polymers, VIAMACOL, Rotary International, Biographical

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Institute of United States of America, Superior Academy of Technical Industrial Services, National Service of Learning, Reforestation Company La Floresta, Casa de Reyes, Engineering School of Antioch, The Southern African Comparative and History of Education Society, University of Paris, Hospital El Carmen de Viboral, Beijing Normal University, Tokyo University, Waseda University. University of Guadalajara.

To the schools, institutions and universities of the five continents that offered me the opportunity to recreate, relearn, reinvent, rethink and study.

And to the whole last, present and future humanity that consecrates the cultivation of the right values, the positive visions, and life, is a great company, the post modernity, the fractality, the harmony of the societies and universal cosmos.

## **GRATEFULNESS AND RECOGNITIONS**

To the whole last and present humanity  
and their universal cosmos.

Recognition also to the M. C. Tonatiuh Bravo Padilla, Rector General, U. de G.; Dr. Marco Antonio Cortés Guardado, Rector CUC, U. de G.; to Dr. Remberto Castro Castañeda, U. de G.; to Dr. Jorge Tellez Lopez, U. de G.; to Bachelor Raul Padilla Lopez, U. de G.; Dr. Raul E. Tamayo Gaviria, Professor Vagn Lundsgaard Hansen, Professor Ching-Lin Hu, Professor Byung-Jin Lee, Professor Erwin H. Epstein, Professor Shin'ichi Suzuki, Dr. David Turner, Dr. Medardo Tapia U., MRS. Guadalupe Gonzalez de Turner, M.C. Jesus Cabral, U. de G.; M.C. Maria Morfin, U. de G.; Bachelor Maria Antonia Abundis, U. de G.; Bachelor Arturo Fernandez, U. de G.; Bachelor Javier Fernandez, U. de G.; M.C. Patricia Medina, U. de G.; Dr. Alfredo Cesar Dachary, U. de G.; Dr. Stella Arnaiz, U. de G.; to MRS. Barbara Bush, to Dr. Fabio Vasquez E., to Dr. Humberto Martinez V., to Dr. Guillermo Esquivias L., for their observations and comments.



## **INTRODUCTORY COMMENT**

### Abstract

Educational robotic in education is a tool for teachers and a learning strategy in the classroom. Keeping in mind that each student has a different way to get the information in the knowledge acquisition of any topic, in this project the information channelings will be use according to the visual and logic model of multiple learning styles (EMMA). In this research some practices were designed, implemented and proven for the subject Structured Design of algorithm for the use of robotics helping in the management and comprehension of controlled structures like cycles and controlled structures. Students comprehended better by using this technique which includes robotics, due to they not only learned the instructions to execute these procedures but they experimented the visualization programming these instructions into robots. Using the simulator platform for the robot BYOB, which is a Scratch program, with this technique, it could be possible to prove that students comprehended and assimilated the use and management of structures besides they learned other kind of programming and the manipulation of robots. The use of robotics awakes in students the need for learn beyond the subject. This technique creates in the student an active thought with the need for learning more reaching a self- study learning and paintings in their steps fractals.

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## Introduction

Educational robotic has been applied in higher level as a support for the understanding of some subjects like math, physics, informatics and others. The main target of this teaching application is to prove that educational robotic applied in education facilitates and motivates the developing of teaching- learning. Resulting that Educational robotic is an excellent tool for abstract concepts from these subjects, allowing them to develop basic competencies like creativity, teamwork (Ivet Moreno,2012) Educational robotic one of the most attractive tools to facilitate the learning in education field. It allows to student and efficient respond to the changing environments from the actual world.

The presence of robotic in the classroom is not trying to form to students merely at the discipline of robotic but it takes advantage of its multidisciplinary nature the generations of environments of learning where the student could perceive the problems of the real world, also imagine and formulate the possible solution and implement their ideas, as long as he or she feels motivated by topics that are developing. (Del Mar, 2006; Aliane,2007, Bravo Sanchez, Forero Guzman 2012)

Educational robotic generates in the student an attraction for getting a movement, in both a simulator and a robot, this kind of programming is easy and simple for the students to solve problem in an fast an easy way to apply so it allows a more significant learning making possible that student generates his own knowledge generating a socialization between



professors and students transforming the classroom into a lab of exploration and experimentation.

At the Cristobal Colon University campus Torrente from Veracruz city, the director of this project Educational Robotic Javier Bolio Hernandez, explains that technological culture in the classroom potentiates the cognitive capital in new generations, it consists by offering to children and teenagers a formation space for competency where they develop creativity, logic, problem translation, and a better understanding of applied math. (G. Briseño,2015)

At the Veracruz University, Electronic instrumentation and atmospheric sciences school, the research by using a LEGO Mindstorms/NXT for the support of students who wants to start a robotic application, as well as the exposition of some orders from some languages seen as no graphic orders, taking them to the skill of a robot for the execution of any task with specific instruction for being executed running the NXT\_G language (Antonio,2011) NXT\_G is a graphic environment, it has elements that brings information, based on graphics it allows to the programmer to intuit what function is going to run due to images of blocks (thesis Manual of mobile robotic practices programmed in Javas using LEGO MINDSTROMS, Veracruz University, Electronic instrumentation and atmospheric sciences school, june 2011) that is to say the graphic interface of programming shows visually the

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instruction to run, in our case cycles and iteration, the image of the programming block shows effectively as an image a cycle or a decision as the case may be.

