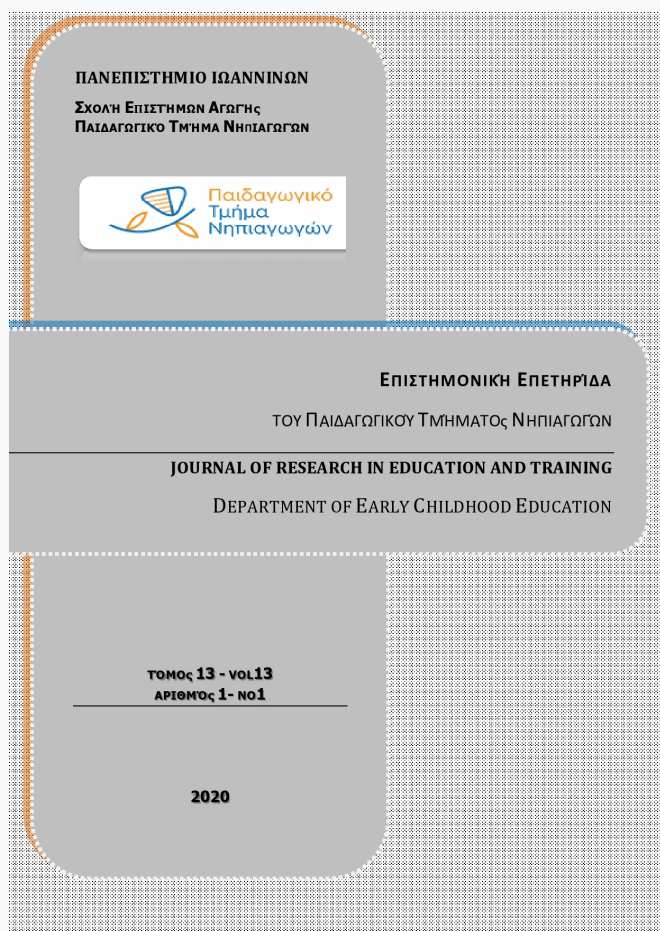


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## “Riskology of teaching” as a new interdisciplinary scientific field of risk study in the designing of the teaching process

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## **From Risk in Teaching to Riskology of Teaching**

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### **Abstract**

The process of teaching design, within which teaching is being planned before its classroom application, includes an account of factors that influence the effectiveness of teaching. The teacher within the access of various scientific fields can draw information on each factor separately. In this way, the analysis of "risk in teaching" is a distinct interdisciplinary process. This paper's suggestion is the development of a new scientific field related to "risk analysis in teaching", by introducing the term "Riskology of Teaching". On this basis, the paper attempts to provide a substantiated presentation of this new scientific field's specific theoretical basis as well as its applications. The basic aims are both to develop a more effective teaching design procedure and to apply a successful teaching process as well.

**Key-words:** Risk, teaching, teaching design, riskology

## 1. Introduction: From Risk to Risk in Teaching

The concept of risk in Education can be found in four cases. In the first case, "risk" is identified when the teacher is called upon to teach something that conflicts with his/her value framework. This kind of "risk", however, does not concern the effectiveness of teaching, but the role of the teacher mainly from an ethical and bureaucratic point of view. In addition, the concept of "risk" can be found in the field of educational administration and leadership, as those who hold administrative positions are called upon to make decisions on a daily basis by examining possible consequences and therefore taking "risks" (Kythreotis, Pashiardis & Kyriakides, 2010). Nevertheless, even in this case, there is no direct relationship between "risk" and teaching. In the third case, "risk" refers to the limit at which several students (particularly vulnerable social groups) are at school failure, a term found in the English-language literature as "at-risk students" (Ishitani, 2008; Taggart et al., 2006; Sagor & Cox, 2004). In this case, however, the focus is also not on teaching as a process but on the general academic performance of the student. Finally, the concept of "risk" may refer to the safety measures that can be taken regarding the safety of students within an educational activity. However, apart from the above four aspects, "risk" has not been adequately studied in relation to the teaching process itself. In other scientific fields such as Economics and Medicine, but also in areas of human activity such as trade and politics, the concept of "risk" is a key element of their theoretical documentation (Kalyvas et al, 2006; Schoon, 2006; McNeil, Frey & Embrechts, 2005).

The formulation of a definition about "teaching risk" or "risk in teaching" faces serious epistemological difficulties as the concept of "risk" is in a process of epistemological identification and evaluation within Didactics. Subsequently, the definition of "risk in teaching" follows the principles of interdisciplinarity, in terms that its theoretical framework is formed by borrowing terms and theories from other disciplines (Nissani, 1995), mainly such as Philosophy (in order to describe its ontological status), Mathematics (in order to include into the definition the concepts of probability and possibility), Pedagogy (in order to connect planning and processing teaching with risk) and Psychology (in order to highlight the decision-making process as a crucial feature to the forming theory).

Among many synonyms, the term “risk” has been defined in English lexicography as “hazard”, “danger”, “threat”, “menace”, “trouble”, “pitfall” and “distress”. In addition, it is defined as “chance of harm”, “probability of loss or injury”, “creation or suggestion of hazard”, “chance of negative consequences” (The Reader’s Digest Great Encyclopedic Dictionary, 1964; Funk & Wagnalls, 1970; Thompson, 1993 Partridge, 2006·Merriam-Webster, 2016)<sup>1</sup>.

