

IMPACT OF MINDSET ACTIVITIES ON PSYCHOLOGICAL WELL-BEING AND EFL SKILLS OF ENGINEERING STUDENTS IN WARTIME

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Abstract. Currently, the educational system of Ukraine is experiencing hard times due to full-scale war. A literature review revealed that military actions harm the mental health of civilians and cause fear, stress, loneliness and burnout. Therefore, learning strategies in wartime should contain effective and psychologically comfortable assimilation of new knowledge. The present study aims to evaluate the efficacy of mindset activities in boosting the psychological well-being of engineering students and improving their EFL grammar and vocabulary skills. A two-group pre and post-test design was used. First-year engineering students were included in the study. PHQ-9 depression questionnaire was used to measure the rate of depression before and after treatment. The questionnaire responses in the experimental group before and after treatment showed that the number of students with moderate depression decreased to 15% after treatment and the percentage of students with minimal depression increased by 20%. The changes in mild depression were minor (5%). By contrast, the respondents' answers to the pre-and post-treatment questionnaire in the control sample did not show significant shifts from severe to minimal rates of depression. To compare students' scores in EFL pre- and post-grammar and vocabulary tests after applying mindset activities the Fisher's Exact Test was used. Twenty-five students of the experimental group (83.3%) passed the test ($n_1 = 30$) and twenty students (57.1%) succeeded in passing the test in the control sample ($n_2 = 35$). The application of the test showed that the obtained empirical value φ (2.359) is higher than the critical value φ (1.64) at $P < 0.05$. Based on the data obtained, it can be concluded that employing mindset activities in EFL classes during wartime can help reduce the rate of depression among engineering students and improve EFL grammar and vocabulary skills.

Keywords: mindset activities, mental health, EFL skills, wartime, engineering students.

Introduction

Using creative problem-solving approaches to teaching and learning became especially relevant with the beginning of a large-scale war unleashed by the Russian Federation on the territory of Ukraine. Currently, producing quick, non-standard and innovative solutions is particularly valuable. Teaching in wartime is not the same as it is in peacetime. The learning process is complicated by air-raid warnings, power outages and the oppressed psycho-emotional state of students and teachers caused by the war. Education in conflict areas becomes a tool that could provide a comfortable healthy environment and ensure high-quality education for those students who have experienced psychological trauma in wartime. Education institutions can be an ideal setting for mental health professionals to intervene with traumatized students by supporting both their trauma-related psychological problems and their ability to learn in the classroom [1].

The office of the Prosecutor General informed that since the beginning of the large-scale war in Ukraine, 148 children died and at least 232 children have been wounded. Involvement in war leads to extreme traumatic experiences that could involve not only sexual or physical abuse, torture, mass killing, destruction of homes and other infrastructure, loss of family and economic insecurity [2], but also have a substantial impact on mental health (fear, substance use, stress, loneliness, burnout, and other related conditions) [4]. The consequences of war affect the population as well as future generations [5].

Ukrainian scientists started to explore the challenges of Ukrainian university education in wartime [3; 4]. The key issues consider the impact of war on university students and staff. In a study from Kurapov most respondents (97.8%) reported deterioration of their psycho-emotional status including depression (84.3%), exhaustion (86.7%), loneliness (51.8%), and nervousness (84.4%), and anger (76.9%), students more than personnel, females more than males. The authors state that the use of substances (i.e. tobacco, alcohol, pain relievers, and sedatives) has increased as well as loneliness associated with fear, burnout and lower resilience [4]. Kataoka et al. concluded that students who have experienced a traumatic event are at increased risk for academic, social, and emotional problems as a result of these experiences. In addition to the leadership and experience "wounded warriors" bring to the classroom, many must overcome the challenges created by post-traumatic stress disorder (PTSD) and traumatic brain injury [6; 7]. Educators may unwittingly expose these students to uncomfortable or

distressing situations [7]. The scientists state that educators can play powerful roles in enabling social and emotional as well as academic development for students from refugee family backgrounds within school contexts [8]. Only if teachers are equipped with basic knowledge about the brain and memory, they can provide instruction and assessment in ways that allow all students in the classroom to feel successful, including “wounded warriors” [7].