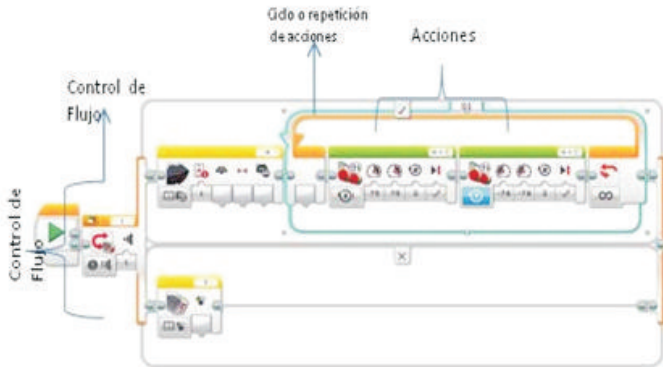


Figure 1. Flow control block

### Methodology

This research demonstrate the support to the educational robotic as a tool at the stage of teaching- learning at the experiment executed to students from first semester at university in the subject Structured Design in Algorithm, specifically at the topic Cycles and Iteration, two groups of tirthy students were assigned as samples groups at the Multidisciplinary Academic Unit Campus Mante (UAMMante)

In order to apply the educational robotic as a support in the classroom, software and hardware were needed, those tools will help teachers and students to simulate the different movements to be taught, for this reason a software called BYOB(SCRACH/NXT) and as hardware the robot (LEGO MINDSTORM) were used.

The topic Cyclic and control structures can be a little confused and abstract, in this case the ise of simulator BYON (SCRACH),



One of the mayor advantages in the use of Educational robotic as a strategy for learning is to keep student's attention as long as possible, due to the robot manipulation and the programming application catch his or her attention and this attention is not easy to disperse because it take their senses in the activity.

Ten exercises were performed in each topic of cyclic structures and three for control structures of repetitions, for example in this case a block was created to simulate slow steps that moves the robot in order that students visualize the movement from the robot step by step, if the practice does not do in this order only a position movement is seen; three repetition with condition, in this case the cycles were done depending of some variable as needed, and three repetitions with limits this one performs a condition till get to a data or target given, the exercises for taking decisions were according to a determined condition.

#### Results and conclusions

For the development of this work a questionnaire was applied to two groups of 30 students in which it was used as an instrument to measure knowledge of algorithmic logic and basic programming.

Those sample groups were Engineer in system computer group E and J from the Multidisciplinary Academic Unit Campus Mante belonging to the Universidad Autonoma de Tamaulipas.

The results shows that after the application of the questionnaire the 90% of students did not have knowledge about educational robotic and basic structures (flow and cyclic)

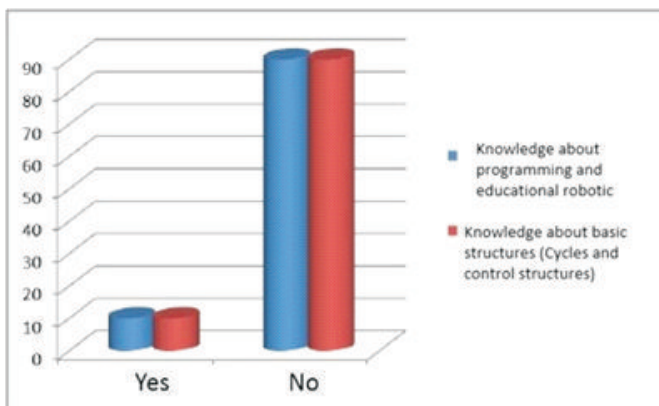


Figure 4. First quiz about knowledge applied to the sample group

Applying the topic for educational robotic, it can be concluded that students understand better the topic and acquire the knowledge for managing basic structures for the solution of problems for programming and a major interest for programming at the management and robot construction. This strategy or support for teaching is a proposal for professors in different areas for practice activities that involve the use of technology, due in the application of this method students develop their coefficient through his or her participation, nowadays teachers face challenges so they require to have students able to compete according to their informatics needs, all of this because of the constant evolution on their profession. This technique allows students to make their own presentations about their surroundings, facilitating the knowledge acquisition.

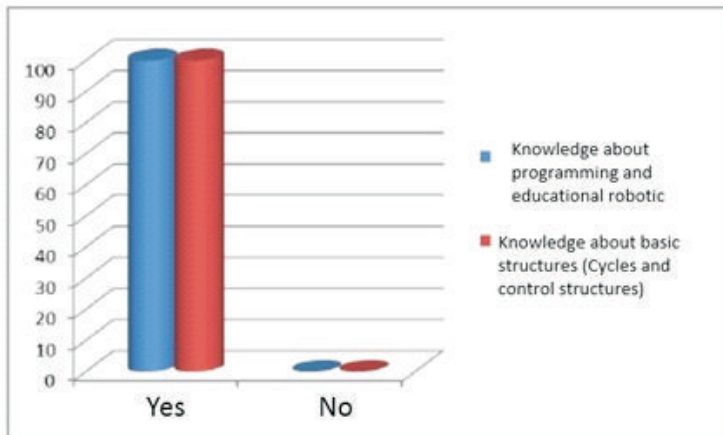


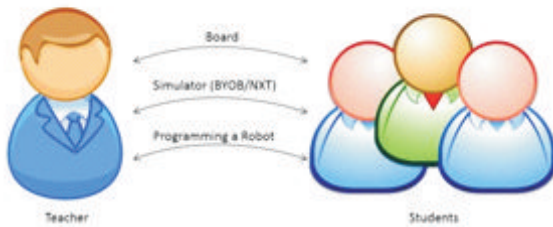
Figure 5 Final questionnaire about educational robotic knowledge on the sample group.

