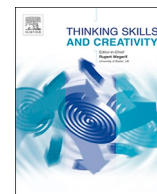




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Problem solving through values: A challenge for thinking and capability development

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ABSTRACT

The paper aims to introduce the conceptual framework of problem solving through values. The framework consists of problem analysis, selection of value(s) as a background for the solution, the search for alternative ways of the solution, and the rationale for the solution. This framework reveals when, how, and why is important to think about values when solving problems. A consistent process fosters cohesive and creative value-based thinking during problem solving rather than teaching specific values. Therefore, the framework discloses the possibility for enabling the development of value-grounded problem solving capability. The application of this framework highlights the importance of responsibility for the chosen values that are the basis for the alternatives which determine actions. The 4W framework is meaningful for the people's lives and their professional work. It is particularly important in the process of future professionals' education. Critical issues concerning the development of problem solving through values are discussed when considering and examining options for the implementation of the 4W framework in educational institutions.

1. Introduction

The core competencies necessary for future professionals include problem solving based on complexity and collaborative approaches (OECD, 2018). Currently, the emphasis is put on the development of technical, technological skills as well as system thinking and other cognitive abilities (e.g., Barber, 2018; Blanco, Schirmbeck, & Costa, 2018). Hence, education prepares learners with high qualifications yet lacking in moral values (Nadda, 2017). Educational researchers (e.g., Barnett, 2007; Harland & Pickering, 2010) stress that such skills and abilities (*the how?*), as well as knowledge (*the what?*), are insufficient to educate a person for society and the world. The philosophy of education underlines both the epistemological and ontological dimensions of learning. Barnett (2007) points out that the ontological dimension has to be above the epistemological one. The ontological dimension encompasses the issues related to values that education should foster (Harland & Pickering, 2010). In addition, values are closely related to the enablement of learners in educational environments (Jucevičienė et al., 2010). For these reasons, *'the why?'* based on values is required in the learning process. The question arises as to what values and how it makes sense to educate them. Value-based education seeks to address these issues and concentrates on values transfer due to their integration into the curriculum. Yazdani and Akbarilakeh (2017) discussed that value-based education could only convey factual knowledge of values and ethics. However, such education does not guarantee the internalization of values. Nevertheless, value-based education indicates problem solving as one of the possibilities to develop values.

Values guide and affect personal behavior encompassing the ethical aspects of solutions (Roccas, Sagiv, & Navon, 2017; Schwartz,

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1992, 2012; Verplanken & Holland, 2002). Therefore, they represent the essential foundation for solving a problem. Growing evidence indicates the creative potential of values (Dollinger, Burke, & Gump, 2007; Kasof, Chen, Himself, & Greenberger, 2007; Lebedeva et al., 2019) and emphasizes their significance for problem solving. Meanwhile, research in problem solving pays little attention to values. Most of the problem solving models (e.g., Newell & Simon, 1972; Jonassen, 1997) utilize a rational economic approach. Principally, the research on the mechanisms of problem solving have been conducted under laboratory conditions performing simple tasks (Csapó & Funke, 2017). Moreover, some of the decision-making models share the same steps as problem solving (c.f., Donovan, Guss, & Naslund, 2015). This explains why these terms are sometimes used interchangeably (Huitt, 1992). Indeed, decision-making is a part of problem solving, which emerges while choosing between alternatives. Yet, values, moral, and ethical issues are more common in decision-making research (e.g., Keeney, 1994; Verplanken & Holland, 2002; Hall & Davis, 2007; Sheehan & Schmidt, 2015). Though, research by Shepherd, Patzelt, and Baron (2013), Baron, Zhao, and Miao (2015) has affirmed that contemporary business decision makers rather often leave aside ethical issues and moral values. Thus, 'ethical disengagement fallacy' (Sternberg, 2017, p.7) occurs as people think that ethics is more relevant to others. In the face of such disengagement, ethical issues lose their prominence.

The analysis of the literature revealed a wide field of problem solving research presenting a range of more theoretical insights rather empirical evidence. Despite this, to date, a comprehensive model that reveals how to solve problems emphasizing thinking about values is lacking. This underlines the relevance of the chosen topic, i.e. a challenge for thinking and for the development of capabilities addressing problems through values. To address this gap, the following issues need to be investigated: When, how, and why a problem solver should take into account values during problem solving? What challenges may occur for using such framework of thinking in different fields of education? Aiming this, the authors of the paper substantiated the conceptual framework of problem solving grounded in consistent thinking about values. The substantiation consists of several parts. First, different approaches to solving problems were examined. Second, searching to reveal the possibilities of values integration into problem solving, value-based approaches significant for problem solving were critically analyzed. Third, drawing on the effect of values when solving a problem and their creative potential, the authors of this paper claim that the identification of values and their choice for a solution need to be specified in the process of problem solving. As a synthesis of conclusions coming from the literature review and conceptual extensions regarding values, the authors of the paper created the coherent framework of problem solving through values (so called 4W).

The novelty of the 4W framework is exposed by several contributions. First, the clear design of overall problem solving process with attention on integrated thinking about values is used. Unlike in most models of problem solving, the first stage encompass the identification of a problem, an analysis of a context and the perspectives that influence the whole process, i.e. 'What?'. The stage 'What is the basis for a solution?' focus on values identification and their choice. The stage 'Ways how?' encourages to create alternatives considering values. The stage 'Why?' represent justification of a chosen alternative according particular issues. Above-mentioned stages including specific steps are not found in any other model of problem solving. Second, even two key stages nurture thinking about values. The specificity of the 4W framework allows expecting its successful practical application. It may help to solve a problem more informed revealing when and how the explication of values helps to reach the desired value-based solution. The particular significance is that the 4W framework can be used to develop capabilities to solve problems through values. The challenges to use the 4W framework in education are discussed.

2. Methodology

To create the 4W framework, the integrative literature review was chosen. According to Snyder (2019), this review is 'useful when the purpose of the review is not to cover all articles ever published on the topic but rather to combine perspectives to create new theoretical models' (p.334). The scope of this review focused on research disclosing problem solving process that paid attention on values. The following databases were used for relevant information search: EBSCO/Hostdatabases (ERIC, Education Source), Emerald, Google Scholar. The first step of this search was conducted using integrated keywords *problem solving model*, *problem solving process*, *problem solving steps*. These keywords were combined with the Boolean operator AND with the second keywords *values approach*, *value-based*. The inclusion criteria were used to identify research that: presents theoretical backgrounds and/or empirical evidences; performed within the last 5 years; within an educational context; availability of full text. The sources appropriate for this review was very limited in scope (N = 2).

We implemented the second search only with the same set of the integrated keywords. The inclusion criteria were the same except the date; this criterion was extended up to 10 years. This search presented 85 different sources. After reading the summaries, introductions and conclusions of the sources found, the sources that do not explicitly provide the process/models/steps of problem solving for teaching/learning purposes and eliminates values were excluded. Aiming to see a more accurate picture of the chosen topic, we selected secondary sources from these initial sources.

