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## The Theoretical Science of Research

Subbarayan Peri

Director, and Principal, Institute of Advanced Studies in Education Rashtriya Sanskrit University, TIRUPATI-517 507, India.

**Abstract:** - The science of research is unique among sciences in many respects. All other sciences are reared by it, but it has never been viewed as a science so far in this world. Had it been developed as an independent science, the world would have advanced by some centuries than what it did and had. The science of research is an integral part of the emerging 'learning science' along with its counter-parts the science of education. Every systematic science has its elements i.e. paraphernalia —assumptions, theories, laws, dimensions, taxonomy et.hoc. which designate that science as 'systematic science'. So the first step in construing the theoretical science of research is to explore its paraphernalia. Again, every science exists in two essential forms; pure and applied. Astonishingly, the applied form of the research science is so popular, but it's pure form is un-identified and unknown. The present paper aims at to iterate the need of theoretical science of research. The strategy— since education is our twin science and that it developed as a full-fledged science with robust theoretical form and frame, we need its help, at least in the formative stages to visualize 'the theoretical science of research'. The paraphernalia are presented in this paper.

**Keywords:** - Learning Science (LSc); Learning from instruction=science of education (ESc); Learning from inquiry=science of research (RSc); Hypothetical Research Designs (HRD); Taxonomy of research (ToR); Research Value (RV).

### I. INITIATION

A metaphor would suit to explain the context, as well my intent very clear.

The metaphor—There is a platinum mixed gold throne full of costly stones. On it a peerless and priceless prince prays. Around him are there mighty ministers: finance, education, social welfare, warfare, software, aviation, mines, and the like. Every minister had with him treasures of knowledge, affect, and skill of his portfolio. Billions of populations composed of different races, communities, continents, casts, cults et. hoc. are approaching the ministers. All the people are getting what they desire. All the ministers including the two prime ministers are happy and prospering day by day. Centuries are rolling..... There stood a humble person, a tailor with an indigenous tape tight to his hand wants to measure his physical get-up and mental make-up (personality) of the precious prince. It is surprising – neither the joyful benefactor masses, nor the ministers, nor the prime ministers, except the humble tailor are caring the prince. Mutually thanking cabinet and the people are dancing individually and in groups. In fact, the cabinet is a part of the thick population. The prince bestows all the property to the masses through the cabinet. But, anybody noticed the prince? No, never! None of them bothered for his needs— could the tiny tailor do his job? You are the judges!

#### Analyse the scene

The prince is the science of research, the tiny tailor is me, and the tight tape is the psychometric. All the sciences are being under the reign of the science of research, but no science cares for the development of the RSc. This happens since centuries together. Now, let's do the job—is the intention of this paper. Scientists could hire the services of the RSc as a house-maid, but could never recognize her as the, queen of all sciences alas! More than that, let's understand; if philosophy and mathematics are the king and queen of sciences, RSc is the emperor!

## II. RATIONALE FOR RESEARCH THEORY

Research theory is the theory of the purpose, application and interpretation of research i.e. learning from inquiry. It is largely an umbrella term, being comprised of a number of theories, rather than a single explanation of— why and how do people research, the process of research, and assessment of research. Rather, it is affected by several factors, including theoretical perspective and epistemological premises. There is no one, clear and universal explanation of how we research and subsequent guide-lines as to how we should research. Rather, there are a range of theories, each with their background in a different psychological, learning and epistemological tradition. To understand research then, we have to understand the theories and rationale behind them. In research, the meaning of the term 'theory' ranges from being connected to scientific knowledge, academic subjects and to empirical and pragmatic knowledge such as research foundations and methodology.

The dualism of theory and practice, which is reflected in the dictionary definition is also evident in the theory of research, where theory is often understood as being all that is not practice. This could be why the term 'theoretical' is regularly used to denote academic as opposed to field experiments, and laboratory research practices. In one perspective, theory is understood to be normative for practice and in the other perspective theory is understood to be derived from practice. The first implies practice having to adapt to theory. Here the term theory attaches itself to scientific knowledge, the knowledge one acts on in practice is thus understood here as being synonymous with applied scientific knowledge. The second that theory is defined through practice— theory is almost understood to be verbalized practice, it becomes a kind of pragmatic guide for actions, where the ideal is a connection between theory and practice that is as close as possible, i.e. theory should fit practice like a glove fits a hand. We are not limiting the definition of theory of research to any one of the above perspective, but a harmonious composite of the two. If the first perspective is synthesis, the second one is analysis, and both in coherence make the sense of the 'theory of research'.