The etymology of the word “risk” goes back to the medieval Italian verb “riscare” or “risicare”, which literally means “to be in danger to throw the ship into a reef” and associates risk with seamanship (Babiniotis, 2010). Respectively, the above medieval Italian verb draws its roots (a) to the modern Greek noun “risikon” (= luck, destiny), (b) to the Latin “riscium”, “rischium”, “risicum” or “riscus” (= danger) or (c) to the Arabic “rizq”, which meant what God gives people to walk, connecting the concept of “risk” with that of destiny and daily survival (Du Cange, 1886; De Vaan, 2008; Mairal, 2020). It is also worth noting that the connection between risk, luck and danger can be found in the etymology of the word “hazard”, as a synonym for risk, which comes from the Arabic word “al zahr” (= dice), implying the participation of luck in determining the course of human life (Bernstein, 1998).

It is worth noting that the use of the term “risk” increases significantly in everyday life after the 1950s and this is probably due to the incorporation of the concept of risk into the basic theory of many sciences<sup>2</sup>.

Nevertheless, all these lexicographical definitions provide an initial conceptual basis for risk, but without specifying its structural features. These individual elements, on the one hand, reflect the way in which a society perceives risk and loss, and on the other hand do not reveal a scientific methodology through which knowledge is produced and action taken (Luhmann, 1991; Zinn & McDonald, 2018). However, in this text, the term risk is used as a danger or a probability of failure.

<sup>1</sup> See also: (1) Collins Dictionary: <https://www.collinsdictionary.com/dictionary/english-italian/risk> – accessed and retrieved: June 30, 2020, (2) Merriam-Webster online Dictionary: <https://www.merriam-webster.com/> – accessed and retrieved: June 30, 2020

<sup>2</sup> See <https://www.collinsdictionary.com/dictionary/english-italian/risk> – accessed and retrieved: June 30, 2020

Consequently, a generally functional definition of "risk in teaching" is that "risk in teaching" is an actual situation regarding the success or the failure of teaching process, the designing of which is a decision-making process. At the same time, decision-making as a structural feature of the "risk" concept is a procedure implemented by the teacher who structures the teaching design. All teacher's decisions on teaching procedures (and especially on teaching design) can be defined as "teaching decisions" and aim at minimizing or even avoiding the failure of the overall teaching process. However, "teaching decisions" are based on hypotheses that involve uncertainty. This element can be mitigated or predicted by a quantification of failure possibilities as well as measurements include probability (Zagkotas & Fykaris, 2017).

Teachers take "teaching decisions" both during the preparation and the course of teaching process as well. Successful preparation, however, requires an analysis of the overall teaching process regarding probable "risk in teaching" factors. Risk analysis in teaching is a complex process that takes into account a number of factors included in the teaching design procedures. Therefore, "risk in teaching" management is a part of teaching design based on information and data provided by "risk in teaching analysis", aiming at reducing or, if possible, avoiding any negative effects on learning outcomes.

## **2. The "Risk in Teaching" ontology**

Learning as a process of changing behavior through the acquisition of new or existing knowledge, skills, behaviors and values (Gross, 2010) is the main goal of the teaching process and as a concept is characterized by a variety of approaches. In particular (Woolfolk, 2017; Schunk, 2009; Slavin, 2007):

- The behavioral learning theories consider knowledge as a change in behavior that is acquired through a permanent, stable and controlled process of stimulation.
- The cognitive theories of learning focus on learning as the creation of organized internal structures that are developed in the process of acquiring and coding knowledge.

- The socio-cognitive theories of learning consider knowledge as a change of behavior that takes place within specific socio-cultural contexts, in which students interact by implementing specific activities.
- Constructivism considers that knowledge involves the characteristic of relativity, aiming at cultivating those skills that can lead to the solution and application of problems.

Although learning theories approach the teaching process, focusing either on the outcome or on the nature of the process, the pursuit of a successful outcome can be considered as a common denominator for both, while focusing on the role of the teacher on planning teaching. Based on this finding, it is pointed out that learning theories bring to the fore the “decision” (through the focus on the role of the teacher) and the “result” as structural features of risk in teaching.

Learning is an internal process, the result of which can only be assumed, as the change of behavior is the only external element that can be used to assess its effectiveness. In addition, teaching takes place through communicative situations and is a dynamic situation characterized by the element of the unpredictable and the unique (Cohen, 2011). This means that the ongoing procedure of teaching involves, in addition to expected, possible adverse developments, the existence of which reinforces uncertainty and is therefore linked to the concept of "risk" (Zagkotas & Fykaris, 2017; Shapiro & Stefkovich, 2016). In this way, learning theories highlight uncertainty and probability as two additional structural features of risk in teaching.

Based on the above, “risk in teaching” can be considered as a real situation that concerns the success or failure of teaching, the organization of which is a decision-making process. At the same time, the decision - as a structural feature of the "risk" - belongs to the teacher, who carries out the teaching plan. The teacher's decisions are aimed at mitigating and/or preventing unwanted developments during the process. However, the teacher's decisions are based on assumptions that include the element of uncertainty, but also on measurements that contain the element of measurable probability.

### 3. The analysis of teaching design as an approach to “risk in teaching”

The term "teaching design" sometimes refers to as "teaching plan", "lesson design", "learning design", "teaching plan", “lesson plan” or a combination of the above. Since the 1960s, some scholars use the term "instruction" instead of "teaching", referring to "instructional design" in order to describe a process that includes all factors that influence learning, not just those who influence the teacher. Within this framework, a "teaching design" is a systematic procedure that aims to activate and support learning along with a better development of all students’ capabilities (Gagné, Briggs & Wager, 1992).