Several important issues were determined as well. First, most researchers ground their studies on existing problem solving models, however, not based on values. Second, some of them conducted empirical research in order to identify the process of studies participants' problem solving. Therefore, we included sources without date restrictions trying to identify the principal sources that reveal the process/models/steps of problem solving. Third, decision-making is a part of problem solving process. Accordingly, we performed a search with the additional keywords *decision-making* AND *values approach*, *value-based decision-making*. We used such inclusion criteria: presents theoretical background and/or empirical evidence; no date restriction; within an educational context; availability of full text. These all searches resulted in a total of 16 (9 theoretical and 7 empirical) sources for inclusion. They were the main sources that contributed most fruitfully for the background. We used other sources for the justification the wholeness of the 4W framework. We present the principal results of the conducted literature review in the part 'The background of the conceptual framework'.

3. The background of the conceptual framework

3.1. Different approaches of how to solve a problem

Researchers from different fields focus on problem solving. As a result, there still seems to be a lack of a conventional definition of problem solving. Regardless of some differences, there is an agreement that problem solving is a cognitive process and one of the meaningful and significant ways of learning (Funke, 2014; Jonassen, 1997; Mayer & Wittrock, 2006). Differing in approaches to solving a problem, researchers (Collins, Sibthorp, & Gookin, 2016; Jonassen, 1997; Litzinger et al., 2010; Mayer & Wittrock, 2006; O'Loughlin & McFadzean, 1999; ect.) present a variety of models that differ in the number of distinct steps. What is similar in these models is that they stress the procedural process of problem solving with the focus on the development of specific skills and competences.

For the sake of this paper, we have focused on those models of problem solving that clarify the process and draw attention to values, specifically, on Huiitt (1992), Basadur, Ellspermann, and Evans (1994), and Morton (1997). Integrating the creative approach to problem solving, Newell and Simon (1972) presents six phases: phase 1 - identifying the problem, phase 2 - understanding the problem, phase 3 - posing solutions, phase 4 - choosing solutions, phase 5 - implementing solutions, and phase 6 - final analysis. The weakness of this model is that these phases do not necessarily follow one another, and several can coincide. However, coping with simultaneously occurring phases could be a challenge, especially if these are, for instance, phases five and six. Certainly, it may be necessary to return to the previous phases for further analysis. According to Basadur et al. (1994), problem solving consists of problem generation, problem formulation, problem solving, and solution implementation stages. Huiitt (1992) distinguishes four stages in problem solving: input, processing, output, and review. Both Huiitt (1992) and Basadur et al. (1994) four-stage models emphasize a sequential process of problem solving. Thus, problem solving includes four stages that are used in education. For example, problem-based learning employs such stages as introduction of the problem, problem analysis and learning issues, discovery and reporting, solution presentation and evaluation (Chua, Tan, & Liu, 2016). Even PISA 2012 framework for problem solving composes four stages: exploring and understanding, representing and formulating, planning and executing, monitoring and reflecting (OECD, 2013).

Drawing on various approaches to problem solving, it is possible to notice that although each stage is named differently, it is possible to reveal some general steps. These steps reflect the essential idea of problem solving: a search for the solution from the initial state to the desirable state. The identification of a problem and its contextual elements, the generation of alternatives to a problem solution, the evaluation of these alternatives according to specific criteria, the choice of an alternative for a solution, the implementation, and monitoring of the solution are the main proceeding steps in problem solving.

3.2. Value-based approaches relevant for problem solving

Huiitt (1992) suggests that important values are among the criteria for the evaluation of alternatives and the effectiveness of a chosen solution. Basadur et al. (1994) point out to visible values in the problem formulation. Morton (1997) underlines that interests, investigation, prevention, and values of all types, which may influence the process, inspire every phase of problem solving. However, the aforementioned authors do not go deeper and do not seek to disclose the significance of values for problem solving.

Decision-making research shows more possibilities for problem solving and values integration. Sheehan and Schmidt (2015) model of ethical decision-making includes moral sensitivity, moral judgment, moral motivation, and moral action where values are presented in the component of moral motivation. Another useful approach concerned with values comes from decision-making in management. It is the concept of Value-Focused Thinking (VFT) proposed by Keeney (1994). The author argues that the goals often are merely means of achieving results in traditional models of problem solving. Such models frequently do not help to identify logical links between the problem solving goals, values, and alternatives. Thus, according to Keeney (1994), the decision-making starts with values as they are stated in the goals and objectives of decision-makers. VFT emphasizes the core values of decision-makers that are in a specific context as well as how to find a way to achieve them by using means-ends analysis. The weakness of VFT is its restriction to this means-ends analysis. According to Shin, Jonassen, and McGee (2003), in searching for a solution, such analysis is weak as the problem solver focuses simply on removing inadequacies between the current state and the goal state. The strengths of this approach underline that values are included in the decision before alternatives are created. Besides, values help to find creative and meaningful alternatives and to assess them. Further, they include the forthcoming consequences of the decision. As VFT emphasizes the significant function of values and clarifies the possibilities of their integration into problem solving, we adapt this approach in the current paper.

3.3. The effect of values when solving a problem

In a broader sense, values provide a direction to a person's life. Whereas the importance of values is relatively stable over time and across situations, Roccas et al. (2017) argue that values differ in their importance to a person. Verplanken and Holland (2002) investigated the relationship between values and choices or behavior. The research revealed that the activation of a value and the centrality of a value to the self, are the essential elements for value-guided behavior. The activation of values could happen in such cases: when values are the primary focus of attention; if the situation or the information a person is confronted with implies values; when the self is activated. The centrality of a particular value is 'the degree to which an individual has incorporated this value as part of the self' (Verplanken & Holland, 2002, p.436). Thus, the perceived importance of values and attention to them determine value-guided behavior.

According to Argandoña (2003), values can change due to external (changing values in the people around, in society, changes in situations, etc.) and internal (internalization by learning) factors affecting the person. The research by Hall and Davis (2007) indicates that the decision-makers' applied value profile temporarily changed as they analyzed the issue from multiple perspectives and revealed the existence of a broader set of values. The study by Kirkman (2017) reveal that participants noticed the relevance of moral values to situations they encountered in various contexts.

Values are tightly related to personal integrity and identity and guide an individual's perception, judgment, and behavior (Halstead, 1996; Schwartz, 1992). Sheehan and Schmidt (2015) found that values influenced ethical decision-making of accounting study programme students when they uncovered their own values and grounded in them their individual codes of conduct for future jobs. Hence, the effect of values discloses by observing the problem solver's decision-making. The latter observations could explain the abundance of ethics-laden research in decision-making rather than in problem solving.

Contemporary researchers emphasize the creative potential of values. Dollinger et al. (2007), Kasof et al. (2007), Lebedeva, Schwartz, Plucker, & Van De Vijver, 2019 present to some extent similar findings as they all used Schwartz Value Survey (respectively: Schwartz, 1992; (Schwartz, 1994), Schwartz, 2012). These studies disclosed that such values as self-direction, stimulation and universalism foster creativity. Kasof et al. (2007) focused their research on identified motivation. Stressing that identified motivation is the only fully autonomous type of external motivation, authors define it as 'the desire to commence an activity as a means to some end that one greatly values' (p.106). While identified motivation toward specific values (italic in original) fosters the search for outcomes that express those specific values, this research demonstrated that it could also inhibit creative behavior. Thus, inhibition is necessary, especially in the case where reckless creativity could have painful consequences, for example, when an architect creates a beautiful staircase without a handrail. Consequently, creativity needs to be balanced.