### 2.1. The common assumptions are as follows

- That practical and theoretical knowledge is coherent, convertible and compatible.
- The assumption that the theoretical and practical domains are of such a nature that a connection is possible.
- That there is one specific theory that applies to one given practice. This assumption is deduced from the conceptions that practice is either 'the realisation of the theoretical aspect', or that theory is derived from practice.
- That theory is directly converted into practice and vice versa.
- That practice is rule based and describable in general terms— derived from the conception that the generality, predictability and regularity, which is a characteristic of theory, is also a characteristic of practice.

Research theory seeks to know, understand and prescribe research practices. Research theory includes many topics, such as— fundamental, applied, and action research, research methods from experimental to historical, research systems designs, experimental designs, dependent, independent, and intervening variables, qualitative and quantitative analysis, instruments, sample, statistical techniques, interpretational ways, generalization modes et.hoc. learning (both learning from inquiry), research policy, organization and leadership. Research thought is informed by many disciplines— anthropology, biology, computers science, economics, education, history, linguistics, neurology, philosophy, psychology, and sociology. Its applications are found in all sciences without any single exception.

Normative theories of research provide the norms, goals, and standards of research, while the descriptive theories of research provide descriptions or explanations of the processes of research. Research psychology is an empirical science that provides descriptive theories of research behaviors of researchers and research out-comes. Examples of theories of research in psychology are: constructivism, behaviorism, cognitive, motivational theory, post-modernism.

There may be any number of theories of research, like cultural theory of research considers how research occurs through the totality of cultures of the globe on the whole, east or west. Other examples are the behaviorist theory of research that comes from research psychology and the functionalist theory of education that comes from sociology of research.

### 2.2. Theories, in general are used for the following main reasons:

1. Help explain a puzzling or complex issue and to predict its occurrence in the future: Research behavior is a latent variable so there is no clear and universal way to explain, measure, predict, and control it. To help explain this process, therefore, theories based on differing epistemological positions have been developed to explain the procedure.
2. Allow the transfer of information in one setting to that of another: The complex and comprehensive conceptual explanations provided within the framework of a theory can be applied in different settings. Theories provide different "lenses" through which to look at complicated problems and social issues,

focusing their attention on different aspects of the data and providing a framework within which to conduct their analysis (Reeves, Albert, Kuper, & Hodges, 2008).

3. Theories provide greater opportunities for improvement by design: By providing information about the mechanisms underlying learning from inquiry and performance, an awareness of theories and can help us to design environments to improve potential research. They enable us for building capacity of researchers. Refer section (10) for translation of research theory into practice.

This is the general statement on the theory of research. Now we try to devote our discussion taking the guide-lines into consideration. Out of the total 12 sections of this paper first 09 sections are devoted to the first perspective (theory/foundations) and last three (9, 10 and 11) sections for the practical (empirical) perspective of the theory of research.

### III. CHARACTERISTICS OF A SYSTEMATIC SCIENCE:

#### i). Society's demand for more

Wholeness-orientation in RSc implies a deviation from traditional disciplinary research that is not well suited. The position of RSc is quite different from other sciences, which depend on it. There are however, no established systematic principles that can meet the demand for wholeness orientation of RSc. To be frank, so far no systematic efforts are observed to systematize RSc itself. "From a philosophy of research perspective, any science is seen as an interactive learning process with both a cognitive and a social communicative aspect. This means, first of all, that science plays a role in the world that it studies. A science that influences its own subject area, such as agricultural science, is named a systemic science (Alroe and Kristensen, 2000)". In the same way, could we designate RSc as systematic science, like agriculture, health, or education? The answer is definitely, non-affirmative. The researcher has in his mind very broad aim to forge a 'systematic science of research' with all its paraphernalia of a systematic science – assumptions, foundations, principles, schools, laws, approaches, methods, taxonomy et.hoc. Again, the quality of any science reflects in all its phases; objectives, process, and products leading to the total quality assurance. Any systematic science, naturally, wants to achieve the quality out-puts. The proposed systematic RSc should also be able to deliver the quality products.