The combination of the above definitions leads to the conclusion that "teaching design" is considered as a decision-making process concerning a systematic planning of teaching in order to be as effective as possible. This achievement requires study and investigation of all information related to the teaching procedure regarding the didactic objectives. On this basis, the “teaching decision-making process” focuses on the organization of the teaching and learning actions and activities, aiming at reflecting, re-reflecting, evaluating the preceded processes and planning the actions that follow (Fykaris, 2010).

This core-analysis of “teaching design” helps the teacher to avoid endangering learning itself and learning outcomes by ensuring, according to Jacobsen, Eggen & Kauchak (2009):

- A continuity within the process of teaching
- An effective use of teaching time.
- The ability to teachers to take into account the needs of their students.
- A response to local and national policy guidelines.
- A predetermination of learning sources (e.g. printed and digital material).
- A possible interdisciplinary approach to teaching.

Based on the above perspective, teaching design is a process of examining a number of factors that need to be taken into account so as not to put the outcome of teaching under risk.

#### **4. The analysis of “risk in teaching” as an interdisciplinary process**

Teaching design is a difficult and systematic process in which the teacher uses information on the teaching conditions in long and short term. For this reason, the analysis of "risk in teaching" can be characterized as an interdisciplinary process. In order to clarify the nature of this interdisciplinarity, it is pointed out that the information offered by medical science or even those related to medicine, referring to the health and biological development of students, can be used to achieve learning by these students. Similarly, Psychology can provide information and knowledge useful for the planning of teaching and ultimately for learning as the exported product of the teaching procedure (Feldman, 2016; Keely & Fox, 2009; Karande & Kulkarni, 2005; Wachs, 2002; Brown & Pollitt, 1994; McDonald et. al., 1994)

In this perspective, the contribution of Linguistics is particularly important given that language improvement involves the overall acquisition of basic and complex language skills through which the child controls and regulates his behavior (Feldman, 2016; Watts, Cockcroft & Duncan, 2009). Subsequently, the student's behavior and the perception of his / her self-image regulates his / her relationship with other people with whom he / she attempts to communicate and interact (Bentham, 2002; Edwards, 1998).

The influence of family is a very important context regarding the configuration of self-image. In the same way, the type of relationships a student develops with other people, along with his / her perceptions about school and the intended learning product both as knowledge and as measurable performance are equally important within the self-image context. The last one consists a level of positive or negative performance imposed or required by school in order to classify its students in levels or classes of performance, corresponding to the classification of social status received by the members of a social context. However, achieving high performance implies a wider engagement of students with learning sources within the school context, which is a procedure that takes time. This, however, restricts the student's leisure time,



which is a timeframe in which he / she can engage in activities that help to develop his personality and improve the image of himself / herself, and, above all, satisfy and thank him / her (Freire, 2013). In this field, the contribution of both Sociological Research and Social Psychology is extremely important because they provide appropriate tools for detecting parameters of performance or school stress, or even information about the overall learning and school environment psychological climate (Frones, 2016; Sociology Reference Guide, 2011).

### **5. “Riskology of Teaching” as an interdisciplinary scientific field**

The analysis of all above factors that are consistent with the reduction of the risk of the teaching outcome ("risk in teaching" analysis) puts the teacher in the forefront as a teaching design key factor (Reigeluth, 2012), given that the teacher:

- Design and predetermine the students' work during teaching.
- Facilitates the learning process by helping the learner in his / her study plan and by supporting him / her when necessary, reinforcing his / her reflection and material and resources.
- He/she is a mentor, taking care of the full and multilateral development of the students.

Therefore, prior to any teaching design, the teacher is asked to evaluate his / her own didactic readiness, to use his / her own teaching experiences and to take into account a possible occurrence of anxiety or professional burnout. On this basis, this article highlights the position of Huang (2013), who proposes the scientific field of “Experimental Riskology”, which is involved in conducting modeling experiments that detect and help manage risk factors. For Huang, "risk" is a scene in the future, related to some events that have already occurred (Huang, 2013).

Within this context, the analysis of "risk", as an interdisciplinary point of scientific intersection, as documented in this paper, can consist a separate field of research and development of research tools. Similarly, research on teaching methodology can lead to the formation of "Riskology of Teaching", through which new epistemological

teaching design bases can be developed by exploiting analytical and management data and information about "risk in teaching".

## **6. The scientific delimitation of “Riskology in Teaching”**

The term "Riskology in Teaching" is inadequate as an epistemological term. This paper supports that “Riskology in Teaching” is a new field that creates abilities of a greater contribution to the management of “risk in teaching”, through an analysis of all factors that a teacher can involve in designing and implementing teaching. The definition of "risk in teaching" draws its roots in the field of Lexicography, where "risk" is defined as hazard, chance of negative consequences, jeopardy, peril, chance of harm, danger, venture, etc. (Reader’s Digest; Collins Gem Dictionary of Synonyms and Antonyms; Standard Dictionary of the English Language; Merriam-Webster Dictionary).

“Risk in teaching” also finds roots in the field of Economic Sciences, where “risk” is distinguished from the concept of "uncertainty" (Kirchler et al, 2017; Knight, 1964). This distinction has created procedures that measures and assess costs and benefits (Aven & Renn, 2010; Schoon, 2006; Althaus, 2005; Renn, 1998).

