

How Does the Regulatory Focus Affect Problem-Solving Among Undergraduate Students?

Abstract

The current study aimed to explore the effect of regulatory Focus – Promotion vs. Prevention – in problem-solving among undergraduate students at The Hashemite University. The hypotheses were that promotion focus students outperform prevention focus students in ill-structured problems but underperform them in well-structured problems, and prevention focus students outperform promotion focus students in well-structured problems but underperform them in ill-structured problems. The participants (n=170) were allocated into four groups according to their mindsets and the problems assigned to them (promotion with ill-structured problems, promotion with well-structured problems, prevention with ill-structured problems, prevention with well-structured problems). After the groups solved all the assigned problems, their work was scored according to Measuring Problem Solving Instrument MPSI. The findings confirmed the hypothesis that the regulatory focus affects how problems are solved.

Keywords: regulatory focus, promotion, prevention, mindset, problem-solving

Introduction

Problem-solving is the process of finding solutions to problems we encounter in life. The solutions to these problems are usually context-specific. Solving problems has an end that must be achieved, and the solutions depend on the orientation of the problem, such as problem-solving skills and method and systematic analysis. Psychologists and sociologists investigate ways to solve the

problems and factors affecting them, such as attention, use of memory, learning, and perception that must be coordinated effectively (Funke et al., 2018), also, Park and Jang (2010) suggested eight factors influencing problem-solving ability such as learners' cognitive strategies, learners' meta-cognitive strategies, providing necessary resources and tools for problem-solving, and learners' self-confidence. But few studies examined the motivational factors influencing problem-solving ability, such as mindset (promotion vs. prevention focus), and this is the main goal of the current study.

Theoretical Background

Problem-Solving in Educational Settings

Problem-solving refers to finding solutions to problems encountered in life (Brandell, 1997). It has been defined as a higher-order cognitive process which requires self-regulation, the ability to specify the constraints, projecting an outcome based on previous experiences, and implying one's behaviour to achieve a goal (Babik et al., 2019). Robertson (2001) and Zaytoun (2004) stated that any problem has a goal to be reached, and achieving that goal depends upon the problem orientation (problem-solving coping style and skills) and systematic analysis. These problem-solving strategies affect the educational benefits for the students.

Among the different kinds of problem-solving, there is what is so-called social problem-solving, which was used in the current study. Social problem-solving refers to a mental process to find functional solutions for ordinary people's everyday problems (D'Zurilla et al., 2021; Eskin et al., 2013).

There are two kinds of problems in real-life: ill-structured and well-structured. Simon (1973) describes ill-structured problems as those that students repeatedly encounter in their daily lives. They include economic, political, social, and scientific problems. To resemble situations in the real world, ill-structured problems have vague goals and insufficient information, and they do not have much transparency and a single best solution (Grohs et al., 2018; Snowman et al., 2012; Voss, 1988). Snowman et al. (2012) also defined well-structured problems as clearly formulated problems with known solution procedures and specified evaluation standards, such as those found in mathematics, science, engineering, or business, because they have the right answers.

Accordingly, the problem-solving process depends on some personal properties of the problem solver, such as competence to deal with new situations, adapt to changing circumstances, and act flexibly to new challenges (Kipman, 2020). So,

this study wonders if problem-solving can be affected by the students' motivational regulation: promotion or prevention focus.

Regulatory Focus Theory, Thinking, Learning, Teaching, and Problem-Solving

In his Regulatory Focus Theory (RFT), Higgins (1997) distinguished between two types of motivational regulation: promotion and prevention focus. The promotion focus emphasises desires and possible gains, while the prevention focus emphasises obligations and possible losses. RFT supposes that promotion and prevention focus utilise distinct means to strive for desired goals, so individuals with a promotion focus utilise approach strategic means for attaining their goals. Conversely, individuals with a prevention focus use strategic avoidance means to attain their goals (Higgins, 1997; Higgins et al., 2001).

With regard to the learning settings, Liu et al. (2019) found that promotion focus was a positive predictor of learning behaviours, whereas prevention focus was a negative predictor. They also found that individuals with promotion focus and low prevention focus showed higher academic self-efficacy and lower depression, which in turn showed greater learning behaviours.