#### ii). we never supposed research as a science,

and suppose if we accept it as a science, what would be its position in the row of sciences; natural, social or human. There are many sciences available today in the world, a part from the pseudoscience. All sciences are classified into three categories; natural, social, and human sciences. The exact sciences are sharp in their theories, methods, and results, but they are of no use, if not applicable/acceptable to the society. It is the society to consume the applied products, and in turn it has to encourage the development of exact sciences to march ahead for perfection. The second category is more nearer to the needs of the society, but they are not perfect from the view point of their vigour of experimentation, methods, and products. By and large, they depend on second hand methods of research; quasi-experimental. Generalization, which is the crux of research cannot be possible in these sciences. The human sciences cannot go for generalization. Objectivity cannot be expected in the case of human sciences. However, our main point is that all these sciences are under the influence of RSc. Any science, strong or weak, but is in the gamut of the science of research. Research component is inbuilt in every science. Evidently, unless any science is equipped with the research component, it would definitely, be a dead science.

#### iii). One more characteristic of the science of research is it's dependability on some subject.

All subjects though being developed by research, RSc cannot have independent existence. So a referral subject is always required. RSc shares the characteristic with its co-science, education. Unless there is content, there is no teaching or research at all. Notwithstanding, the subjects dependency, today, education is an independent discipline, like engineering, medicine or agriculture, physics, physiology, psychology, or pharmacology.

#### iv). RSc shares many things with the science of education.

The subject matter of both the sciences is the same, 'learning'. I proposed that both education and research are the two legitimate fields of the 'science of learning', their core being 'learning'. At the same time see the difference; if a content known to somebody is learnt by us, it is designated as is teaching, while a content unknown to anybody in the world up to that point of time that is research. It is surprising, if the two poles of education— teacher and the taught are reduced into one pole, it is research! Education and research represent the two hemi-spheres of the brain, the left for teaching (by reasoning and training for reasoning) and the right for research (intuition). Both are the tendencies of human mind. Inquisitiveness is the base. If inquisitiveness is unveiled by somebody who knows it already, it is teaching. But, if inquisitiveness is unveiled by himself, it is research. Finally, leaning from instruction is designated as teaching, while learning from inquiry is designated

as research. In another way, let's see: education is acquirement of knowledge, affect, and skills of a subject, research is enhancement and or create of the acquired knowledge, affect, and skills of a subject. "The emerging science of learning is a merger or rather an amalgam of two behavioristic, cognitive, and brain sciences—the science of education, and the science of research (Peri, 2013)".

#### v). Both ESc and RSc work on complementary basis

mastery gained from instruction helps to probe further to invent, and today's inventions are tomorrow's curriculum. Teaching pushes the teacher and the taught to invent. The inventor teaches his inventions by virtue of his self-actualization. He cannot keep quiet, but in practice he really, thumps-up! Scholarship is the common denominator for both of them. They both are the brain-activities, involving in teaching behaviour and research behaviour respectively. The process of teaching and research are assessed by their end-products, mostly. In case of teaching, the assessment is by the achievement of the students, while in research by peer-evaluation (as on date). Of course, I am developing research assessment procedures which are content-free and other than peer evaluation.

#### 3.1. Some characteristics of RSc

The above discussion could derive some characteristics of RSc as listed below—

- Inquisitiveness is the parent of the science of research.
- The science of research is a natural product, like the breathing.
- It is found abundant in nature.
- The human mind has the tendency of inquiry and establishing facts.
- Research behavior is endowed in the human nature.
- Activity of the right brain, like intuition is inclusive of the activities of the left-brain.
- The science of research is always dependent on some other subject.
- Philosophy and mathematics are the two eyes of the science of research.
- The science of research is one sub-field of the emerging science, the learning science.
- Concentration and commitment are the two fundamental principles of the science of research.
- Intuition is the key concept in the study of the science of research, just as S—R bond for the behaviourists, and whole of Gestalts, but beyond them.
- Theory to run after applications for its construction.
- Research science is the study of research behaviours of researchers.

### IV. WHY PEOPLE DO RESEARCH

How researchers are motivated? is the genuine question often come across the discussions. There are three sets of reasons; psychological (hedonism, inquisitiveness, self-actualization, meta-motivation, peak-experiences), economical (wants, and incentives) and social (necessarily, social status, status symbol).

#### 4.1. Types of researchers

There are many types of researchers. Formal and informal, freelancers and hired, hobby, habituated, and addicted, accident and occupational, trained and untrained, professional and non-professional et.hoc.

### V. INDUCTION

#### 5.1. Subject matter of the science of research

Is it a descriptive science? a process science? or a product oriented one? Or an exact science? What should be our answer to the question, what it studies?

a).