Ultimately, values affect human beings' lives as they express the motivational goals (Schwartz, 1992). These motivational goals are the comprehensive criteria for a person's choices when solving problems. Whereas some problem solving models only mention values as possible evaluation criteria, but they do not give any significant suggestions when and how the problem solver could think about the values coming to the understanding that his/her values direct the decision how to solve the problem. The authors of this paper claim that the identification of personal values and their choice for a solution need to be specified in the process of problem solving. This position is clearly reflected in humanistic philosophy and psychology (Maslow, 2011; Rogers, 1995) that emphasize personal responsibility for discovering personal values through critical questioning, honest self-esteem, self-discovery, and open-mindedness in the constant pursuit of the truth in the path of individual life. However, fundamental (of humankind) and societal values should be taken into account. McLaughlin (1997) argues that a clear boundary between societal and personal values is difficult to set as they are intertwined due to their existence in complex cultural, social, and political contexts at a particular time. A person is related to time and context when choosing values. As a result, a person assumes existing values as implicit knowledge without as much as a consideration. This is particularly evident in the current consumer society.

Moreover, McLaughlin (1997) stresses that if a particular action should be tolerated and legitimated by society, it does not mean that this action is ultimately morally acceptable in all respects. Education has possibilities to reveal this. One such possibility is to turn to the capability approach (Sen, 1990), which emphasizes what people are effectively able to do and to be. Capability, according to Sen (1990), reflects a person's freedom to choose between various ways of living, i.e., the focus is on the development of a person's capability to choose the life he/she has a reason to value. According to Webster (2017), 'in order for people to value certain aspects of life, they need to appreciate the reasons and purposes – the *whys* – for certain valuing' (italic in original; p.75). As values reflect and foster these whys, education should supplement the development of capability with attention to values (Saito, 2003). In order to attain this possibility, a person has to be aware of and be able to understand two facets of values. Argandoña (2003) defines them as *rationality* and *virtuality*. Rationality refers to values as the ideal of conduct and involves the development of a person's understanding of what values and why he/she should choose them when solving a problem. Virtuality approaches values as virtues and includes learning to enable a person to live according to his/her values. However, according to McLaughlin (1997), some people may have specific values that are deep or self-evidently essential. These values are based on fundamental beliefs about the nature and purpose of the human being. Other values can be more or less superficial as they are based on giving priority to one or the other. Thus, virtuality highlights the depth of life harmonized to fundamentally rather than superficially laden values. These approaches inform the rationale for the framework of problem solving through values.

4. The 4W framework of problem solving through values

Similar to the above-presented stages of the problem solving processes, the introduced framework by the authors of this paper revisits them (see Fig. 1). The framework is titled 4W as its four stages respond to such questions: Analyzing the Problem: *What?* → Choice of the value(s): *What* is the *background* for the solution? → Search for the alternative *ways* of the solution: *How?* → The rationale for problem solution: *Why* is this alternative *significant*? The stages of this framework cover seven steps that reveal the logical sequence of problem solving through values.

Though systematic problem solving models are criticized for being linear and inflexible (e.g., Treffinger & Isaksen, 2005), the authors of this paper assume a structural view of the problem solving process due to several reasons. First, the framework enables problem solvers to understand the thorough process of problem solving through values. Second, this framework reveals the depth of each stage and step. Third, problem solving through values encourages tackling problems that have crucial consequences. Only by understanding and mastering the coherence of how problems those require a value-based approach need to be addressed, a problem solver will be able to cope with them in the future. Finally, this framework aims at helping to recognize, to underline personal values, to solve problems through thinking about values, and to take responsibility for choices, even value-based. The feedback supports a direct interrelation between stages. It shapes a dynamic process of problem solving through values.

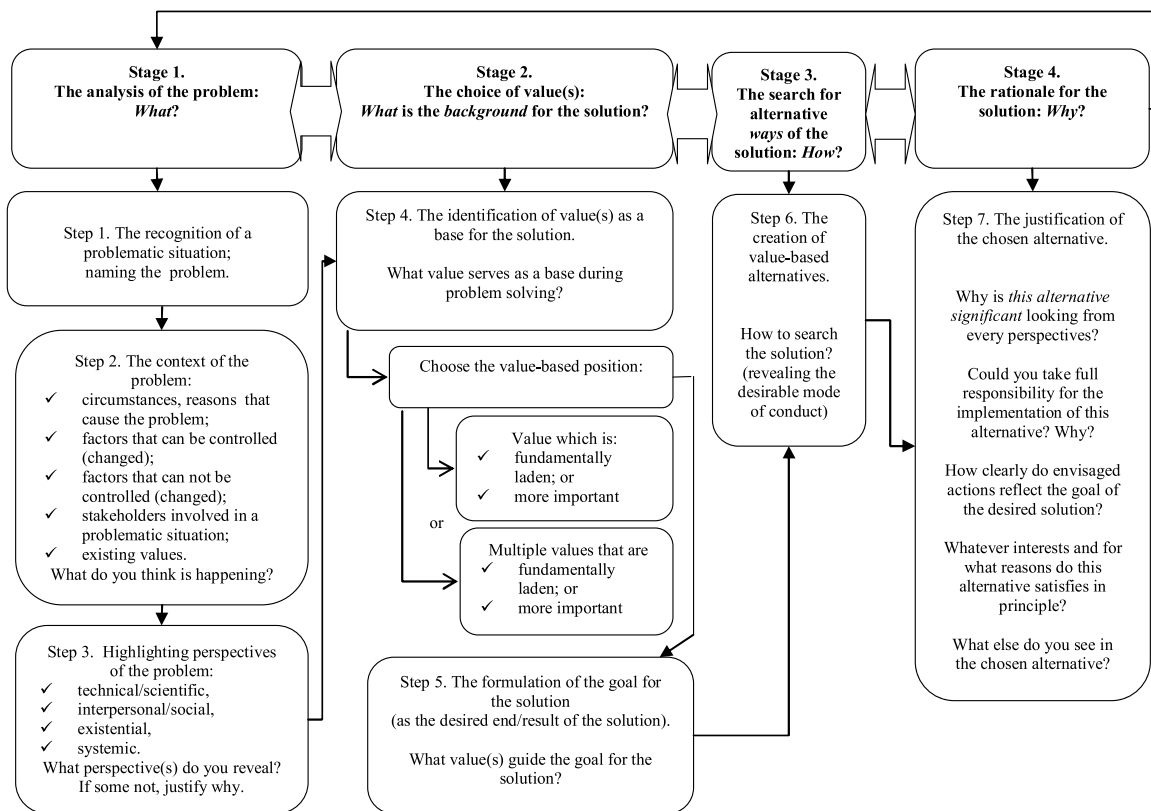


Fig. 1. The 4 W framework: problem solving through values.