The following diagram shows the different information channelings used to transmit the information because of the two different kind of knowledge (visual, listener or kinesthetic) in the students being those styles very important in order to implement methods of learning to achieve the best of information to generate a more significant knowledge in the students.

The learning styles are “the cognitive features, affective and physiological, those helps as stable indicators, how learners perceive, interact and respond to the learning environment” (Alonso y Gallego en Ramirez, Osorio 2008:4) this is the reason that as a responsible of the subject, teachers should apply this method, and adapt it in such way that they choose the most appropriate information channeling.

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Diagram for learning with the support of different information channelings.



Due to the importance that learning styles have to achieve a significant knowledge in the student, like Kolb mentions “in order to learn, the information we receive should be worked or processed” it is developing a methodology that covers all the Learning styles in the student (Visual, Listener and kinesthetic) the EMMA methodology shows the same content with different information channeling for a better transmission and reception of the information, we are sure that applying this kind of tools as a support on the teaching-learning process, it will be reached the attention and interest in the student.

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Note: To page 28 to 72, the reader is left between the mentioned interpretation and paints for the reader to generate their own ideas and creative about. This is an exercise in creative writing and painting to generate new ideas.





**OBSERVATION:**

Rhochrematic process in electromagnetism pedagogy.

Discreet Variable

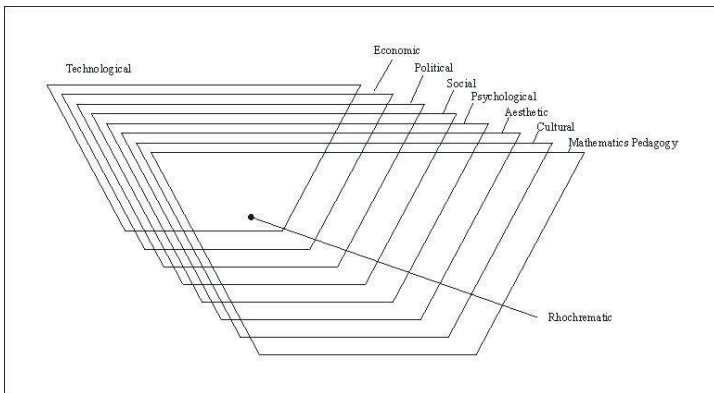
$$\sum_{b1}^{a1} x1 + \sum_{b2}^{a2} x2 + \dots + \sum_{bn}^{an} xn + \dots + \sum_{bk}^{ak} xk$$

Continuous Variable

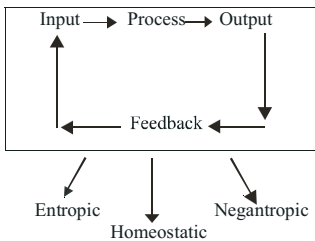
$$\int_{b1}^{a1} x1 + \int_{b2}^{a2} x2 + \dots + \int_{bn}^{an} xn + \dots + \int_{bk}^{ak} xk$$

Integrating the Rhochrematic process in electromagnetism pedagogy.

Integration System



Rhochrematic → The Process of Reprocess  
Process System



$n_1 \dots n_2 \dots n_n \dots n_k$  with Discret Variable and Continous Variable in the System

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**Phase 1**



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**Phase 2**



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**Phase 3**





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**Phase 4**



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**Phase 5**



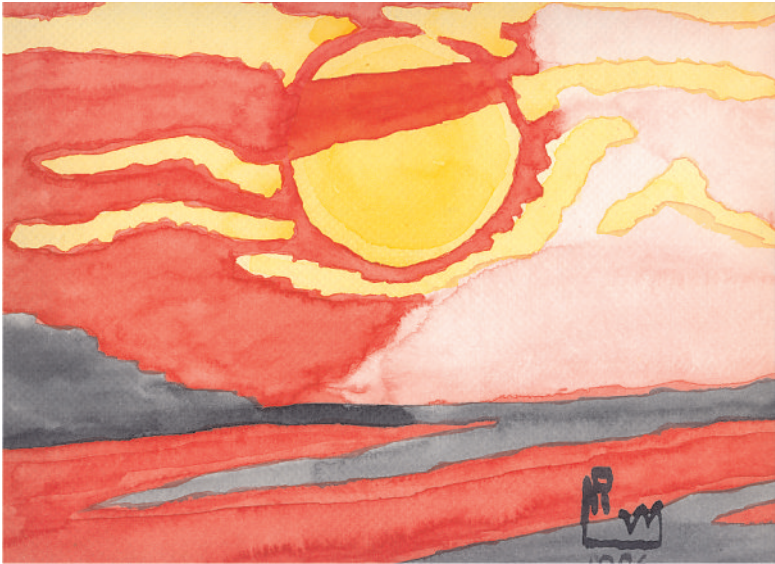
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**Phase 7**