My immediate, spontaneous, Un-inhibited and straight forward answer is, it is the "study of the research behaviors of the researchers". Research behaviors of the researchers are the building blocks or rather fundamental units of the RSc, whereby we can understand, measure, predict, and control the research as a whole. Are there attempts to define, explore, and explain the research behaviors? The answer is clear 'no'. When our sister science has grown to the level of an independent science or discipline with its constructs viz. teaching behaviours, why can't we advance with similar constructs? This the most important point where we should start our attack.

b).

Again, if you ask me the question, What is the subject matter of the RSc, it is the study of learning with special reference to learning from inquiry. The higher order learning (obtained from insight to creativity) is the

subject matter of the science of research. To be more specific, learning by intuition is the subject matter of the RSc. A lot of research is required on this issue for the development of the science of research as a conscious and formal effort. Intuition is the key concept in the research process and research behavior. There are three sources of literature in support:

- i) A school of ancient Indian philosophers, Vedantins studied nididhyasana and practiced in their curriculum. Nididhyasana via. upsana is the technique of inculcation of intuition.
- ii) Blooms and Flanders could show a way that intuition to be an objective of research, and finally
- iii) computational models of learning also support it.

Of course, a great deal of literature is available on this issue. However, there is need to balance the use of the subjective and esoteric intuition and objective and scientific method in the science of research.

c).

Study of scientific method is another subject area of the RSc.

## 5.2. Theory of science of Research

Education or teaching theory mainly rests on learning theories. It's quite natural because, learning is the subject matter of teaching. Same thing holds good for research theory also. But, the most unfortunate thing is that we never tried for 'a theory of research'. Extensive literature on learning theories and their applicability for teaching has been witnessed and recorded. Right from beginning of the 20<sup>th</sup> century from the efforts of Thorndike much work was done. In fact, today we are in a position to control the learning of a given individual. Thanks to educational psychology. The education theory is supported by cognitive, behavioristic, humanistic, constructivism and post-modernism contributions to learning. Both tough-minded (behaviorism) and tender-minded (humanistic) psychologies supported our understanding of learning from their theoretical back-up. We are applying them to education, but never to research. In fact, constructivism and post-modernism learning theories are more useful for research than for teaching. The individual has to construct his own authentic knowledge is the main caption of constructivism. Is it easy for a matured scholar or for an immature novice or sophomore to construct his own authentic knowledge? Where does the constructivism hold better? But, we never tried constructivism in the case of research. In sixties Skinner has used the concepts 'shaping the behavior' and Bloom, 'teaching behavior', learning out-comes et.hoc. and teaching theory woes much to these concepts, but we didn't try to apply or coin such constructs to understand learning from inquiry. As a result there is no any research theory under the surface of the earth. The root cause of non-development of any research theory is that we couldn't come out of the tunnel vision of 'learning', viewing it as only teaching-learning process, but never thought beyond that. While appreciating the efforts of educational psychologists for their commendable contributions to teaching, we have to find fault with them for their short-sightedness or limited-sightedness. In 2000 in one of my research papers I commented: Who is the last bench, last seat occupier in the class of universal scientists? My spontaneous, immediate, un-inhibited response is 'psychologist'. Being a psychologist why do you speak so? is the question from my friends circles. "Psychologists are late born and lazy. They are fed and led by their elder brothers, who are far, further, fore-goers in predicting and controlling the behaviors of their clients— plasma, plants, and planets. They, psychologists don't know that they have a behavior unless pointed out by somebody. They discard their characteristic and unique legitimate subject of study, the study of consciousness (the most precious substance than any other entity in the world) out of passion for pretty purposes, study of overt-behavior". Let it be, of course, I have my pride of being a psychologist that we are successful in prediction, and control of our clients— teachers, engineers, scientists, linguists, administrators, leaders et.id. The success of educational psychologists is that: given an individual and defined content, they are in a position to inculcate the desired knowledge to a predetermined degree within the specified time to that individual. Yes, it is their success story.