The first stage of problem solving through values - ‘*The analysis of the problem: What?*’ - consists of three steps (see Fig. 1). The first step is ‘*Recognizing the problematic situation and naming the problem*’. This step is performed in the following sequence. First, the problem solver should perceive the problematic situation he/she faces in order to understand it. Dostál (2015) argues that the problematic situation has the potential to become the problem necessary to be addressed. Although each problem is limited by its context, not every problematic situation turns into a problem. This is related to the problem solver’s capability and the perception of reality: a person may not ‘see’ the problem if his/her capability to perceive it is not developed (Dorst, 2006; Dostál, 2015). Second, after the problem solver recognizes the existence of the problematic situation, the problem solver has to identify the presence or absence of the problem itself, i.e. to name the problem. This is especially important in the case of the ill-structured problems since they cannot be directly visible to the problem solver (Jonassen, 1997). Consequently, this step allows to determine whether the problem solver developed or has acquired the capability to perceive the problematic situation and the problem (naming the problem).

The second step is ‘*Analysing the context of the problem as a reason for its rise*’. At this step, the problem solver aims to analyse the context of the problem. The latter is one of the external issues, and it determines the solution (Jonassen, 2011). However, if more attention is paid to the solution of the problem, it diverts attention from the context (Fields, 2006). The problem solver has to take into account both the conveyed and implied contextual elements in the problematic situation (Dostál, 2015). In other words, the problem solver has to examine it through his/her ‘contextual lenses’ (Hester & MacG, 2017, p.208). Thus, during this step the problem solver needs to identify the elements that shape the problem - reasons and circumstances that cause the problem, the factors that can be changed, and stakeholders that are involved in the problematic situation. Whereas the elements of the context mentioned above are within the problematic situation, the problem solver can control many of them. Such control can provide unique ways for a solution.

Although the problem solver tries to predict the undesirable results, some criteria remain underestimated. For that reason, it is necessary to highlight values underlying the various possible goals during the analysis (Fields, 2006). According to Hester and MacG (2017), values express one of the main features of the context and direct the attention of the problem solver to a given problematic situation. Hence, the problem solver should explore the value-based positions that emerge in the context of the problem.

The analysis of these contextual elements focus not only on a specific problematic situation but also on the problem that has emerged. This requires setting boundaries of attention for an in-depth understanding (Fields, 2006; Hester & MacG, 2017). Such understanding influences several actions: (a) the recognition of inappropriate aspects of the problematic situation; (b) the emergence of paths in which identified aspects are expected to change. These actions ensure consistency and safeguard against distractions. Thus, the problem solver can now recognize and identify the factors that influence the problem although they are outside of the problematic situation. However, the problem solver possesses no control over them. With the help of such context analysis, the

Table 1
 The main characteristics of four perspectives for problem solving
 Source: adapted by the authors of the paper based on [Linstone \(1989\)](#); [Mitroff \(2000\)](#).

Characteristic of perspectives	Technical/scientific perspective	Interpersonal/social perspective	Existential perspective	Systemic perspective
Goal	Problem solving focuses on implementation and a product	Action, stability, process	Lives and fates of individual human beings and their life-worlds	Problem within the context of a larger whole; trying to establish the nature of different relationships
Mode of inquiry	Modelling, data, analysis	Consensual and adversary	Intuition, learning, experience	Encompass all above mentioned; connecting to the whole
Ethical basis	Rationality	Justice, fairness	Morality	Holistic approach
Planning horizon	Long-term	Intermediate	Short-term and long-term	Long-term, focus on the consequences
Communication	Technical report, briefing	Language differs for insiders, public	Personality important	Personality important as a part of a whole

problem solver constructs a thorough understanding of the problem. Moreover, the problem solver becomes ready to look at the problem from different perspectives.

The third step is '*Perspectives emerging in the problem*'. Ims and Zsolnai (2009) argue that problem solving usually contains a 'problematic search'. Such a search is a pragmatic activity as the problem itself induces it. Thus, the problem solver searches for a superficial solution. As a result, the focus is on control over the problem rather than a deeper understanding of the problem itself. The analysis of the problem, especially including value-based approaches, reveals the necessity to consider the problem from a variety of perspectives. Mitroff (2000) builds on Linstone (1989) ideas and claims that a sound foundation of both naming and solving any problem lays in such perspectives: the technical/scientific, the interpersonal/social, the existential, and the systemic (see Table 1).

Whereas all problems have significant aspects of each perspective, disregarding one or another may lead to the wrong way of solving the problem. While analysing all four perspectives is essential, this does not mean that they all are equally important. Therefore, it is necessary to justify why one or another perspective is more relevant and significant in a particular case. Such analysis, according to Linstone (1989), 'forces us to distinguish *how* we are looking from *what* we are looking at' (p.312; italic in original). Hence, the problem solver broadens the understanding of various perspectives and develops the capability to see the bigger picture (Hall & Davis, 2007).

The problem solver aims to identify and describe four perspectives that have emerged in the problem during this step. In order to identify perspectives, the problem solver search answers to the following questions. First, regarding the technical/scientific perspective: What technical/scientific reasons are brought out in the problem? How and to what extent do they influence a problem and its context? Second, regarding the interpersonal/social perspective: What is the impact of the problem on stakeholders? How does it influence their attitudes, living conditions, interests, needs? Third, regarding the existential perspective: How does the problem affect human feelings, experiences, perception, and/or discovery of meaning? Fourth, regarding the systemic perspective: What is the effect of the problem on the person → community → society → the world? Based on the analysis of this step, the problem solver obtains a comprehensive picture of the problem. The next stage is to choose the value(s) that will address the problem.

The second stage - '*The choice of value(s): What is the background for the solution?*' - includes the fourth and the fifth steps. The fourth step is '*The identification of value(s) as a base for the solution*'. During this step, the problem solver should activate his/her value (s) making it (them) explicit. In order to do this, the problem solver proceeds several sub-steps. First, the problem solver reflects taking into account the analysis done in previous steps. He/she raises up questions revealing values that lay in the background of this analysis: What values does this analyzed context allow me to notice? What values do different perspectives of the problem 'offer'? Such questioning is important as values are deeply hidden (Verplanken & Holland, 2002) and they form a bias, which restricts the development of the capability to see from various points of view (Hall & Paradise, 2007). In the 4W framework, this bias is relatively eliminated due to the analysis of the context and exploration of the perspectives of a problem. As a result, the problem solver discovers distinct value-based positions and gets an opportunity to identify the 'value uncaptured' (Yang, Evans, Vladimirova, & Rana, 2017, p.1796) within the problem analyzed. The problem solver observes that some values exist in the context (the second step) and the disclosed perspectives (the third step). Some of the identified values do not affect the current situation as they are not required, or their potential is not exploited. Thus, looking through various value-based lenses, the problem solver can identify and discover a congruence between the opportunities offered by the values in the problem's context, disclosed perspectives and his/her value(s). Consequently, the problem solver decides what values he/she chooses as a basis for the desired solution. Since problems usually call for a list of values, it is important to find out their order of priority. Thus, the last sub-step requires the problem solver to choose between fundamentally and superficially laden values.