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**Phase 11**





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**Phase 12**



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**Phase 13**



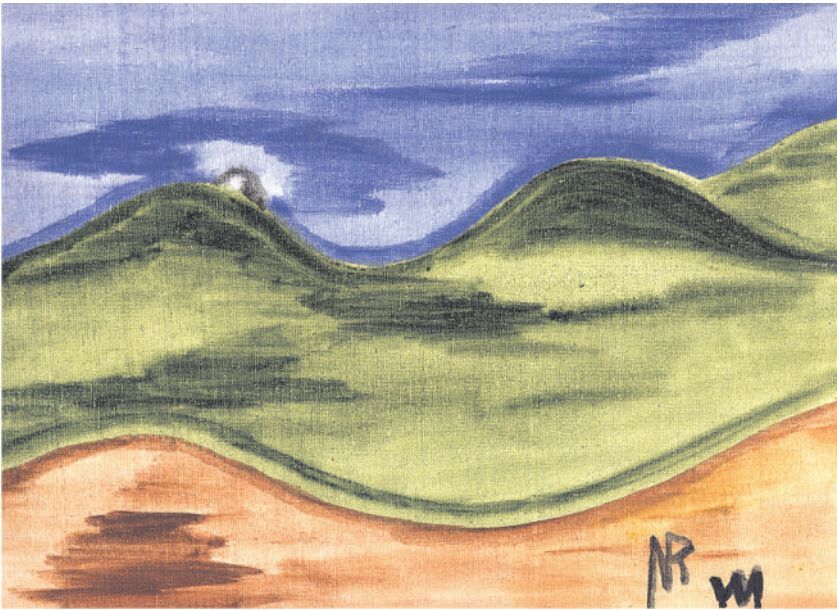
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**Phase 14**



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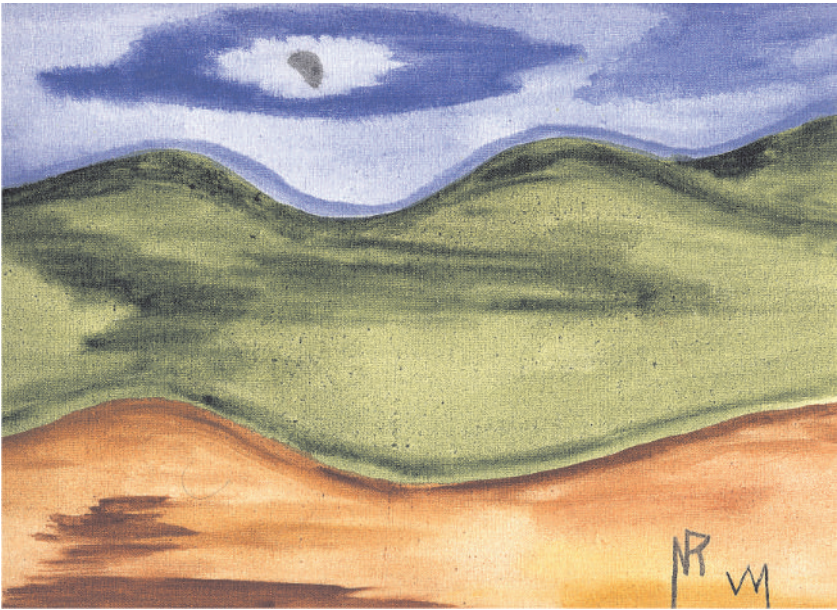


**Phase 15**





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**Phase 16**



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**Phase 17**



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**Phase 18**



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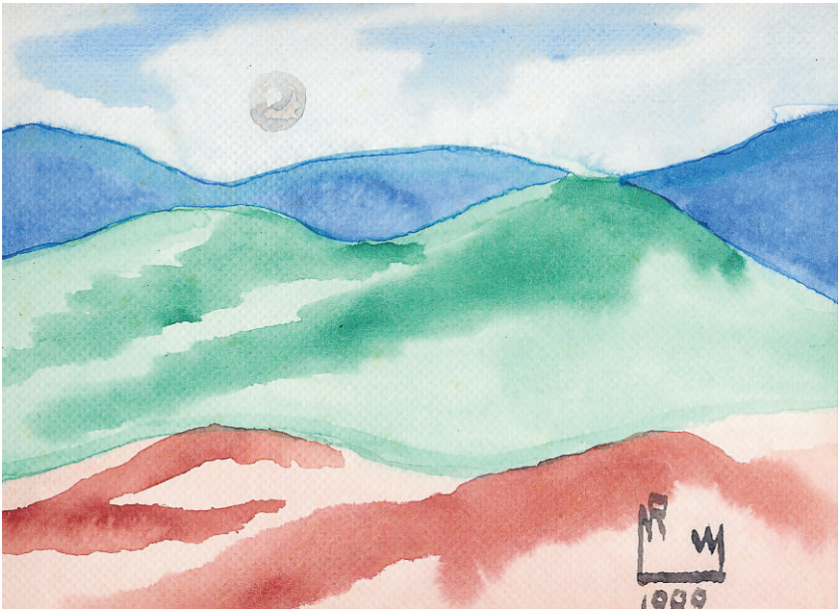


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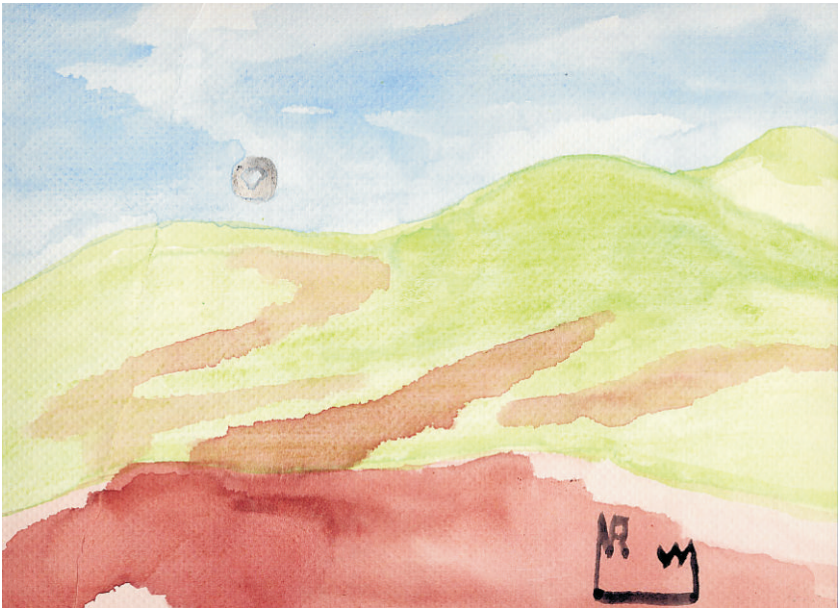
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**Phase 20**