5.3. My expectation of educational psychologists is— they could estimate the quality of research out-comes of a given researcher as they did for teachers. The days are not far away, soon we could do it with the concept of 'research values'. I am developing a strategy to assess the quality of researcher, and research products in "PERI" units. In future, any researcher could select research out-comes from the list of standardized research out-comes to guide his research at three nodes; selecting objectives, conducting the experiment and evaluating the out-comes then and there. At the same time, through-out the gamut, 'the research values (RV)' will help him to navigate his research to achieve better quality of research. RV of any product of research is estimated by the quantity and quality research out-comes embedded in that research product. The unit of research value is 'Peri', just like Helmholtz, Volts, or Ohms. Here-after, evaluation of the quality of research is assessed in 'Peris', just as the quality of the metal gold is expressed in 'carrots'. It takes care of many unanswered queries and practices in the field of research. Finally, the need of the hour is forging the RSc is to establish 'a research theory', may

be or may not be on the same grounds of educational theory. This is an unique and peculiar state of affairs— theory to run after applications for its construction. As said earlier, applied form of the RSc is so popular, while its theoretical form is un-identified and unknown.

## VI. APPROACHES TO THE SCIENCE OF RESEARCH

For every science there shall be two approaches, in general traditional and scientific. Traditional is mostly carried from its formative stages with their cumulative efforts, while the scientific takes over at one fine moment and influence the growth of that science towards perfection. In general, both approaches would be complementary in nature in nurturing that science. This mutual functioning is quite common in all sciences.

### 6.1.

At times, the indigenous research insights are flourished in the light of the scientific approach, and sometimes the scientific thought delivers a new insight under the traditional. We find many examples for the first statement, but limited to the second. I quote one latest example to the indigenous insight to be developed in the light of scientific approach. John Biggs, an influential educationalist of our century, posed one query with the caption, “The paradox of the China’s learners”. Biggs (1992) contends, “Students from the Confucian heritage (China, Japan and Korea) are stereotyped in the West for passively memorising. Well, that’s the way they’re taught, isn’t it, to memorise large amounts of material in preparation for gruelling examinations in harsh, overcrowded classrooms? But hey, don’t they also out-shine Western students in international comparisons of academic achievement, in science and mathematics achievement especially? And don’t these students disproportionately gain first class honours in our universities? You can’t do that by rote memorisation. So are we wrong about what constitutes ‘good teaching’ and about the evils of rote memorising? Or are Sino-Japanese brains genetically better than ours?” This hypothesis needs a lot of research out-put by scientists! Personally, I too agree with John Biggs. I studied the Sanskrit grammar under a guru, my father traditionally. In the Hindu tradition the father ought to be guru to his sons. Again, rote memorization is a part and parcel of learning the Paninian Sanskrit grammar (though the guru teaches the meaning of aphorisms, at that age and stage of developmental we cannot understand them). So, rote memory is the forced choice, but after advancement the entire text would be at tip-of-tongue and we would form the gestalt of the grammar). Though no scientific study is attempted, we witnessed transfer of training from the knowledge of the Sanskrit grammar to other learning. Good Sanskrit scholar’s proficiency of English is unparallel than his counter parts. This is my observation since six decades with hundreds of cases, indeed. In education they continued to accept the traditional approach since centuries together, and recently accepted the scientific approach (with Skinner, Bloom and Flanders et.hoc).

### 6.2.

We should take note that in general, in any process there appears three approaches – traditional, scientific, and combination of the two. Peri (2011) define traditional approach as, “Handing over the knowledge, affect, and skills of the subject from generation to generation successively and successfully”. In teaching this process is being carried out by teacher-taught activity. I define scientific approach as “Understanding, measuring, predicting, and controlling the phenomena under taken for study”. Though there is apparent conflict among the first two streams, they are always complimentary in their nature and yield the best results when we try for the third approach. For clear understanding of any phenomena both are indispensable parts of the whole. But, as long as we depend on only one among them, either traditional or scientific approach we enjoy the lop-sided understanding. If we apply this principle of approaches to the RSc, we have only approach, the traditional. It is our first duty to develop the scientific approach to the science of research. So far, it is unavailable, indeed! Scientific approach is possible through understanding the elements of research, building-blocks i.e. units of research behaviors. This is dealt with in section (9).

## VII. DIMENSIONS OF SCIENCE OF RESEARCH

We call them as dimensions, references, foundations, or family in a net-work. Those sciences, which share some commonality with respect to their subject matter, methods, processes, procedures or in their nature with akin sciences are called as dimensions, references or foundations etc. For example, education is a social science. It’s an abstract science. It shares its components with philosophy, psychology, sociology, and economics. So the four sciences are said to be the foundations of the science of education. I define RSc as, “study of research behavior of researchers” in relation to the wants and needs of the society, but under the frame work of the broadest perspective beyond the wants of an individual, total individual, and universal social organization”. The definition may be explained as: individual has wants (economics), he behaves as a unit (psychology), he behaves as an integral part of the whole, the social organization (sociology), and finally, with universal perspective (philosophy). The science of research has five foundations viz sociological, philosophical, psychological, economical, and educational. Among the five, each one has got its own significance in