As a consequence of the definition of risk in teaching, “Riskology of Teaching” as a term could be defined as the study of all the conditions related to the identification, analysis and management of risk in teaching. This term is an epistemological neologism, as the literature on teaching risk is extremely deficient or non-existent. In addition, the ending -ology gives orientation to scientific study and is found in the international literature in an article by C. Huang (2013), which proposes Experimental Riskology as a new field in risk analysis.

## **7. The application of the scientific method to the epistemological basis of the "Riskology of Teaching" suggestion**

The new scientific field of "Riskology of Teaching", as presented in this article, the "scientific method" is used in the form applied to other sciences, in particular: 1. Formulation of a scientific question 2. Development of hypotheses 3. Determining predictions, 4. Making observations or applying experiments 5. Analyzing the results of observations or experiments 6. Exporting findings in relation to the original

hypothesis (Gauch, 2003; Popper, 2002). Extensively, for each factor in the teaching design, assumptions and predictions of effectiveness in teaching can be made, along with limiting or even eliminating possible “risks”. This information can either be enhanced by the existence of recording data, or can form a basis for future records.

In addition, teaching design in its overall is a methodical process, which is analyzed in stages with a final excerpt of the plan of a single lesson chapter or a wider, long-term design such as a whole semester course. On this basis, models of teaching design have been built up, which were applied either to the design of an hourly teaching or, in the case of instructional design models, to the design of an entire educational system (Dick, Carey & Carey, 2015; Larson & Lockee, 2014; Morrison, Ross, Kalman & Kemp, 2001; Klafki, 2000; Gagné, Briggs & Walter, 1992). The contribution of "Riskology of Teaching" can lead to the production of new teaching design models that will include “risk in teaching” analysis and will help reduce a possible failure of learning outcomes.

## **8. The articulation of “Riskology of Teaching” theoretical propositions**

The use of the scientific method in the epistemological structure of the "Riskology of Teaching" contributes to the creation of theoretical foundations of documentation and epistemological essence. In this context, "Riskology of Teaching" analyzes data in order to articulate a theoretical teaching suggestion, which is expected to be verified during the teaching process. The frequency of this verification can potentiate the forecast. However, without prediction, there would be no theoretical proposition. In this way, the field of "Riskology of Teaching" can create theoretical frameworks that can be investigated by the scientific method or, in other words, bring forward a set of laws that allow the explanation of teaching phenomena beyond the data provided by phenomenological methods.

The epistemological basis of this approach is found on the views of Rene Descartes, who attempted to formulate scientific rules by using key elements of Mathematics in order to: (Descartes, 1637, part B, chapters 22-25 in the 1987 edition by Librairie Philosophique):

- Avoid rush and prejudice in the decisions about truth ("d 'eviter soigneusement la precipitation")

- Split difficulties into individual elements so that they can be better studied ("de diviser chacune des difficultés")
- Form an orderly course of thought from the simplest to the most complex problem ("de conduire par ordre mes pensées"),
- Keep reviews and enumerations regularly to ensure that the process is properly followed ("de faire partout de dénombrements et des revues si générales").

Generally, the concept of "Riskology of Teaching" is epistemologically structured in four pillars: The first one concerns the basic aim which is avoiding "risk in teaching" as much as possible so that the learner is led to the acquisition of learning outcomes. In this direction, the management of "risk in teaching" aims to help the student to seamlessly seek the truth.

The second pillar focuses on the fact that identifying "risk in teaching" requires an analysis of the individual parameters of teaching.

The third pillar considers teaching design as a regular course of thinking, starting from "what" and "for what objective" [do I teach?], i.e. the content or the teaching objectives, in order to plan in detail each teaching phase. The content is broken down into sub-elements from the general to the specific, as well as the teaching objectives are formulated on the basis of more general purposes as defined by the curricula. Therefore, the teacher needs to make decisions (Jacobsen, Eggen & Kauchak, 2009) and identify "risk in teaching" factors that can lead teaching into failure.

Finally, the fourth pillar concerns the type and context of the assessment as a process of measuring and evaluating data along with identifying the limits of teaching design (Scheerens, Glas & Thomas, 2005).

## **9. Epistemological models of "Riskology of Teaching"**

Referring to science, Thomas Kuhn, emphasizes on the need to study namely the "anomalies, or violations of expectation," and stresses that explanations must be given about crises caused by "repeated failure" (Kuhn, 1970: ix). In addition, he notes that the scientific community adopts new "paradigms" since they offer solutions to both

old and outstanding scientific problems and to possible emerging "anomalies" (Kuhn, 1970: 169).

However, the question that arises is whether "Riskology of Teaching" can meet these two requirements to become an innovative scientific field. The answer to this question can be found in the abilities "Riskology of Teaching" in solving problems adapted to each of the three classes of theoretical scientific problems that Kuhn puts. In particular Kuhn identifies these categories as the determination of a significant fact, the matching of facts with theory, and the articulation of theory (Kuhn, 1970: 34). The scientific documentation of "Riskology of Teaching" contributes to a development of theoretical techniques and application procedures by the new scientific field suggested in this paper in each of the above three fields.

In particular, regarding the first category, "Riskology of Teaching" parametricises the teaching design with specific but different in each case criteria related to the dynamics involved in each "risk in teaching" factor (the student, the teacher, the content of learning and the learning environment). In this way, the most important potential "risk in teaching" factors on the effectiveness of teaching are being predicted, highlighted, hierarchized and analyzed in order to design a priori alternative approaches for each "risk" case separately.