Concerning the relationship between regulatory focus, motivational and mental process, Watling et al. (2012) found a relationship between regulatory focus theory and positive response to feedback, that feedback is prompting under promotion focus, whereas negative feedback is prompting under prevention focus. Beuk and Basadur (2016) pointed out that promotion focus results in higher levels of creative potential, and regulatory focus influences both the number of ideas and the type of ideas generated. Moreover, Sassenrath et al. (2016) found that when people encounter a demanding task, they experience challenge rather than threat when they are in a promotion focus as compared to a prevention focus because promotion focus individuals perceive their resources relative to the prevention focus ones. Peng et al. (2019) found that promotion-focused individuals intended to use positive words to describe mysterious decision-making information and created more positive self-frames than prevention-focused individuals. Besides, Hui (2021) revealed that higher perspective-taking and promotion enhance creativity. Also, Wang et al. (2022) pointed out that promotion focus positively predicted creativity through innovative style and negatively predicted creativity through adaptive style, and prevention focus negatively predicted creativity through adaptive style. Wang et al. (2021) found an indirect relationship between regulatory focus and creativity through the mediation of intrinsic motivation.

Finally, Lalot et al. (2022) found that promotion focus had an activating effect on decision times, increased persistence and originality, and greater visuospatial

memory performance. Meanwhile, prevention focus had a deactivating effect and reduced performance and persistence.

Since regulatory focus directs how an individual thinks, behaves, and feels, Higgins (1997) suggests that it is a goal-pursuit theory regarding people's perceptions in the decision-making process, so it is necessary to examine its role in problem-solving settings. Unfortunately, researchers paid little attention to the impact of the regulatory focus on problem-solving despite the importance of these variables, which is considered an additional motive to conduct this study.

Based on that, there are several reasons to suppose that what people focus on when solving problems might differ as a function of regulatory focus. And because some evidence was found about the relationship between regulatory focus and problem-solving (Hui, 2021; Wang et al., 2021; 2022), it is necessary to empirically examine the effect of regulatory focus in problem-solving within educational settings.

Research Problem

University students always face problems needed to be solved throughout their academic life. The students may also face two kinds of problems: ill-structured problems and well-structured problems. The students' methods of solving these problems may be influenced by their mindset or whether they are promotion or prevention regulatory focused. The regulatory focus has been studied in terms of many themes, such as emotional experience (Brockner & Higgins, 2001), learners' responses to feedback in the clinical setting (Watling et al., 2012), entrepreneurial process (Brockner et al., 2004), and antismoking advertising (Zhao & Pechman, 2007), but there is lack of studies that examine the effect of the regulatory focus on the problem-solving. Some studies (Hui, 2021; Wang et al., 2021; 2022) examined the theoretical relationship between regulatory focus and problem-solving, but there is a dereliction in studying that relationship experimentally. Therefore, the current study aims to examine the effect of the regulatory focus in problem-solving among undergraduates. Accordingly, the current study tried to examine the following hypotheses:

- H1: Promotion focus students outperform prevention focus students in ill-structured problems and underperform them in well-structured problems.
- H2: Prevention focus students outperform promotion focus students in well-structured problems and underperform them in ill-structured problems.

Research Methodology

This study is quasi-experimental and was conducted to examine the effect of regulatory focus in problem-solving.

Sample of Research

A total of 170 undergraduate students enrolled in the department of educational psychology in the first semester of the academic year 2021/2022 at The Hashemite University in Jordan participated in the study. The participants studied in four classes in Social Psychology and Theories of Personality. The sample ranged in age from 18 to 22 years; their academic grade ranged from satisfactory to excellent. Study sample rights were met at study sites before data collection, and the study was conducted in line with the terms of the Helsinki Declaration (1989). The study was approved by the Ethics Committee of the Educational Psychology and Counselling Department at (No. 3/10/2020/2021) The Participants were distributed randomly according to their results on the regulatory focus questionnaire, as Table 1 shows:

Table 1 Participants distribution into four groups according to their results on the regulatory focus questionnaire and the problem-solving scale

	RFT			total
		promotion	prevention	
problem	Ill-structured	34	42	76
	Well-structured	46	48	94
total		80	90	170

Instrument and Procedures

Regulatory Focus Questionnaire (RFQ). This questionnaire was derived from Lockwood et al. (2002). It comprises 28 items and measures chronic regulatory focus and has two subscales, promotion focus 14 items and prevention focus 14 items. It was translated to Arabic by an accredited translator and back-translated to English (Brislin, 1970). Participants rated their agreement with each item on a 5-point Likert scale, anchored by not at all true (one point) and very true (5 points). The ratings for the 14 items on each subscale were summed to create total scores, where the minimum score is 14, and the maximum score is 70 for each subscale. To determine the type of regulatory focus of the individual, he must get over 42 degrees on the promotion or prevention subscale. Cronbach alpha

was calculated to assure internal consistency, and the values were .88 and .89 for promotion focus and prevention focus items, respectively.