visualizing and developing the science of research. Research is from the society, by the society, and for the society. Philosophy directs the research, the psychology is the real process of research, and economics economizes the research resources, efforts, process and products. The educational foundations serves two functions viz. (a) sustenance of research trends, content for generations together and (b) facilitate enhancement of the research methods and content to keep up-to-date in flow of time. In fact, by its very nature RSc is at a higher level with respect to its abstractness. Further, its loci are so vast to embrace all sciences— physical, natural, social, and human. Then what should be the dimensions of the science of research?

### VIII. PRINCIPLES OF SCIENCE OF RESEARCH

As a matter of fact all principles of learning apply to the research also, as research is also a kind of learning. Thus Thorndike's laws of learning viz. readiness, use-and-disuse, effect along with latest list; primacy, recency, intensity, freedom and requirement are accepted principles of research. In addition, I have added; scholarship, favourable attitude to the theme of research, and life, humanness, sensitivity to issues, fraternity, fore-sightedness and self-esteem to the above list. In general, the principles accepted for research are: systematic, discipline, verifiable, cautious, value-free, excellence, honesty, integrity, co-operation, and accountability. However, for the science of research, the first two basic principles are concentration and commitment (CC). I need to comment on my fraternity in this context. We belong to the family of educational psychologists. Our fathers are the great B.F. Skinner, Carl Rogers, Jerome. S. Bruner, Albert Bandura, B.S. Bloom et.id. We did a great service to the society; educating the progeny. But, we left what we ought to do as primary, but attempt what needs to be secondary. There are two doublets— i) attention and concentration; and ii) motivation and commitment. Among them, to me it appears both attention and motivation is at lower level paving way for higher ones; concentration and commitment. But, we, educational psychologists or to the matter of fact, psychologists, in general, did tremendous job on attention and motivation and totally left the other important couplet; concentration and commitment. Both concentration and commitment are productive skills. For a detailed discussion on this issue refer my papers referred to in the references, Peri (2007).

### IX. TOWARDS TAXONOMY OF RESEARCH

Any systematic science will have its systematic. It is otherwise known as taxonomy. The entire science has been analyzed up to the least possible division to get the building-blocks. The nature of these building blocks is studied in isolation and in permutations and combinations. This process gives rise to a systematic understanding of the subject. This in short, is the philosophy of taxonomy. The life of the life sciences is their taxonomy. Dimitri Mendeleev's periodic law is the basis of taxonomy of chemistry. The study of sub-atomic particles is the taxonomy in physics. Taxonomy injects scientific temper and treatment to any science. Our sister science, education has a well developed taxonomy of educational objectives constructed by Bloom, Simson, and Krathowhol. In 1982 John Biggs developed SOLO taxonomy for the cognitive domain. In 2001 Bloom's taxonomy has been revised to include and reflect the timely changes and trends by Anderson and Krathowhol. We needn't emphasize that educational taxonomy improved the educational practices to an astonishing level. Its influence is felt throughout the world. It is the Bloom's taxonomy which gave a clear statement on the teaching process in toto, comprehending objectives, process, and evaluation of teaching, bringing all the components of teaching under one umbrella. It helps the teachers to identify the objectives of teaching before teaching, guides the process of instruction at the time of its execution, and provides objective evaluation then and there itself. It is a pre-sketch of the proposed teaching explaining what, how, and gains of teaching. While, Flanders focus is on the real and exact scene of teaching, studying the teaching behaviours of teachers' in co-ordination with the learning behaviours of the students. These two attempts discovered the scientific approach of teaching. Thus teaching enjoys the two essential and well collaborated approaches i.e. traditional and scientific. Today, after Bloom and Flanders we are in a position to follow the two complimentary approaches in teaching. This is the reason, why I say teaching is in advantageous position of enjoying both the approaches, while the research lacks in the second approach. Ultimately, research is subjected to subjective assessment with its essential evils, ballistic and personal judgements. But coming to our own story of RSc, we didn't attempt taxonomy of research objectives, which would have presented clarity of the research objectives, process, and products in wholeness. I proposed a taxonomy of research in 2007 and now, I am at it.