As far as the second category of scientific problems, "Riskology of Teaching" creates a wide database which is constantly updated and has the potential to confirm or modify theoretical suggestions on a scientific question. This agreement or inconsistency between predictions and final data provides opportunities to review and optimize teaching as a whole while enriching the teacher's experience.

As to the third category, "Riskology of Teaching" is a specific field of application, with its own terminology. This fact results to an a priori rejection of vaguenesses and to an articulation of reasonable theoretical propositions, while at the same time possible future reformulations are being conceptually delineated (Rey & Sager, 1995).

Kuhn sees these theoretical problems as "normal", because they represent the greatest number of problems in science. Combined to them, there are more "extraordinary" problems that occur in special circumstances and their resolution adds value to science itself (Kuhn, 1970: 34). "Riskology of Teaching" aims at identifying unusual

and unpredictable situations in the teaching process, providing for the teaching activities that can prevent the influence of these “extraordinarities” on the effectiveness of teaching. In this way, the teacher as a scientist studies and suggests solutions to "expected violations" by calculating, on the one hand, the type and the extent of the "anomaly", and, on the other hand, by presenting these theoretical considerations to applied tests through which the theory itself is adapted and rebuilt.

Kuhn also pointed out that, although the outcome of many research efforts is predictable, the emergence of an innovative way of solving a problem is a successful response to a new scientific challenge (Kuhn, 1970: 35-36). On this basis, "Riskology of Teaching" approaches teaching design from a different starting point, which is to avoid "risk in teaching" as the basis for a further organization of the teaching process. This approach has so far not been identified in the international literature and is a *per se* innovative attempt to respond to a basic scientific question of Pedagogy, which concerns teaching methodology and summarizes into the question: "How can the success of teaching process be ensured?"

In order to answer this question, "Riskology of Teaching" borrows basic elements of its theoretical basis from other scientific fields and innovates not because it introduces elements of these sciences to Pedagogy but because it creates an extension of an interdisciplinary character to the science of Pedagogy itself towards an autonomous field of the methodology of teaching. This expansion is determined with increasingly precision as long as the achievements of "Riskology of Teaching" concern both diachronic and "extraordinary" scientific questions. Thus, "Riskology of Teaching" brings to the fore decision-making, which it attempts to relate to risk analysis. In this context, but also on the basis of Kuhn's position that scientific research is guided by direct modeling as well as through abstracted rules (Kuhn, 1970: 47), "Riskology of Teaching", develops its own decision models borrowed from other scientific fields.

In particular, in the case of "Riskology of Teaching", the following decision-making models at risk can be accepted:

“Normative” decision-making are models based on considerations about which decision is correct. These considerations derive by the question "How should people behave in a risk-involved situation?" (Koheler & Harvey, 2004). These models are

mainly based on quantitative data, which primarily analyze the relationship between the benefits and losses of a decision<sup>3</sup>. Within this framework, decision-making, as a process, draws epistemological support from rationalism. In other words, it expresses evolutionary stages, essentially linear, where each stage involves different purposes and processes. Since the early 20th century, Dewey (1910) has proposed a five-step linear process that one can follow in order to make a decision. Subsequently, several researchers<sup>4</sup> will continue to formulate decision-making models based on rationality. Most converge to the following process: (a) Initially identify the problem / issue / topic to be processed; (b) Then develop the alternatives; (c) Next, select the most appropriate of the alternatives with basic criteria the correlation between the achievement of teaching objectives and the possible consequences of its implementation; (d) Thereafter, the decision is followed by an action plan, and (e) the result is evaluated in order any experience resulting from the process to be exploitable.

The second category of models is “descriptive” decision-making models based on considerations of how decisions are made by people. The first model of this kind was formulated in 1956 by Herbert Simon, who made the three-step decision process: (a) Intelligence, i.e. recognition of a situation requiring a decision and gathering of relevant information; (b) Design, i.e. the development of alternative possibilities for action, and (c) Choice, i.e. the selection of one of these possibilities (Arwerg, 2008). In 1979, Kahneman & Tversky formulated “Perspective Theory”, according to which individual decisions are more reliant on the prospect of profit than with on the prospect of an apparent loss, because people are negatively prejudiced against losses (Cox, 2015; Kahneman & Tversky, 1979 & 1984).

By reviewing the key factors in teaching design, "Riskology of Teaching" is expected to use the descriptive models to a greater extent because they favor qualitative research instead of quantitative, using a series of corresponding data. However, quantitative data, such as student performance grades, must be taken into serious consideration, as they present information that can lead to predictions and, in this way, contribute to the effectiveness of teaching by limiting “risk in teaching” factors.

<sup>3</sup>See Bhushan & Rai, 2004 for an overview of the most commonly used quantitative models.

<sup>4</sup>See Bhushan & Rai (2004), Clemen & Reilly (2004), Gruning & Kuhn (2005). Especially Adair (2007) describing the “Bridge-Model”.

## **10. The Teacher as manager of risk vs teacher as a risk taker. An emerging dipole.**

A structural-phenomenological approach to the individual's tendency to take risks has been formulated by Michael Apter in the late 20th - early 21st century by the name "Reversal Theory". Apter explored the motivations, emotions, and characteristics of the human personality involved in risk-taking, concluding that people face two different psychological states associated with risk. The first condition is the tendency to avoid risk, as this is experienced as something unpleasant and stressful. In this case, the risk is avoided as self-protection and arousal-avoidance motives are stimulated. The second situation is diametrically opposed to the first and favors a view of risk as a stimulus to pleasant emotions. In this case, the risk is attempted as it leads to arousal-seeking. Individuals who experience situations assess them sometimes under the first and sometimes under the second condition (Apter, 2007; Apter, 2001).