In some cases, the problem solver identifies that a set of values (more than one value) can lead to the desired solution. If a person chooses this multiple value-based position, two options emerge. The first option is concerned with the analysis of each value-based position separately (from the fifth to the seventh step). In the second option, a person has to uncover which of his/her chosen values are fundamentally laden and which are superficially chosen, considering the desired outcome in the current situation. Such clarification could act as a strategy where the path for the desired solution is possible going from superficially chosen value(s) to fundamentally laden one. When a basis for the solution is established, the problem solver formulates the goal for the desired solution.

The fifth step is '*The formulation of the goal for the solution*'. Problem solving highlights essential points that reveal the structure of a person's goals; thus, a goal is the core element of problem solving (Funke, 2014). Meantime, values reflect the motivational content of the goals (Schwartz, 1992). The attention on the chosen value not only activates it, but also motivates the problem solver. The motivation directs the formulation of the goal. In such a way, values explicitly become a basis of the goal for the solution. Thus, this step involves the problem solver in formulating the goal for the solution as the desired outcome.

The way how to take into account value(s) when formulating the goal is the integration of value(s) chosen by the problem solver in the formulation of the goal (Keeney, 1994). For this purpose the conjunction of a context for a solution (it is analyzed during the second step) and a direction of preference (the chosen value reveals it) serves for the formulation of the goal (that represents the desired solution). In other words, a value should be directly included into the formulation of the goal. The goal could lose value, if value is not included into the goal formulation and remains only in the context of the goal. Let's take the actual example concerning COVID-19 situation. Naturally, many countries governments' preference represents such value as human life ('it is important of every individual's life'). Thus, most likely the particular country government's goal of solving the COVID situation could be to save the lives of the country people. The named problem is a complex where the goal of its solution is also complex, although it sounds simple. However, if the goal as desired outcome is formulated without the chosen value, this value remains in the context and its meaning becomes tacit. In the case of above presented example - the goal could be formulated 'to provide hospitals with the necessary equipment and facilities'. Such goal has the value 'human's life' in the context, but eliminates the complexity of the problem that leads to a partial solution of the problem. Thus, this step from the problem solver requires caution when formulating the goal as the

desired outcome. For this reason, maintaining value is very important when formulating the goal's text. To avoid the loss of values and maintain their proposed direction, it is necessary to take into account values again when creating alternatives.

The third stage - '*Search for the alternative ways for a solution: How?*' - encompasses the sixth step, which is called '*Creation of value-based alternatives*'. Frequently problem solver invokes a traditional view of problem identification, generation of alternatives, and selection of criteria for evaluating findings. Keeney (1994); Ims and Zsolnai (2009) criticize this rational approach as it supports a search for a partial solution where an active search for alternatives is neglected. Moreover, a problematic situation, according to Perkins (2009), can create the illusion of a fully framed problem with some apparent weighting and some variations of choices. In this case, essential and distinct alternatives to the solution frequently become unnoticeable. Therefore, Perkins (2009) suggest to replace the focus on the attempts to comprehend the problem itself. Thinking through the 'value lenses' offers such opportunities. The deep understanding of the problem leads to the search for the alternative ways of a solution.

Thus, the aim of this step is for the problem solver to reveal the possible alternative ways for searching a desired solution. Most people think they know how to create alternatives, but often without delving into the situation. First of all, the problem solver based on the reflection of (but not limited to) the analysis of the context and the perspectives of the problem generates a range of alternatives. Some of these alternatives represent anchored thinking as he/she accepts the assumptions implicit in generated alternatives and with too little focus on values.

The chosen value with the formulated goal indicates direction and encourages a broader and more creative search for a solution. Hence, the problem solver should consider some of the initial alternatives that could best support the achievement of the desired solution. Values are the principles for evaluating the desirability of any alternative or outcome (Keeney, 1994). Thus, planned actions should reveal the desirable mode of conduct. After such consideration, he/she should draw up a plan setting out the actions required to implement each of considered alternatives.

Lastly, after a thorough examination of each considered alternative and a plan of its implementation, the problem solver chooses one of them. If the problem solver does not see an appropriate alternative, he/she develops new alternatives. However, the problem solver may notice (and usually does) that more than one alternative can help him/her to achieve the desired solution. In this case, he/she indicates which alternative is the main one and has to be implemented in the first place, and what other alternatives and in what sequence will contribute in searching for the desired solution.

The fourth stage - '*The rationale for the solution: Why*' - leads to the seventh step: '*The justification of the chosen alternative*'. Keeney (1994) emphasizes the compatibility of alternatives in question with the values that guide the action. This underlines the importance of justifying the choices a person makes where the focus is on taking responsibility. According to Zsolnai (2008), responsibility means a choice, i.e., the perceived responsibility essentially determines its choice. Responsible justification allows for discovering optimal balance when choosing between distinct value-based alternatives. It also refers to the alternative solution that best reflects responsibility in a particular value context, choice, and implementation.

At this stage, the problem solver revisits the chosen solution and revises it. The problem solver justifies his/her choice based on the following questions: Why did you choose this? Why is this alternative significant looking from the technical/scientific, the interpersonal/social, the existential, and the systemic perspectives? Could you take full responsibility for the implementation of this alternative? Why? How clearly do envisaged actions reflect the goal of the desired solution? Whatever interests and for what reasons do this alternative satisfies in principle? What else do you see in the chosen alternative?

As mentioned above, each person gives priority to one aspect or another. The problem solver has to provide solid arguments for the justification of the chosen alternative. The quality of arguments, according to Jonassen (2011), should be judged based on the quality of the evidence supporting the chosen alternative and opposing arguments that can reject solutions. Besides, the pursuit of value-based goals reflects the interests of the individual or collective interests. Therefore, it becomes critical for the problem solver to justify the level of responsibility he/she takes in assessing the chosen alternative. Such a complex evaluation of the chosen alternative ensures the acceptance of an integral rather than unilateral solution, as 'recognizing that, in the end, people benefit most when they act for the common good' (Sternberg, 2012, p.46).

5. Discussion

The constant emphasis on thinking about values as explicit reasoning in the 4W framework (especially from the choice of the value(s) to the rationale for problem solution) reflects the pursuit of virtues. Virtues form the features of the character that are related to the choice (Argandoña, 2003; McLaughlin, 2005). Hence, the problem solver develops value-grounded problem solving capability as the virtuality instead of employing rationality for problem solving.

Argandoña (2003) suggests that, in order to make a sound valuation process of any action, extrinsic, transcendent, and intrinsic types of motives need to be considered. They cover the respective types of values. The 4W framework meets these requirements. An extrinsic motive as 'attaining the anticipated or expected satisfaction' (Argandoña, 2003, p.17) is reflected in the formulation of the goal of the solution, the creation of alternatives and especially in the justification of the chosen alternative way when the problem solver revisits the external effect of his/her possible action. Transcendent motive as 'generating certain effects in others' (Argandoña, 2003, p.17) is revealed within the analysis of the context, perspectives, and creating alternatives. When the learner considers the creation of alternatives and revisits the chosen alternative, he/she pays more attention to these motives. Two types of motives mentioned so far are closely related to an intrinsic motive that emphasizes learning development within the problem solver. These motives confirm that problem solving is, in fact, lifelong learning. In light of these findings, the 4W framework is concerned with some features of value internalization as it is 'a psychological outcome of conscious mind reasoning about values' (Yazdani & Akbarilakeh, 2017, p.1).