### X. RESEARCH SYSTEMS DESIGNS (FROM THEORY TO PRACTICE)

All sensible sciences have their strategies to culminate the theories into practice. The architect has his blue-print beforehand for all practical purposes. The economist has his annual plans of budget. A teacher has his annual, semester, unit plans and finally 'instructional designs before he proceeds to the class room teaching with clarity of objectives, teaching-learning activities, and evaluation. My pre-caution to you is don't be confused between experimental designs in research with research systems designs. In research we have experimental and quasi-experimental designs to run the experiment, but nothing more. Research systems designs are blue-prints

for the entire planning of the research undertaken. At present, our research process is en-capsule between project (research) proposal and report. Meanwhile, at each and every stage of your research process what you are doing is not known to the outer world or for himself also sometimes. We require ‘research systems designs (like instructional systems designs for teaching)’ for planning, execution, and evaluation of research from point-to-point and stage-by-stage. How do you design them? It is possible by developing taxonomy of research only. The purpose of this proposal is to develop HRSD based on Prof. Peri’s taxonomy of research, and to attempt an effective research training development modules for researchers. Hypothetical research design is the practice of creating research experiences to enhance knowledge, affect and skill of a subject more efficient, and effective with efficacy. The process consists broadly of determining the current state and needs of the researcher, defining the end goal of research, and creating some ‘intervention’ to assist in the transition. Ideally, the process is informed by tested theories of learning science and may take place in research and development based settings. “Emerging science of learning is a merger, or rather amalgam of two sciences—education and research (Peri, 2013)”. As a field of learning science, both ISD and HRSD are historically and traditionally rooted in cognitive and behavioral psychology, and recently in constructivism and post-modernism. The contrast of the instructional and research designs is that—

- i) ISD is for teaching-learning process (learning from instruction) and HRSD is for research process (learning from inquiry).
- ii) if ISD has the Bloom’s taxonomy as its theory, the HRSD has Professor Peri’s taxonomy of research objectives as its theory.

Educationalists have developed ISD to culminate the theory/ies of education into real teaching-learning process, and it’s a success story beyond any doubt hence, now, an attempt to develop HRSD to culminate theory of research into practice.

Strategy to develop HRSD: The position of HRSD is in-between research proposal and research reporting, which are familiar to the world of research. Its step-by-step analysis, but leading to the final goal. It’s the micro-approach to research. In general, if the research proposal is too broad and vague, the HRSD is pin-pointed and focused by its nature. As the first step, RP are identified with the objectives, hypotheses or any other criteria as to the wish of the researcher. The entire research is divided into several smaller units, and each unit is subdivided into chewable chalk-lets viz. RPs. Each RP is taken up for process, one-by-one till the end point. As the second step, RA includes— research designs, methods, data-collection (includes variables, tool, sample, and analysis). Finally, summary and conclusion are made at the end of the HRSD.

### 10.1. Proposed Lay-out of Peri’s HRSD

I). Preliminaries: General statement of— objectives, specifications, hypotheses, research activities, data-collection ( experimental design, methods, tool, sample) analysis, and generalizations.

II. Table: Showing PRs and RAs and Research Process:

S.N	Obj/specification	Research Point	Research Activities	Timeframe	Evaluation
1	From Peri’s taxonomy	RP (i)	RA (a, f, o.....)	06months	***
n	-do-	RP (n)	RA (b, j, o.....)	03months	***

Objective type questions framed on Research Questions are posed to ensure out-comes of research objectives. or significance of the research hypotheses are questioned.

III). Concluding remarks: 1, 2, 3, 4, 5,

### 10.2. Advantages

1. Transparency and clarity of the research process,
2. Establishes a clear communication across a host of stake-holders—researcher, supervisor, evaluator, funding agency, policy-makers, and public on objectives/process/products of research,
3. Serve as blue-print,
4. The researcher can spot out himself where his research is? and its progress, like railway time table,
5. Immediate feed-back at the end of every RP makes the researcher confident via. sense of achievement,
6. The adjudicator is also in a position to verify the progress of the work at any given time,
7. Since research specifications are the fundamental units of the research, the quality of researcher and research products could be objectively estimated,
8. Again, since research specifications are units of research which are content-free, it helps to estimate the quality of research over a wide spectrum of subjects and disciplines; physics, philology, political science, music et.id, and
9. The final visible advantage is that we could ‘develop research design development program’ scientifically.