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**Phase 21**



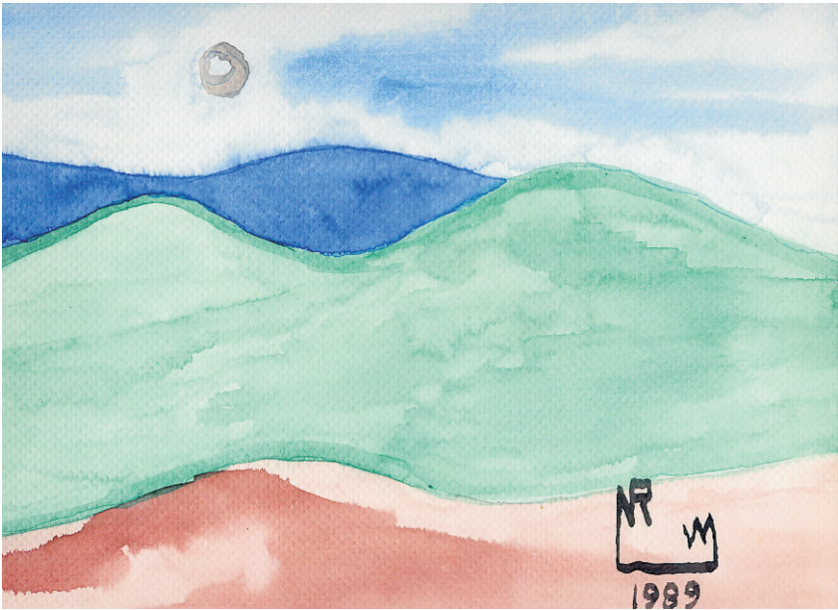
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**Phase 22**



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**Phase 23**





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Researcher in methodology in The First Annual Conference of the Society of Compared Education of Asia, Waseda University, Japan, 1996; Registered in the «Who's Who in the World 1995-2003»; Advisory of the UNESCO 1985-1999; Lecturer and Prof. Researcher in methodology in the Sixth International Conference of Experiences of Learning, University of Tampere, Finland, 1998; Lecturer and Researcher Professor in Methodology, University of Cape Town, South Africa, 1998; Professor and Researcher in Methodology in Second Conference Yearly of the Society of Compared Education of Asia, Beijing, Normal Beijing University, China, 1998; Lecturer and Prof. University Researcher in Oxford, England, 1997; Lecturer and Prof. Researcher in Methodology in the 10° World Congress of Compared Education, University of Cape Town, South Africa, 1998; Lecturer and University Researcher in Oxford, England, 1997; Lecturer and Researcher in the 49° International Congress of Americanism, Quito, Ecuador, 1997. Professor and researcher in methodology in second conference yearly of the Society of compared education of Asia, Normal Beijing University, Beijing, China, 1998; Professor and researcher in methodology in 11th world congress of comparative education, Korea National in Cheongju, University of Education, Korea, 2001; Professor and researcher in methodology in the 4th comparative education Society of Asia biennial conference, Universitas Pendidikan Indonesia (UPI), Indonesia University of Education, Bandung, West Java, Indonesia, 2003; Professor and researcher in methodology in the Bulgarian Comparative Education Society (BCES) Annual International Conferences from the II BCES Conference 2003 through to the XIII BCES Conference 2015, Sofia, Bulgaria. Professor and researcher in methodology

in XIV World Congress of Comparative Education Societies (WCCES), Istanbul, Turquia, 2010. Professor and researcher in methodology in XV World Congress of Comparative Education Societies (WCCES), University of Buenos Aires, Buenos Aires, Argentina, 2013. Professor and Researcher in Methodology in World Education Fellowship, 44th International Conference, Korea, 2008. Professor and Researcher in Methodology in XIII World Congress of Comparative Education Societies (WCCES), Sarajevo, Bosnia-Herzegovina, 2007. Professor and Researcher in Methodology in 10th International Seminar of Mathematics Education on Creativity Development Korea Society of Mathematics Education (KSME), Seoul, Korea, 2005. Professor and Researcher in Methodology in 12th World Congress of Comparative Education Societies (WCCES), Havana, Cuba, 2004. Professor and Researcher in Methodology in International Conference, Making Educational Reform: Learning from the Asia Experience and Comparative Perspectives, Bangkok, Thailand, 2004. Professor and Researcher in Methodology in 42nd International Conference World Education fellowship, Gujarat Research Society, Khar, Mumbai, India, 2004. Professor and Researcher in Methodology in "Undécimo Encuentro Práctico de Profesores de Español como Lengua Extranjera, organizado por International House y Difusión", Barcelona, Spain, 2002. Professor and Researcher in Methodology in XXI CESE Conference (Comparative Education Society in Europe). The Danish University of Education. Copenhagen, Denmark, 2004. Professor and Researcher in Methodology in 10th International Congress on Mathematical Education, Copenhagen, Denmark, 2004. Professor and Researcher in Methodology in E-Learn-2005. World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, Vancouver, BC,