The 4W framework is complicated enough in terms of learning. One issue is concerned with the educational environments (Jucevičienė, 2008) required to enable the 4W framework. First, the learning paradigm, rather than direct instruction, lies at the foundation of such environments. Second, such educational environments include the following dimensions: (1) educational goal; (2) learning capacity of the learners; (3) educational content relevant to the educational goal: ways and means of communicating educational content as information presented in advance (they may be real, people among them, as well as virtual); (5) methods and means of developing educational content in the process of learners' performance; (6) physical environment relevant to the educational goal and conditions of its implementation as well as different items in the environment; (7) individuals involved in the implementation of the educational goal.

Another issue is related to exercising this framework in practice. Despite being aware of the 4W framework, a person may still not want to practice problem solving through values, since most of the solutions are going to be complicated, or may even be painful. One idea worth looking into is to reveal the extent to which problem solving through values can become a habit of mind. Profound focus on personal values, context analysis, and highlighting various perspectives can involve changes in the problem solver's habit of mind. The constant practice of problem solving through values could first become 'the epistemic habit of mind' (Mezirow, 2009, p.93), which means a personal way of knowing things and how to use that knowledge. This echoes Kirkman (2017) findings. The developed capability to notice moral values in situations that students encountered changed some students' habit of mind as 'for having "ruined" things by making it impossible not to attend to values in such situations!' (the feedback from one student; Kirkman, 2017, p.12). However, this is not enough, as only those problems that require a value-based approach are addressed. Inevitably, the problem solver eventually encounters the challenges of nurturing 'the moral-ethical habit of mind' (Mezirow, 2009, p.93). In pursuance to develop such habits of mind, the curriculum should include the necessity of the practising of the 4W framework.

Thinking based on values when solving problems enables the problem solver to engage in thoughtful reflection in contrast to pragmatic and superficial thinking supported by the consumer society. Reflection begins from the first stage of the 4W framework. As personal values are the basis for the desired solution, the problem solver is also involved in self-reflection. The conscious and continuous reflection on himself/herself and the problematic situation reinforce each step of the 4W framework. Moreover, the fourth stage ('The rationale for the solution: Why') involves the problem solver in critical reflection as it concerned with justification of 'the **why**, the reasons for and the consequences of what we do' (italic, bold in original; Mezirow, 1990, p.8). Exercising the 4W framework in practice could foster reflective practice. Empirical evidence shows that reflective practice directly impacts knowledge, skills and may lead to changes in personal belief systems and world views (Slade, Burnham, Catalana, & Waters, 2019). Thus, with the help of reflective practice it is possible to identify in more detail how and to what extent the 4W framework has been mastered, what knowledge gained, capabilities developed, how point of views changed, and what influence the change process.

Critical issues related to the development of problem solving through values need to be distinguished when considering and examining options for the implementation of the 4W framework at educational institutions. First, the question to what extent can the 4W framework be incorporated into various subjects needs to be answered. Researchers could focus on applying the 4W framework to specific subjects in the humanities and social sciences. The case is with STEM subjects. Though value issues of sustainable development and ecology are of great importance, in reality STEM teaching is often restricted to the development of knowledge and skills, leaving aside the thinking about values. The special task of the researchers is to help practitioners to apply the 4W framework in STEM subjects. Considering this, researchers could employ the concept of 'dialogic space' (Wegerif, 2011, p.3) which places particular importance of dialogue in the process of education emphasizing both the voices of teachers and students, and materials. In addition, the dimensions of educational environments could be useful aligning the 4W framework with STEM subjects. As STEM teaching is more based on solving various special tasks and/or integrating problem-based learning, the 4W framework could be a meaningful tool through which content is mastered, skills are developed, knowledge is acquired by solving pre-prepared specific tasks. In this case, the 4W framework could act as a mean addressing values in STEM teaching.

Second is the question of how to enable the process of problem solving through values. In the current paper, the concept of enabling is understood as an integral component of the empowerment. Jucevičienė et al. (2010) specify that at least two perspectives can be employed to explain *empowerment*: a) through the power of legitimacy (according to Freire, 1996); and b) through the perspective of conditions for the acquisition of the required knowledge, capabilities, and competence, i.e., enabling. In this paper the 4W framework does not entail the issue of legitimacy. This issue may occur, for example, when a teacher in economics is expected to provide students with subject knowledge only, rather than adding tasks that involve problem solving through values. Yet, the issue of legitimacy is often implicit. A widespread phenomenon exists that teaching is limited to certain periods that do not have enough time for problem solving through values. The issue of legitimacy as an organizational task that supports/or not the implementation of the 4W framework in any curriculum is a question that calls for further discussion.

Third (if not the first), the issue of an educator's competence to apply such a framework needs to be addressed. In order for a teacher to be a successful enabler, he/she should have the necessary competence. This is related to the specific pedagogical knowledge and skills, which are highly dependent on the peculiarities of the subject being taught. Nowadays actualities are encouraging to pay attention to STEM subjects and their teacher training. For researchers and teacher training institutions, who will be interested in implementing the 4W framework in STEM subjects, it would be useful to draw attention to 'a material-dialogic approach to pedagogy' (Hetherington & Wegerif, 2018, p.27). This approach creates the conditions for a deep learning of STEM subjects revealing additional opportunities for problem solving through values in teaching. Highlighting these opportunities is a task for further research.

In contrast to traditional problem solving models, the 4W framework is more concerned with educational purposes. The prescriptive approach to teaching (Thorne, 1994) is applied to the 4W framework. This approach focuses on providing guidelines that enable students to make sound decisions by making explicit value judgements. The limitation is that the 4W framework is focused on

thinking but not executing. It does not include the fifth stage, which would focus on the execution of the decision how to solve the problem. This stage may contain some deviation from the predefined process of the solution of the problem.

6. Conclusions

The current paper focuses on revealing the essence of the 4W framework, which is based on enabling the problem solver to draw attention to when, how, and why it is essential to think about values during the problem solving process from the perspective of it's design. Accordingly, the 4W framework advocates the coherent approach when solving a problem by using a creative potential of values.

The 4W framework allows the problem solver to look through the lens of his/her values twice. The first time, while formulating the problem solving goal as the desired outcome. The second time is when the problem solver looks deeper into his/her values while exploring alternative ways to solve problems. The problem solver is encouraged to reason about, find, accept, reject, compare values, and become responsible for the consequences of the choices grounded on his/her values. Thus, the problem solver could benefit from the 4W framework especially when dealing with issues having crucial consequences.

An educational approach reveals that the 4W framework could enable the development of value-grounded problem solving capability. As problem solving encourages the development of higher-order thinking skills, the consistent inclusion of values enriches them.