List of problems (LP). Two groups of problems were prepared. The first group contained three well-structured problems, such as Z-scores and T. scores, percentiles, and behavioural modification plan, they were chosen from these fields as Snowman et al. (2012) suggested that well-structured problems could be found in mathematics or engineering, for example. And the second group contained three ill-structured problems, such as Control of unlicensed weapons, high university fees and coverage of expenses, and integrating youth with political action. They were chosen as Simon (1973) suggested that ill-structured problems could be found in social sciences.

Measuring Problem-Solving Instrument (MPSI). It was designed to assess the students' performance in problem-solving skills. The list of indicators was designed according to Lynch et al. (2000) about their model of solving open-ended problems. The instrument contains four categories for solving the problem: Identifying the nature of a problem and relevant information, Framing an open-ended problem, Resolving an open-ended problem, and Re-addressing an open-ended problem. This instrument was used because it fits the purposes of the current study in terms of the solving process.

Problem-Solving Skills Test (PSST). It was created to examine the students' prior knowledge of problem-solving skills. It is a 20 items multiple-choice test. Cronbach Alpha for internal consistency was .899. It is a good indicator and suitable means for research purposes. To determine the levels of the students' problem-solving skills, the scores of the students were compared with the following criteria: poor 20-35.9, fairly poor 36-51.9, good 52-67.9, very good 68-83.9, and excellent 84-100.

Procedures

The sample was drawn purposively from four social psychology classes and theories of personality courses in the first semester of the academic year 2021/2022. The instrument of RFQ was applied to the subjects to specify their mindset. The results of the scale are displayed in Table 2.

Table 2. Means and Standard deviation of the students on the mindset scale

mindset	N	%	Mean	SD
promotion	76	44.7	52.82	9.787
prevention	94	55.3	50.10	3.230

To ensure that the subjects have a background in problem-solving, the author trained them in the course of three 45-minutes sessions. Then the students were subjected to the PSST to be assured that they acquired the problem-solving skills after being allocated randomly to four groups according to their mindset (promotion vs. prevention) and the type of the problems (well-structured vs. ill-structured). The results of that test are shown in Table 3.

Table 3. Means and standard deviations of the students' scores on the PSST

groups		Ill-structured problems	Well-structured problems
promotion	N	34	42
	Mean	42.53	41.62
	SD	2.677	5.287
	Level	<i>Fairly Poor</i>	<i>Fairly Poor</i>
prevention	N	46	48
	Mean	42.52	44.33
	SD	5.058	5.216
	Level	<i>Fairly Poor</i>	<i>Fairly Poor</i>

Table 3 shows that the participants of the two mindsets had the same level of knowledge in solving the two kinds of problems. Moreover, One-Way ANOVA uncovered that there were no significant differences between the groups ($F(3, 166) = 2.576, p > .056$), which meant that the four groups of the study were equivalent.

After that, they were given the tasks to be solved. The well-structured problems groups needed two 45-minutes sessions to finish their tasks, but the ill-structured problems groups needed five 45-minutes sessions to finish their tasks. All the tasks were scored according to the MPSI.

Data Analysis

The SPSS statistics 23.0 (Statistical Package for the Social Sciences) statistical package program was used in analysing data. Means, standard deviations, and One-Way ANCOVA were used to test the differences between the groups.

Research Results

To test the hypotheses of the study “*H1: Promotion focus students outperform prevention focus students in ill-structured problems and underperform them in well-structured problems*”, and “*Prevention focus students outperform promotion focus students in well-structured problems and underperform them in ill-structured problems*” means and standard deviations of the students’ scores on the MPSI was calculated, and they were shown in Table 4.