Canadá. Professor and Researcher in Methodology in the First International Symposium of Mathematics and Its Connections to the Arts and Sciences. MACAS 1. The University of Education, Schwabisch Gmund, Germany, 2005. International Biography 1995- 1998»; 1989-1990; Prof. in Statistic, 1989-1990, United States of America, 1996- 1998; degree of nursing for Public Health, Registered in the «Dictionary of Grateful at world level among the five trumental nursing, 1989; Prof. of Education, in the Program of Graduate «Prof. of Biostatistic, 1989; Prof. of world for the Biographical Institute of Methodology of the Research, 1989- 1989-1990, Prof. in Methods of Research Prof. in Research of the Methodology, for Surgery, 1989-1990, Prof. in of Cambridge, England, 1995-1996-1998; Program of Graduate degree in nursing Professor from the UAG-MEXICO: thousand (5.000) personalities of the Investigator of the International Center Methodology of the Research in the the Program of Graduate degree in Ins-1990; Prof. of History and Philosophy in the Program of Graduate degree of Pediatric nursing, 1989-1990; Prof. in Methodology of the Research in the Program of Graduate degree of nursing of Intensive Care, 1989-1990; Prof. of Communication and Leadership in the Program of Master in Administration, 1990; Prof. of Organizational Behavior in the Program of Master in Administration, 1991; Prof. of Evaluation in Projects of Investment, 1991; Prof. of Administration of Production, 1991; Prof. Advisory of Thesis in the School of Electric Mechanical Engineering, 1988-1998; Prof. of Analysis of Markets and Research in the School of Business, 1993; Prof. in Methodology of the Research in the Program of Graduate degree in Endodontics, in the School of Dentistry, 1988-1994; Prof. in Biostatistics, 1988-1995; Prof. in the Seminar of Scientific

Research I, II and III, 1988- 1995; Prof. in Planning in the School of Electric and Industrial Mechanical Engineering, 1990; Prof. of Systems Engineering, 1989; Prof. of Introduction to The Engineering, 1989; Prof. Analysis and Design Administrative Systems, 1989; Prof. in Technical of Economic Evaluation, 1989; Prof. of Analysis and Design Productive Systems, 1989; Prof. of Administration of Production in the School of Administration, 1990-1991; Prof. in the Seminar of Investigation, 1990; Prof. in the degree Seminar, 1990; Prof. in Methodology in Social Sciences, in the School of Economy, 1989; Prof. in Library Researcher Seminar in the Institute of Humanities, 1989; Prof. in Research of Operations, in the School of Administration, 1991; Prof. in Methodology of the Pedagogic Research, in the School of Pedagogy, 1990; Prof. in Methods of Aids for the Community, 1989-1990; Prof. of Statistical in the Schools: of Economy, Accounting and of Administration, 1990; Prof. of Introduction to the Engineering and of Systems of Engineering in Computational Engineering School, 1988-1989; Prof. of Statistic in Technical Economic Evaluation, 1988-1989; Prof. in educational Organization in the School of Pedagogy, 1989; Prof. in Pedagogic Research, in the School of Pedagogy, 1996; Prof. of the Seminar in Research, in the School of Pedagogy, The pedagogy of the landscape painting with applications in the mathematics popularization 1996; Prof. Supervisor inmeasures and instruments of precision in Computational Engineering School, 1996; Prof. of Social Investigation, in the School of Communications, 1995-1997; Prof. of Analysis of Market in the School of Business, 1993; Prof. of Methodology of the Research in the School of Architecture, Design of Interiors and Landscape, 1996-1997; Computer science, 1996, Administration, 1997, International Careers, 1997; Accounting, 1997.

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International finances, 1997, International Trade, 1997; International marketing, 1997; Prof. Models of Quality, 1996-1998; Prof. Methodology of the Research in Architecture, Industrial Design, Graphic Design, Interiors Design and landscape, 1996-1998; Prof. Social Research of the Communication, 1996-1998. Prof. In Educational Planning, 1989-1990; Prof. In Organizational Behavior, 1990; Prof. In Education and Evaluation of Projects, 1991; Prof. in Administration of the Production, 1990-1991; Prof. Creativity and Everyday Life 1990; Prof. Didactics of Mathematics, 1988-1990; Prof. Research of Analysis of Markets, 1993; Prof. Planning, 1990; Prof. In Engineering of Systems, 1988-1989; Prof. Introduction of Engineering, 1988-1989; Prof. Technical of Economic evaluation, 1988-1989; Prof. Analysis and Design of Administrative Systems, 1988-1989; Prof. Biostatistic, 1989-1990; Prof. Methods of Research, 1988-1998; Prof. History and Philosophy of the Education, 1989; Prof. Statistic 1989-1991; Prof. Seminar of Degree, 1990-1998; Prof. Design of Productive Systems, 1989; Prof. Seminars of Research, 1988-1998; Prof. Methods in Social Sciences, 1989; Prof. Seminar of Library Research, 1989; Prof. Research of Operations, 1990-2000; Prof. Introduction to the Pedagogic Research, 1990-1997; Prof. Aids Communications, 1989-1990; Prof. Educational organization, 1989; Prof. Social Research, 1995-1998; Prof. Models of Quality, 1995-1998; Prof. Educational administration, 1989-1990; Prof. Social Research, 1995-1998; Prof. Educational Research, 1996; Researcher DAPA-UAG, 1995-1999; Professor from the University of Guadalajara CUC: Prof. of Differential Equations 2006; Prof. Electromagnetism theory 2001-2006, Prof. Architecture History and Town Planning 2001-2006; Prof. Introduction