The 4W framework requires the educational environments for its enablement. The enablement process of problem solving through values could be based on the perspective of conditions for the acquisition of the required knowledge and capability. Continuous practice of this framework not only encourages reflection, but can also contribute to the creation of the epistemic habit of mind. Applying the 4W framework to specific subjects in the humanities and social sciences might face less challenge than STEM ones. The issue of an educator's competence to apply such a framework is highly important. The discussed issues present significant challenges for researchers and educators. Caring that the curriculum of different courses should foresee problem solving through values, both practicing and empirical research are necessary.

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References

- Argandoña, A. (2003). Fostering values in organizations. *Journal of Business Ethics*, 45(1–2), 15–28. <https://link.springer.com/content/pdf/10.1023/A:1024164210743.pdf>.
- Barber, S. (2018). A truly "Transformative" MBA: Executive education for the fourth industrial revolution. *Journal of Pedagogic Development*, 8(2), 44–55.
- Barnett, R. (2007). *Will to learn: Being a student in an age of uncertainty*. UK: McGraw-Hill Education.
- Baron, R. A., Zhao, H., & Miao, Q. (2015). Personal motives, moral disengagement, and unethical decisions by entrepreneurs: Cognitive mechanisms on the "slippery slope". *Journal of Business Ethics*, 128(1), 107–118. <https://doi.org/10.1007/s10551-014-2078-y>.
- Basadur, M., Ellspermann, S. J., & Evans, G. W. (1994). A new methodology for formulating ill-structured problems. *Omega*, 22(6), 627–645. [https://doi.org/10.1016/0305-0483\(94\)90053-1](https://doi.org/10.1016/0305-0483(94)90053-1).
- Blanco, E., Schirmbeck, F., & Costa, C. (2018). *Vocational Education for the Industrial Revolution. International Conference on Remote Engineering and Virtual Instrumentation*. Cham: Springer649–658.
- Chua, B. L., Tan, O. S., & Liu, W. C. (2016). Journey into the problem-solving process: Cognitive functions in a PBL environment. *Innovations in Education and Teaching International*, 53(2), 191–202. <https://doi.org/10.1080/14703297.2014.961502>.
- Collins, R. H., Sibthorp, J., & Gookin, J. (2016). Developing ill-structured problem-solving skills through wilderness education. *Journal of Experiential Education*, 39(2), 179–195. <https://doi.org/10.1177/1053825916639611>.
- The development and assessment of problem solving in 21st-century schools. In B. Csapó, & J. Funke (Eds.). *The nature of problem solving: Using research to inspire 21st century learning* OECD Publishing. (Chapter 1). <https://doi.org/10.1787/9789264273955-en>.
- Dollinger, S. J., Burke, P. A., & Gump, N. W. (2007). Creativity and values. *Creativity Research Journal*, 19(2-3), 91–103. <https://doi.org/10.1080/10400410701395028>.
- Donovan, S. J., Guss, C. D., & Naslund, D. (2015). Improving dynamic decision making through training and self-reflection. *Judgment and Decision Making*, 10(4), 284–295. http://digitalcommons.unf.edu/apsy_facpub/2.
- Dorst, K. (2006). Design problems and design paradoxes. *Design Issues*, 22(3), 4–17. <https://doi.org/10.1162/desi.2006.22.3.4>.
- Dostál, J. (2015). Theory of problem solving. *Procedia-Social and Behavioral Sciences*, 174, 2798–2805. <https://doi.org/10.1016/j.sbspro.2015.01.970>.
- Fields, A. M. (2006). Ill-structured problems and the reference consultation: The librarian's role in developing student expertise. *Reference Services Review*, 34(3), 405–420. <https://doi.org/10.1108/00907320610701554>.
- Freire, P. (1996). *Pedagogy of the oppressed (revised)*. New York: Continuum.
- Funke, J. (2014). Problem solving: What are the important questions? *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 493–498). <https://escholarship.org/content/qt76s9s36z/qt76s9s36z.pdf>.
- Hall, D. J., & Davis, R. A. (2007). Engaging multiple perspectives: A value-based decision-making model. *Decision Support Systems*, 43(4), 1588–1604. <https://doi.org/10.1016/j.dss.2006.03.004>.
- Hall, D. J., & Paradise, D. (2007). Investigating value-based decision bias and mediation: do you do as you think? *Communications of the ACM*, 50(4), 81–85.
- Halstead, J. M. (1996). Values and values education in schools. In J. M. Halstead, & M. J. Taylor (Eds.). *Values in education and education in values* (pp. 3–14). London: The Falmer Press.
- Harland, T., & Pickering, N. (2010). *Values in higher education teaching*. Routledge.
- Hester, P. T., & MacG, K. (2017). *Systemic decision making: Fundamentals for addressing problems and messes*. New York: Springer.
- Hetherington, L., & Wegerif, R. (2018). Developing a material-dialogic approach to pedagogy to guide science teacher education. *Journal of Education for Teaching*.