## XI. ASSESSMENT OF RESEARCH

Lack of a strong theory reflects in all segments of that science—understanding, measuring, predicting, and control. This is true in the case of the science of research. Absence of fundamental theory of a science reflects in its assessment. Anyhow, let us survey the methods of assessment of Research available today. If we penetrate deep into the literature on research on Research, we notice the entire focus on evaluative studies. Just like teachers have more tendencies to test the students, rather to teach, so also the researchers! Of course, it's the human nature. The studies on the philosophy, theory, process of Research are limited while on evaluation are out-rated. The agencies and governments are more interested in the methodology of rating the individual, departmental/ school/ and university potentiality of research. The unhappy out-come is more concentration on quantitative studies establishing indices with strong mathematical support. It is so unhappy that attempts on subjective peer-evaluation have not gained momentum. Actually, researchers would have taken rigours studies on the serious defects of the peer-evaluation viz. its ballistic, and subjectivity or on some supporting evaluative methods.

The International Network for Quality Assurance Agencies in Higher Education (INQAAHE) is a world-wide association of some 200 organisations that are active in the theory and practice of quality assurance in higher education. The greater majority of its members are quality assurance agencies that operate in many different ways. However, the Network also welcomes (as associate or institution members) other organisations that have an interest in quality assurance (QA) in higher education (HE). INQAAHE thus offers its members the many benefits of being part of such an active group of workers in QA in H E. This body of like-minded folk provides an enormous reassurance, support and assistance in our daily QA work. But, finally in all above mentioned cases they couldn't over-come the major weakness – lion's share to the peer- evaluation with its serious defects – high degree of ballistic and subjectivity.

Both NGO and GO agencies play a crucial role in guiding, and enforcing the policies and practices of not only doctoral degree award, but in rating a particular university department/school/university or research organization—government, non-government. They act as authorities to sanction funding for research projects and monitor the research at all levels. We know very well that there are research projects running into billions of dollars sanctioned by UNO and governments. The basic remains the same—on what base they sanction billions and how do they evaluate the proposal, how do they evaluate the mid-term, and the final? The answer is the Peer-evaluation. Is peer-evaluation is pool-proof? No. Then! No answer? We measure the depth of the subject matter and expressive ability of students with essay type questions and supplement it with the objective type to down grade bias and to assess the steep understanding of the concept/theory and its applications. We assess the specific learning out-come to the minute level where subjectivity is equated to zero level. But, in contrast we have not identified and listed the Research Out-comes at all. Isn't?

### 11.1. There are two divisions of assessment of Research

qualitative and quantitative. Under the sub-head qualitative there is only one entry, viz. peer-review. Though there are other entries, like credibility of the publisher, credibility of the author, they are peripheral one. They have their limitations and demerits. Among the quantitative there are many, for e.g. number of papers, articles, chapters, monographs, text books, reference books etc. Recently, some more measures like bibliometric, scientometric, impact factor, citation index, etc. are found. In other words, the peer-review is an internal, while the others are external. The gap between the two sets of measures is unhealthy, yet attempts are not found in this direction. I contemplate on a method which would be quantitative and qualitative as well and friendly to the existing methods and could get along with them with the base of RVs. It is not totally from the thread out my mind, but following the foot prints. Our identical twin, Education which is far further fore-runner in the race of assessment will definitely, provide a clue.

## XII. SUMMARY AND CONCLUSION

Rationale for the research theory was presented at the out-set. Just like any other science, say physics, the RSc would have taken its structure, strength, and soul as a theoretical science. Despite being a member of the LSc, it is unfortunate it didn't solidify as a systematic science as its twin science, ESc. We can follow the not exactly finger prints, but foot-prints of the well established theory of ESc to evolve our theoretical science of research, for both ESc and RSc have many things in common, including their subject matter i.e. 'learning'. With the same reason we can adapt a majority of essentials characteristics of a science— its paraphernalia of elements; assumptions, theories, principles, laws, taxonomy, dimensions et.id as per their applicability to our concern science, the RSc. Some important characteristics which we could construct, develop, and establish are: theories of research based on learning theories, dimensions, taxonomy, and hypothetical research systems designs corresponding to education theory, dimensions of education, approaches to education, taxonomy of educational objectives, and instructional systems designs. In all the above developments much care has taken in respect of— what to be taken, what to be taken with necessary changes, and what not to be taken to abandon

blind follow-up. It could be concluded that there is an acute need to shape, forge, and establish 'the theoretical science of research' like any other theoretical science (for example theoretical physics) to strengthen the RSc, and there by the galaxy of sciences, including the emerging learning science.

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