to experimental methodology 2001-2006; Prof. Thermodynamic phenomenon 2002-2006; Prof. Transit engineering 2002-2006; Prof. Soil Mechanis II 2004; Prof. Multivariable analysis 2005-2006; Prof. Colour Theory 2005-2006; Prof. Building 2004-2006; Prof. Town planning design 2006; Prof. Watercolour 2004-2006; Prof. Complex Variables 2005-2006; Prof. Distance Learning Theory and Practitce 2006; Prof. Projects 2004; Prof. Mexican Architecture 2006; Prof. Technical drawing 2004; Prof. Chemistry 2003; Prof. Theory and Educative epistemology 2001-2004; Prof. Educative painting and creative rhochromatic 2001-2006; Prof. geometry 2004; Prof. Numerical analysis 2003-2005; Prof. diferencial calculus and integral calculus 2001-2004; Prof. Tenured Professor C (maxim category) 2004-2006; Prof. Sch. Telematic energy 2001-2006; Prof. sch. architecture 2001-2006; Prof. sch Civil engineering 2001-2006; Prof. Sch. education 2001-2006; Prof. net center, pereira 2000-2001; Prof. Research methods coltepunto, Rionegro, 1979; Prof. Research methods Riotex, Rionegro, 1979; Prof. research methods SENA, Medellín, 1981; Prof. research methods ASSTI, Medellín, 1980-1982; Prof. research Methods Pinturales, Medellín, 1981; Prof. research methods Fallo, M1981; Prof. research methods Viamacol, Medellín, 1982-1983; Prof. of introduction to experimental methodology, 2001-2003; Prof. of Soil Mechanics II, 2001-2002; Prof. of Evaluation of Projects, 2003; Prof. of Transit engineering, 2002-2003; Prof. of Thermodynamic Phenomenon, 2002; Prof. Differential Calculus and Integral Calculus, 2001-2002; Prof. of Electromagnetism Theory, 2002-2002; Prof. of Architecture History and Town Planning, 2001-2002; Prof. of Theory and Educative Epistemology, 2001-2002; Prof. of Research and Develop I, 2002; Prof. of Educative Painting and Creative Rhochromatics, 2001-2002; Prof. Advisory of Thesis in Postgraduate, 2001-2002;

Consultant in Administration, Costs, Numismatic, Production, Reengineering, Philately, Lepidopterology, Rionegro, 1983-1996; Consultant in Epistemology, Rhochrematics, Guadalajara, 1983-1996; Consultant in investigator's fields in the National Service of Learning, Medellin, Colombia, 1981; in the Superior Academy of Industrial Technical Services, 1980-1996; in the Modern Institute of Education, 1982-1985; Advisory in the Center of Educational Research, University of Antioch 1983-1986. Adviser in Research in the University San Buenaventura, 1985-1987; Advisory of the UNESCO, 1983-1999; Advisory in Planning and Development, in the Company of Reforestation, The Floresta, Rionegro, Antioch, Colombia, 1980-1984; Advisory in Marketing and Administration in the Companies: Dometal, 1986, Riotex, 1979, Coltepunto, 1979, Company of Packings, CORP, 1982, in Medellin, Colombia. Advisory in Production and Costs in House of Kings, Furniture of Style and Decoration, 1980-1981, Medellin, Colombia. Assistant of Production in Dimadera, Design and Decoration, 1981-1984; Medellin, Colombia. Director in the CREAD, Technological Institute Pascual Bravo, Rionegro, Colombia, 1985-1986: Prof. of basic mathematics in the School of Mechanical and Electric Engineering, Colombia, 1985: Administrative adviser in the Modern Institute of Education, Medellin, Colombia 1984-1987; Prof. in Administrative Techniques in the School of Public Administration, ESAP; Medellin, Colombia, 1986: Prof. in General Accounting, ESAP, 1986, Prof. in Ecology in Civil Engineering, in the School of Engineering of Antioch, Colombia, 1987; Prof. in the Methodology of the Research in the School of Industrial Technology Jaime

Isaza Cadavid, Institute Colombian Polytechnic, Rionegro, 1986-1987; Prof. of Practical Industrial, Coordinator of Practical Industrial, Colombia, 1986-1987; Prof. of Methodology of the Research in the School of Civil Constructions 1987; Prof. of Practical in the Colegio Montessori, Medellin, Colombia, 1982. Author of: "Quality and Social Impact", 1986; "The Open Education", 1986; "Computers in Education: Their Teaching, Research and Languages" 1992; "Methodology of Incidence of Malocclusions in 3 to 5 year old Pre-School Children", 1994; "Methodology of Incidence of Cavities Related to the Bacterial Plaque in 3 to 5 year old Pre-School Children", 1994, "Methodology of Oral Habits in 3 to 5 year old Pre-School Children and its Consequences in Primary and Dentition", 1994; "Methodology of the of Baby Bottle Syndrome in 3 to 5 year old Pre-School patients", 1994; "Methodology of Predictive Analysis of Moyers Space in the Arches of Subjects during Mixed Dentition", 1991, among other works. He is also author of numerous Articles it has more than enough Research and Education in the areas of Methodology of the Research, Statistic, Quality, Prospective, Rhochrematics Planning Strategic, Costs, Educational Systems and the Mathematics Pedagogy. Individual exhibitor of paintings in oil and watercolor, among those that are included: "Other Parts of the Universe", New York, United States, 1995; "Mountains and tree", Phoenix, Arizona, United States, 1994; "Hoist", Boston, Massachusetts, United States, 1990; "Canyon", Salt Lake City, Utah, United States, 1989; "ThreeMountains", Seattle, Washington, United States, 1993; "Lake and Mountains", Sidney, Australia, 1994; "Mountains and Cypresses", Copenhagen, Denmark, 1994; "Beach", Long Beach, California, United States, 1995; "Volcano", Purace, Cauca, Colombia, 1990; "Peninsula", Honolulu, Hawaii, United