Although motivation seems to play an important role in the decision to take or avoid risk, the meta-motivational psychological state of the individual emerges as the most decisive factor in characterizing risk as attractive or not. This is the final assessment of a risk situation in which the experience is described as pleasant or unpleasant. In this way, the individual's internal tendency to avoid risks can be reversed ("reverse") and turned into a risk-taking trend (Apter, 2007) - and vice versa.

Based on the above theory, Llewellyn (2003) distinguished three categories of individuals based on the desire to take risks: (a) those who avoid any risk-taking action ("risk avoiders"), by rejecting risk as unacceptable and unjustified, (b) those involved in an action despite the apparent risk ("risk reducers"), by considering risk as undesirable but –yet- unavoidable, and (c) those who are triggered by the existence of risk in a forthcoming action ("risk optimizers") and try to reduce it as much as possible.

As for the teacher himself, moving between dipoles such as risk taking or risk avoiding (risk manager vs risk taker) he experiences risk in teaching either as unpleasant and stressful or as pleasant and fun (Alexakos, 2015). However, the important issue is -according to Apter- the way in which the teacher evaluates each time his experience from taking a risk in teaching (Apter, 2007). The final assessment



of the teaching experience regarding the existence of "risk" reinforces the metacognitive process of reflection on the basis of which the teacher has the opportunity to differentiate his pre-existing perceptions (Alexakos, 2015; Glava & Glava, 2011). This is because the experience offered by avoiding risk is different from the experience of taking it: avoiding risk requires prior study and waiting for a specific outcome of the teaching, while taking it involves greater uncertainty and has the potential to test its reflexes teacher in unpredictable situations. This latter finding can either strengthen the teacher's self-confidence or weaken it (Bohning & Hale, 1998). Even so, owning one is still beyond the reach of the average person. still looking for it (risk-optimizer).

To conclude, "Riskology of Teaching" is being suggested by this paper as a new scientific field that can be a branch of a more general science under the name "Riskology". Our suggestion draws its roots to the Huang (2013) concept of "Experimental Riskology", a scientific field in which models are created through which experiments are conducted and conclusions are drawn on the nature and the management of risk. Respectively, "Riskology of Teaching" can develop its own models that analyze the individual factors of teaching design in identifying and managing "risk in teaching". The latter, together with the "teaching decision", are the first elements of the "Riskology of Teaching" terminology, which, in addition to terminology and models, can apply scientific methods and create its own theories.

By incorporating the basic structural elements of other disciplines, "Riskology of Teaching" tries to limit the "violations of expectation" which Kuhn has noted, in order to reduce risk of learning outcomes and qualitative upgrade teaching procedure. On this basis, the scientific dialogue remains to be developed, not only in the field of "Riskology of Teaching" as a scientific discipline, but also in "Riskology" as an autonomous science as well. Finally, Riskology of Teaching can pose a role-dilemma to the teacher in order to avoid or undertake risks in planning and processing teaching.

**REFERENCES:**

- Adair J. (2007). *Decision Making & Problem Solving Strategies*. London & Philadelphia: Kogan Page
- Alexakos, K. (2015). *Being a teacher – researcher. A primer on doing authentic inquiry research on teaching and learning*. Rotterdam, Boston, Taipei: Sense Publishers
- Althaus C.E. (2005). A disciplinary perspective on the epistemological status of risk, *Risk Analysis* 25(3), pp. 567–88.
- Apter, M.J. (2007). *Reversal Theory: The Dynamics of Motivation, Emotion and Personality*. Oxford: Oneworld Publications
- Apter, M.J. (Ed.) (2001). *Motivational Styles in Everyday Life: A Guide to Reversal Theory*. Washington, D.C.: American Psychological Association. DOI: <https://doi.org/10.1037/10427-001>
- Arwerg, U.R. (2008). Decision Support Systems and Decision-Making Processes. Chapter in: Adam F. & Humphreys P. *Encyclopedia of Decision-Making and Decision Support Technologies*. Hershey, New York: Information Science Reference, pp. 218-224
- Babinotis, G. (2010). Etymologiko Lexiko tis Neas Ellinikis Glossa (Etymological Dictionary of Modern Greek Language). Athens: Kentro Lexikologias
- Bechtel R. & Churchman A. (2002). *Handbook of Environmental Psychology*. New York: John Wiley & Sons
- Bentham S. (2002). *Psychology in Education*. Routledge Modular Psychology Series. Hove: Routledge
- Bernstein, P. (1998). *Against the Gods. The remarkable story of risk*. New York: John Wiley & Sons, Inc.