Table 4. Means and standard deviations of the students’ scores on the MPSI

groups		Ill-structured problems	Well-structured problems
promotion	N	34	42
	Mean	70.00	59.67
	SD	2.000	5.771
	<i>Level</i>	<i>very good</i>	<i>good</i>
prevention	N	46	48
	Mean	42.04	87.00
	SD	4.274	1.868
	<i>Level</i>	<i>Fairly Poor</i>	<i>excellent</i>

Table 4 shows that there were superficial differences between the groups of the study, where promotion students were better than the prevention students in ill-structured problems, and the grades were very good and fairly poor, respectively. On the other hand, the results were the opposite for the prevention participants, who were better than their counterparts in well-structured problems, and the grades were excellent and good, respectively.

Besides, one-way ANCOVA was conducted after controlling the pre-test scores of PSST, and it revealed that the difference between the four groups was significant ($F(3,169) = 1160.593, p = .000, \text{partial } \eta^2 = .955$), which means that hypotheses were accepted.

Discussion

The results of this study confirmed the hypotheses. It was found that the promotion focus students outperformed prevention focus students in ill-structured problems and underperformed them in well-structured problems. On the other hand, pre-

vention focus students outperform promotion focus students in well-structured problems and underperform them in ill-structured problems, hence that what Higgins (1997) and Higgins et al. (2001) stressed that individuals with a promotion focus tend to utilise approach strategic means for achieving their goals, where the ill-structured problems require setting goals. The superiority of the promotion focus students over those with prevention focus can be explained by the fact that the promotion students stated their own goals when they were performing the tasks. This action is consistent with what Smithson (2012) and Weltman and Wolfson (1964) stated that when individuals state their goals by themselves, they have control over their goals and actions, leading to better performance. Another possible reason for the superiority of the promotion focus students was that they were striving for progress and planning for the resolution, and the gradual progress itself was considered a reward for them, and that what Wang et al. (2019) confirmed in their study that progressive and immediate rewards improve the performance.

The result can also be explained by the behaviour of the participants in the ill-structured problems conditions who were helping each other by presenting suggestions to solve those problems, which expanded their knowledge to challenge these problems, which in turn affected their performance in these types of problems. In addition, these kinds of problems were real and related to the participants' daily lives, which motivated them to find creative solutions to help the community get rid of them.

On the other hand, the results showed that the prevention focus students outperformed the promotion focus students in well-structured problems. This finding seemed logical because the well-structured problems as clearly formulated problems with known solution procedures and specified evaluation standards, and those features – as Higgins (1997), Higgins et al. (2001), and Snowman et al. (2012) claimed – consisted of the natures of those people's mindset who avoid strategic means in order to achieve their goals.

Furthermore, this finding might be related to problem closure, where the data available in well-structured problems helped prevention focus students to achieve unfulfilled goals, which made them feel relief that they could avoid negative consequences, which eventually assisted them in solving the problems, and that what Baas et al. (2011) stated that such situations consist with the nature of the prevention focus people.

This result can also be explained by the fact that the nature of the well-structured problems is logical and requires abstract thinking, so their solutions did not

require much effort because the methods of solving are clear and specific and do not require effort, and these situations fit their mindset.

Conclusions

The finding showed differences in the students' mindsets, which make a difference in the problem-solving method. So, it can be said that the mindset (promotion vs prevention) affects how the students solve different kinds of problems in terms of using different procedures for that.

Implications

Based on the findings of the current study, there are some benefits. The educators may increase their interest in the students' mindset and specify them before designing curricula or methods of instruction. Teachers may concentrate on problem-solving setting after specifying the mindset of the students and tailor the teaching methods and techniques to fit the students' learning styles.

Limitations and Recommendations

The results of the current study do not come without substantial limitations. The sample size may not be sufficient, but that was the maximum size that could be drawn, because of some administrative constraints relating to the university facilities, the researcher was forced to choose an available sample. The generalizability of the findings also has limitations because training students on problem-solving by a course of three 45-minute sessions may not be sufficient too, but that is what was possible for the time of the students because they could not leave most of their classes to take the training course because it was very difficult to find a common time to which gather all the 170 students.

With regard to the researchers, they can conduct more studies on the regulatory focus to study this concept deeply, taking into account other variables such as personality traits, mental abilities, or way of measuring it. Also, more studies need to be conducted on problem-solving because as mentioned previously, there is a paucity in examining the relationship between mindsets and problem-solving.

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