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States, 1994; "Cypress", Cambridge, England, 1992; "Shadow of the tree", Sao Paulo, Brazil, 1995; "Moon and Venus", Guadalajara, Jalisco, Mexico; "Eucalyptus", Sydney, Australia, 1990; "Five Trees", Johannesburg, South Africa, 1992; "Two Trees", Tokyo, Japan, 1988; "Hudson River", New York, United States, 1991; "Many Pine Trees", Augusta, Maine, United States, 1991; "Several Trees", Washington, D.C., United States 1992; "Several Mountains", Denver, Colorado, United States, 1988; "To Start the Day with the Sun", Charlottesville, North Carolina, United States, 1990; "Volcano and Peak", Purace, Cauca, Colombia, 1990; "The Beginning of the Day with Cypresses", Spokane, Washington, United States, 1989; "Mountains with clouds", Cheyenne, Wyoming, USA, 1988 "To Happen in the late Afternoon in the Beach" Miami, Florida, United States, 1989; "Part of the universe", Boston, Massachusetts, United States, 1989; "Lake and Trees", Duluth, Minnesota, United States, 1989; "To Start the Day with Trees", Scranton, Pennsylvania, United States, 1988; "Five Mountains", Knoxville, United States, 1988; "Volcano and Clouds", Purace, Cauca, Colombia, 1994; "Mountains and Clouds", Lincoln, Nebraska, United States, 1994; "The Beginning of the Day and Clouds", Birmingham, Alabama, United States, 1993; "Three Pine Trees", Rochester, New York, United States, 1992; "The Desert", Tucson, Arizona, United States, 1990; "Volcano and Mountain", Purace, Cauca, Colombia, 1991; "To Start the Day and, Trees", Hartford, Connecticut, United States, 1988; "Desert and Clouds", Tucson, Arizona, United States, 1988; "Moon and Cypresses", Guadalajara, Jalisco, Mexico, 1989; "To Start the Day and Clouds" Miami, Florida, United States, 1988; "Lake and Moon", Chapala, Jalisco, Mexico, 1990; "Mountains and Lake", Denver, Colorado,

United States, 1995; "Volcano and Brimstone", Purace, Cauca, Colombia, 1991; "To Happen in the late afternoon and Sea", West Palm Beach, Florida, United States, 1994; "Volcano and Clouds", Purace, Cauca, Colombia, 1992; "Lake, Moon and Trees", Chapala, Jalisco, Mexico, 1993; "Mountain and Gases", Tacoma, Washington, United States, 1993; "Volcano and Gases", Purace, Cauca, Colombia, 1994; "Desert and Shadow", Tucson, Arizona, USA, 1995, "Desert and Gases", Tucson, Arizona, USA, 1991, "Volcano and Trees", Purace, Cauca, Colombia, 1990, "Everest mount", Nepal, 1988; "Pine Trees, Lake and Mountains", Denver, Colorado, United States, 1989; "Mountains and Moon", Guadalajara, Jalisco, Mexico, 1989; "To happen in the Late Afternoon and Sea", St. Petersburg, Florida, United States, 1995; "Desert and Heat", Tucson, Arizona, United States, 1991; "Lake, Moon and Clouds", Chapala, Jalisco, Mexico, 1988; "The Beginning the Day, Gases and Trees", New York, United States, 1992; "The Beginning of the Day, Clouds and Trees", New York, United States, 1989; "Lake and Vegetables", Denver, Colorado, United States, 1988; "Sea and Mountains", Vancouver, Canada, 1989; "Sea and Gases", Eureka, California, United States, 1990; "Shadows and Desert", Tucson, Arizona, United States, 1993; "To Start the Day and thunderstorm clouds", New Haven, Connecticut, United States, 1992; "Lake, Thunderstorm and clouds and Moon" Chapala, Jalisco, Mexico, 1994; "To Happen in the Late Afternoon and Beach", Galveston, Texas, United States, 1991; "Mount Everest", Nepal, 1998; "Pines, Lake and Mountains", Denver, Colorado, United States, 1989; "Mountains and Moon", Guadalajara, Jalisco, Mexico, 1989; "To Happen in the Late Afternoon and Sea", St. Petersburg, Florida, United States, 1995; "Deserted Heat", Tucson, Arizona, United States, 1991; "Lake, Moon and Clouds", Chapala, Jalisco, Mexico,

1988; "To Start the Day, Gases and Trees", New York, United States, 1992; "The Beginning of the Day, Clouds and Trees", New York, United States, 1989; "Lakes and Vegetables", Denver, Colorado, United States, 1988; "Sea and Mountains", Vancouver, Canada, 1989; "Sea and Gases", Eureka, California, United States, 1990; "Shadows and Desert", Tucson, Arizona, United States, 1993; "To Start the Day and thunderstorm Clouds", New Haven, Connecticut, United States, 1992; "Lake, thunderstorm and clouds and Moon", Chapala, Jalisco, Mexico, 1994; "To Happen in the Late Afternoon and Beach", Galveston, Texas, United States, 1991, among others. Author:

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