- Bhushan N. & Rai K. (2004). *Strategic Decision Making. Applying the Analytic Hierarchy Process*. London, Berlin, Heidelberg, New York, Hong Kong, Milan, Paris, Tokyo: Springer
- Bohning, G. & Hale, L. (1998). Images of self-confidence and the change-of-career prospective elementary science teacher. *Journal of Elementary Science Education* 10 (1), pp. 39-59
- Brown J. & Pollitt E. (1996). Malnutrition, poverty and intellectual development. *Scientific American* 274, pp. 38-43.
- Clemen R.T. & Reilly T. (2004). *Making Hard Decisions with Decision Tools*. Australia, Canada, Singapore, Spain, United Kingdom, United States: Duxbury Thompson Learning
- Cohen, D.K. (2011). *Teaching and its Predicaments*. Cambridge, Massachusetts, and London, England: Harvard University Press
- Collins Dictionary: <https://www.collinsdictionary.com/dictionary/english-italian/risk>—accessed: June 30, 2019
- Cox L.A. Jr. (2015). *Breakthroughs in Decision Science and Risk Analysis*. New Jersey: Wiley
- De Vaan, M. (2008). *Etymological Dictionary of Latin and other Italic Languages*, Leiden & Boston: Brill
- Descartes R. (1637). *Discours de la Methode. Texte et Commentaire par Etienne Gilson*, 1987, Paris: Librairie Philosophique J. Vrin
- Dewey J. (1910). *How we think*. Boston, New York, Chicago: D.C. Heath & Co
- Dick W., Carey L. & Carey J. (2015). *The Systematic Design of Instruction*. Boston, Columbus, Indianapolis, New York, San Francisco, Upper Saddle River, Amsterdam, Cape Town, Dubai, London, Madrid, Milan, Munich, Paris, Montreal, Toronto, Delhi, Mexico City, Sao Paulo, Sydney, Hong Kong, Seoul, Singapore, Taipei, Tokyo: Pearson

- Du Cange, D. (1886) *Glossarium mediae et infimae latinitatis*. R-S. Vol. 7. Επιμέλεια: Carpenterii, D.P. & Henschel, G.A.L. Niort: Impr. L. Favre
- Edwards V. (1998). *The power of Babel. Teaching and learning in multilingual classrooms*. Staffordshire: Trentham Books Ltd
- Feldman R. (2016). *Development across the lifespan*. Boston, New York, San Francisco, Mexico City, Montreal, Toronto, London, Madrid, Munich, Paris, Hong Kong, Tokyo, Cape Town, Sydney: Pearson
- Frones I. (2016). *The Autonomous Child. Theorizing Socialization*. Cham, Heidelberg, New York, Dordrecht, London: Springer
- Funk & Wagnalls (1970). *Standard Dictionary of the English Language. Vol. 2*. New York: Funk & Wagnalls
- Fykaris I. (2010). Syghrones diastaseis tou didaktikou ergou kai rolou tou ekpaideftikou. Oria kai dynatotites. (Modern dimensions of the teaching work and the role of the teacher. Limits and abilities). Thessaloniki: Afoi Kyriakidi (book in Greek)
- Gagne R., Briggs L. & Wager W. (1992). *Principles of Instructional Design*. Fort Worth, Philadelphia, San Diego, New York, Orlando, Austin, San Antonio, Toronto, Montreal, London, Sydney, Tokyo: Harcourt Brace College Publishers
- Gauch H. G. Jr. (2003). *Scientific Method in Practice*. Cambridge: Cambridge University Press
- Germanos D. (1993). Choros kai diadikasies agogis. I pedagogiki poiotita tou chorou (Enviromnent and educational processes. The pedagogical quality of learning environment). Athens: Gutenberg (book in Greek)
- Glava, C.C. & Glava, A.E. (2011). Development of metacognitive behavior of future teacher students through electronic learning diaries as means of self-reflection. *Procedia Computer Science* 3, pp. 649–653

- Gross, R. (2010). *Psychology: The Science of Mind and Behaviour*. London: Hodder Education
- Grünig R. & Kühn R. (2005). *Successful Decision-making. A Systematic Approach to Complex Problems*. Berlin, Heidelberg, New York: Springer
- Huang C. (2013). Experimental Riskology: A New Discipline for Risk Analysis. *Human and Ecological Risk Assessment* 19, pp. 389-399
- Ishitani, T. T. (2008). How to explore timing of intervention for students at risk of departure. *New Directions for Institutional Research* 137, pp. 105–122. doi:10.1002/ir.241
- Jacobsen D., Eggen P. & Kauchak D. (2009). *Methods of Teaching. Promoting Student Learning in K-12 Classrooms*. Boston, New York, San Francisco, Mexico City, Montreal, Toronto, London, Madrid, Munich, Paris, Hong Kong, Tokyo, Cape Town, Sydney: Pearson
- Kahneman D. & Tversky (1984). Choices, Values, and Frames. *American Psychologist* 39 (4), pp. 341-350
- Kahneman D. & Tversky A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica* 47 (2), pp. 263-292
- Kalyvas, L., Akkizidis, I., Zourka, I. & Bouchereau, V. (2006). *Integrating market, Credit and operational Risk*. Risk Books.
- Kirchler M., Andersson D., Bonn C., Johannesson M., Sorensen, Stefan M., Tinghog G., Vastfjall D. (2017). The effect of fast and slow decisions on risk-taking. *Journal of Risk Uncertain* 54, pp. 37-59, DOI 10.1007/s11166-017-9252-4
- Klafki W. (2000). Didaktik analysis as the core of preparation of instruction. Chapter in: Ian Westbury, Stefan Hopmann & Kurt Riquarts (eds.): *Teaching as a Reflective Practice: The German Didaktic Tradition*, pp. 139-159. Mahwah: Lawrence Erlbaum Associates Inc. Publishers
- Knight F. (1964). *Risk, uncertainty and profit*. New York: Augustus Kelley.