- 44(1), 27–43. <https://doi.org/10.1080/02607476.2018.1422611>.
- Huitt, W. (1992). Problem solving and decision making: Consideration of individual differences using the Myers-Briggs type indicator. *Journal of Psychological Type*, 24(1), 33–44.
- Ims, K. J., & Zsolnai, L. (2009). *Holistic problem solving. The future international manager*. London: Palgrave Macmillan116–129.
- Jonassen, D. (2011). Supporting problem solving in PBL. *Interdisciplinary Journal of Problem-based Learning*, 5(2), 95–119. <https://doi.org/10.7771/1541-5015.1256>.
- Jonassen, D. H. (1997). Instructional design models for well-structured and III-structured problem-solving learning outcomes. *Educational Technology Research and Development*, 45(1), 65–94. <https://doi.org/10.1007/BF02299613>.
- Jucevičienė, P. (2008). Educational and learning environments as a factor for socioeducational empowering of innovation. *Socialiniai mokslai*, 1, 58–70.
- Jucevičienė, P., Gudaitytė, D., Karenauskaitė, V., Lipinskienė, D., Stanikūnienė, B., & Tautkevičienė, G. (2010). *Universiteto edukacinė galia: Atsakas XXI amžiaus iššūkiams [The educational power of university: the response to the challenges of the 21st century]*. Kaunas: Technologija.
- Kasof, J., Chen, C., Himsel, A., & Greenberger, E. (2007). Values and creativity. *Creativity Research Journal*, 19(2–3), 105–122. <https://doi.org/10.1080/10400410701397164>.
- Keeney, R. L. (1994). Creativity in decision making with value-focused thinking. *MIT Sloan Management Review*, 35(4), 33–41.
- Kirkman, R. (2017). Problem-based learning in engineering ethics courses. *Interdisciplinary Journal of Problem-based Learning*, 11(1), <https://doi.org/10.7771/1541-5015.1610>.
- Lebedeva, N., Schwartz, S., Plucker, J., & Van De Vijver, F. (2019). Domains of everyday creativity and personal values. *Frontiers in Psychology*, 9, 1–16. <https://doi.org/10.3389/fpsyg.2018.02681>.
- Linstone, H. A. (1989). Multiple perspectives: Concept, applications, and user guidelines. *Systems Practice*, 2(3), 307–331.
- Litzinger, T. A., Meter, P. V., Firetto, C. M., Passmore, L. J., Masters, C. B., Turns, S. R., ... Zappe, S. E. (2010). A cognitive study of problem solving in statics. *Journal of Engineering Education*, 99(4), 337–353.
- Maslow, A. H. (2011). *Būties psichologija. [Psychology of Being]*Vilnius: Vaga.
- Mayer, R., & Wittrock, M. (2006). Problem solving. In P. Alexander, & P. Winne (Eds.). *Handbook of educational psychology* (pp. 287–303). New York, NY: Psychology Press.
- McLaughlin, T. (2005). The educative importance of ethos. *British Journal of Educational Studies*, 53(3), 306–325. <https://doi.org/10.1111/j.1467-8527.2005.00297.x>.
- McLaughlin, T. H. (1997). *Šiuolaikinė ugdymo filosofija: demokratiškumas, vertybės, įvairovė. [Contemporary philosophy of education: democracy, values, diversity]* Kaunas: Technologija.
- Mezirow, J. (1990). *Fostering critical reflection in adulthood*. San Francisco: Jossey-Bass Publishers1–12. <https://my.liberatedleaders.com.au/wp-content/uploads/2017/02/How-Critical-Reflection-triggers-Transformative-Learning-Mezirow.pdf>.
- Mezirow, J. (2009). *An overview on transformative learning. Contemporary theories of learning*. Routledge90–105 (Chapter 6).
- Mitroff, I. (2000). *Kaip neklysti šiais beprotiškais laikais: ar mokame spręsti esmines problemas. [How not to get lost in these crazy times: do we know how to solve essential problems]*Kaunas: Šviesa.
- Morton, L. (1997). Teaching creative problem solving: A paradigmatic approach. *Cal. WL Rev.* 34, 375.
- Nadda, P. (2017). Need for value based education. *International Education and Research Journal*, 3(2)<http://ierj.in/journal/index.php/ierj/article/view/690/659>.
- Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall.
- OECD (2013). *PISA 2012 assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy*. Paris: PISA, OECD Publishing. <https://www.oecd.org/pisa/pisaproducts/PISA%202012%20framework%20e-book.final.pdf>.
- OECD (2018). *PISA 2015 results in focus*. PISA, OECD Publishing<https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf>.
- O'Loughlin, A., & McPadzean, E. (1999). Toward a holistic theory of strategic problem solving. *Team Performance Management: An International Journal*, 5(3), 103–120.
- Perkins, D. N. (2009). Decision making and its development. In E. Callan, T. Grotzer, J. Kagan, R. E. Nisbett, D. N. Perkins, & L. S. Shulman (Eds.). *Education and a civil society: Teaching evidence-based decision making* (pp. 1–28). Cambridge, MA: American Academy of Arts and Sciences (Chapter 1).
- Roccas, S., Sagiv, L., & Navon, M. (2017). *Methodological issues in studying personal values. Values and behavior*. Cham: Springer15–50.
- Rogers, C. R. (1995). *On becoming a person: A therapist's view of psychotherapy*. Boston: Houghton Mifflin Harcourt.
- Saito, M. (2003). Amartya Sen's capability approach to education: A critical exploration. *Journal of Philosophy of Education*, 37(1), 17–33. <https://doi.org/10.1111/1467-9752.3701002>.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Vol. Ed.), *Advances in experimental social psychology: Vol. 25*, (pp. 1–65). Academic Press.
- Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? *Journal of social issues*, 50(4), 19–45.
- Schwartz, S. H. (2012). An overview of the Schwartz theory of basic values. *Online Readings in Psychology and Culture*, 2(1), 1–20. <https://doi.org/10.9707/2307-0919.1116>.
- Sen, A. (1990). Development as capability expansion. *The community development reader*, 41–58. <http://www.masterhdfs.org/masterHDFS/wp-content/uploads/2014/05/Sen-development.pdf>.
- Sheehan, N. T., & Schmidt, J. A. (2015). Preparing accounting students for ethical decision making: Developing individual codes of conduct based on personal values. *Journal of Accounting Education*, 33(3), 183–197. <https://doi.org/10.1016/j.jaccedu.2015.06.001>.
- Shepherd, D. A., Patzelt, H., & Baron, R. A. (2013). "I care about nature, but...": Disengaging values in assessing opportunities that cause harm. *The Academy of Management Journal*, 56(5), 1251–1273. <https://doi.org/10.5465/amj.2011.0776>.
- Shin, N., Jonassen, D. H., & McGee, S. (2003). Predictors of well-structured and ill-structured problem solving in an astronomy simulation. *Journal of Research in Science Teaching*, 40(1), 6–33. <https://doi.org/10.1002/tea.10058>.
- Slade, M. L., Burnham, T. J., Catalana, S. M., & Waters, T. (2019). The impact of reflective practice on teacher candidates' learning. *International Journal for the Scholarship of Teaching and Learning*, 13(2), 15. <https://doi.org/10.20429/ijstl.2019.130215>.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>.
- Sternberg, R. (2012). Teaching for ethical reasoning. *International Journal of Educational Psychology*, 1(1), 35–50. <https://doi.org/10.4471/ijep.2012.03>.
- Sternberg, R. (2017). Speculations on the role of successful intelligence in solving contemporary world problems. *Journal of Intelligence*, 6(1), 4. <https://doi.org/10.3390/jintelligence6010004>.
- Thorne, D. M. (1994). Environmental ethics in international business education: Descriptive and prescriptive dimensions. *Journal of Teaching in International Business*, 5(1–2), 109–122. https://doi.org/10.1300/J066v05n01_08.
- Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: The history, development, and implications for gifted education and talent development. *The Gifted Child Quarterly*, 49(4), 342–353. <https://doi.org/10.1177/001698620504900407>.
- Verplanken, B., & Holland, R. W. (2002). Motivated decision making: Effects of activation and self-centrality of values on choices and behavior. *Journal of Personality and Social Psychology*, 82(3), 434–447. <https://doi.org/10.1037/0022-3514.82.3.434>.
- Webster, R. S. (2017). *Being spiritually educated. Re-enchanting education and spiritual wellbeing*. Routledge73–85.
- Wegerif, R. (2011). Towards a dialogic theory of how children learn to think. *Thinking Skills and Creativity*, 6(3), 179–190. <https://doi.org/10.1016/j.tsc.2011.08.002>.
- Yang, M., Evans, S., Vladimirova, D., & Rana, P. (2017). Value uncaptured perspective for sustainable business model innovation. *Journal of Cleaner Production*, 140, 1794–1804. <https://doi.org/10.1016/j.jclepro.2016.07.102>.
- Yazdani, S., & Akbarilakeh, M. (2017). The model of value-based curriculum for medicine and surgery education in Iran. *Journal of Minimally Invasive Surgical Sciences*, 6(3), <https://doi.org/10.5812/minsurgery.14053>.
- Zsolnai, L. (2008). *Responsible decision making*. New Brunswick and London: Transaction Publishers.