- Koehler D.J. & Harvey, N., Eds. (2004). *Blackwell Handbook of Judgment and Decision Making*. Malden, MA: Blackwell Publishing
- Kuhn T.S. (1970). *The Structure of Scientific Revolutions*. Chicago & London: The University of Chicago Press
- Kyhtreotis, A., Pashiardis, P. & Kyriakidis, L. (2010). The influence of school leadership styles and culture on students' achievement in Cyprus primary schools. *Journal of Educational Administration* 48 (2), pp. 218-240
- Larson M. & Lockee B. (2014). *Streamlined ID. A practical guide to Instructional Design*. New York & London: Routledge
- Llewellyn, D.J. (2003). *The Psychology of Physical Risk-Taking Behavior. Doctoral Thesis*. University of Strathclyde, Glasgow, U.K.
- Louvar F & Louvar D. (1998). *Health and Environmental Risk Analysis: Fundamentals with Applications*. Upper Saddle River, NJ: Prentice Hall Books
- Luhmann, N. (1991). *Soziologie Des Risikos*. Berlin & New York: Walter de Gruyter
- Mairal, G. (2020). Has Risk a History? Κεφάλαιο στο: Ghosh, B. & Sarkar, B. (Eds). *The Routledge Companion to Media and Risk*. New York: Routledge, pp. 27-45
- McDonald M.A., Singman M., Espinosa M. & Neumann C. (1994). Impact of a Temporary Food Shortage on Children and their Mothers. *Child Development* 65, pp. 404-415
- McNeil, A., Frey, R. & Embrechts, P. (2005). *Quantitative Risk Management. Concepts, Techniques and Tools*. Princeton and Oxford: Princeton University Press
- Merriam-Webster online Dictionary: <https://www.merriam-webster.com/> – Accessed: June 30, 2019
- Merriam-Webster's Advanced Learner's English Dictionary (2016). Merriam-Webster, Incorporated

- Morrison G., Ross S., Kemp J., & Kalman H. (2010). *Designing effective instruction*. John Wiley & Sons
- Nissani, M. (1995). Fruits, Salads, and Smoothies: A Working definition of Interdisciplinarity. *The Journal of Educational Thought - Revue de la Pensée Éducative* 29 (2), pp 121–128
- O'Hagan-Lobb M. (1982). Seating arrangement as a predictor of small group interaction. *Journal of Advanced Nursing* 7, pp. 163-166
- Partridge, E. (2006). *Origins. A Short Etymological Dictionary of Modern English*. London & New York: Routledge
- Popper K. (2002). *Conjectures and Refutations: The Growth of Scientific Knowledge*, London and New York: Routledge
- Reigeluth C. (2012). Instructional Theory and Technology for the New Paradigm of Education. *RED, Revista de Educación a Distancia. Número 32*. 30/09/2012. Ανακτήθηκε (26/06/2018) από το <http://www.um.es/ead/red/32>
- Renn O. (1998). Three decades of risk research: accomplishments and new challenges. *Journal of Risk Research* 1 (1), pp. 49-71
- Rey A. & Sager J. (1995). *Essays on terminology*. Amsterdam, Philadelphia: John Benjamins
- Rosenfield P., Lambert N. & Black A. (1985). Desk Arrangement on Pupil Classroom Behavior. *Journal of Educational Psychology* 77 (1), pp. 101-108
- Sagor, R. & Cox, J. (2004). *At-Risk Students. Reaching and Teaching Them*. London & New York: Routledge
- Scheerens J., Glas C. & Thomas S. (2005). *Educational Evaluation, Assessment, and Monitoring. A Systemic Approach*. Lisse, Abingdon, Exton, Tokyo: Swets & Zeitlinger
- Schoon I. (2006). *Risk and Resilience*. New York: Cambridge University Press

- Schunk, D. H. (2009). *Learning Theories. An Educational Perspective*. London: Pearson Publications
- Shapiro, J.P. & Stefkovich, J. (2016). *Ethical Leadership and decision making in education*. London, Malwah, New Jersey: Lawrence Erlbaum Associates Publishers
- Sociology Reference Guide. The Process of Socialization. Pasadena, CA & Hackensack, NJ: Salem Press
- Taggart, B., Sammons, P., Smees, R., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Elliot, K. & Lunt I. (2006). Early identification of special educational needs and the definition of ‘at risk’: The Early Years Transition and Special Educational Needs (EYTSN) Project. *British Journal of Special Education* 33 (1), pp. 40-45
- The Reader’s Digest Great Encyclopedic Dictionary (1964). Vol.2, London, Montreal, Cape Town: The Reader’s Digest Association
- Thompson, D. (Ed.) (1993). *The Oxford Dictionary of current English*. Oxford, New York, Toronto, Delhi, Bombay, Calcutta, Madras, Karachi, Kuala Lumpur, Singapore, Hong Kong, Tokyo, Nairobi, Dar Es Salaam, Cape Town, Melbourne, Auckland, Madrid, Berlin: Oxford University Press
- Watts J., Cockcroft K. & Duncan N. (2009). *Developmental Psychology*. Cape Town: UCT Press
- Woolfolk, A. (2017). *Educational Psychology*. Boston, Columbus, Indianapolis, New York, San Francisco, Amsterdam, Cape Town, Dubai, London, Madrid, Milan, Munich, Paris, Montreal, Toronto, Delhi, Mexico City, São Paulo, Sydney, Hong Kong, Seoul, Singapore, Taipei, Tokyo: Pearson
- Zagkotas V. & Fykaris I. (2017). The “risk in teaching process” or the “didactic risk”: Views of the Greek teachers. *International Journal of Social Sciences and Educational Research*, Vol. 3(4), pp. 1068-1081.
- Zinn, J. O. & McDonald, D. (2018). *Risk in The New York Times (1987–2014). A corpus-based exploration of sociological theories*. Cham: Palgrave MacMillan.