The scientists suggest that constructivist, hands-on, inquiry-based science activities may have a curative potential and could be valuable in education and therapy [9]. The research findings from Fazel and Stein show that addressing the history of the war and genocide as personally significant events can foster positive psychosocial development and strengthening of intergenerational relationships [8]. Cognitive interventions utilizing memory strategies focused on attention, encoding, storage, and retrieval, as well as environmental accommodations within the classroom, can also increase the academic success of students with memory deficits after traumatic brain injury [10]. Lengenfelder et.al., for instance, have revealed that self-generated learning strategies can contribute to learning new information and developing long-term memory in students with post-traumatic stress disorder [11]. Sinski in his paper provides suggestions for research-supported strategies that postsecondary faculty can use to promote wider access for an increasingly diverse student population [7]. Social network communication between teachers and students on Facebook [12], for instance, may provide students with easy access to human connections and emotional support [13]. Hence, the teachers should be trained to adapt their teaching style and the curriculum to fit these students’ varying capabilities and needs [14].

However, to the best of our knowledge, no study examines EFL learning strategies that enable university students under stress caused by war to increase their language fluency and boost their psychological well-being. This study constitutes a relatively new area of research which has emerged from the urgent need to reconsider the process of teaching in wartime. Accordingly, the current study tests the relationship between using mindset activities in EFL classrooms and the psychological well-being of students majoring in engineering. We hypothesize that providing mindset activity in EFL teaching can decrease the rate of depression among the students and improve their grammar and vocabulary skills. Our finding might be useful for university teachers in wartime, but also for the foreign language instructors who work with students who experience depression and stress.

Materials and methods

The university in the study is located in the west of Ukraine. We employed 65 first-year male bachelors in Agricultural Engineering from the higher educational institution “Podillia state university”. The students EFL proficiency levels varied from A1 to A2 in experimental ($n_1 = 30$) and control ($n_2 = 35$) groups. Before the experiment, the students of both groups were suggested to answer the PHQ-9 depression questionnaire to determine the emotional status of future engineers. The respondents were asked what they had been bothered by in the last two weeks. Each option (lack of interest in current events; indifference, depression; problems with falling asleep, insomnia, on the contrary, sleeping too much; feeling tired or exhausted; lack of appetite or overeating; feeling like a failure, blaming yourself for weighing on your family; hard to focus on reading or watching TV; move or speak unusually slowly (inhibition), or vice versa, excited, move more than usual; thoughts of suicide, or self-harm) was given a score. If the students experience one of the conditions not every day, they get 0, if they experience such conditions every day, they get 3 points. The same PHQ-9 depression questionnaire was suggested to the students of experimental and control groups after treatment. During the autumn semester of the 2022 academic year (16 EFL learning hours per semester according to the EFL syllabus) all engineering students were studying general topics.

The major difference between EFL teaching strategies was implementing self-developed mindset activities with the engineering students of the experimental group. We have chosen the mindset activities that have a powerful influence on students’ psychological well-being: “Negative to positive”, “Famous fails”, “How can I contribute?”, “Self-awareness checklist”. All the activities had a twofold purpose: improving grammar and vocabulary and enhancing the psychological well-being of engineering students. These activities helped cover quite a lot of grammar and lexical issues. Also, mindset activities were aimed at improving the mental state of respondents by focusing on students’ talent, learning the impact of self-awareness on self-improvement, analyzing and accepting their strengths and weaknesses,

seeing mistakes in a positive light and understanding how to make the mental shift by altering their internal voice.

The mindset activities were adapted to engineering students’ needs: level of language proficiency, problem and profession-based focus, and audio, visual and technology support. Grammar and vocabulary posttest was suggested to participants in both groups.

Results and discussion

The PHQ-9 test [15] was used twice with the students of both groups for screening, diagnosing, monitoring and measuring the severity of depression. Fig. 1 represents PHQ-9 test results before and after treatment in the experimental group.

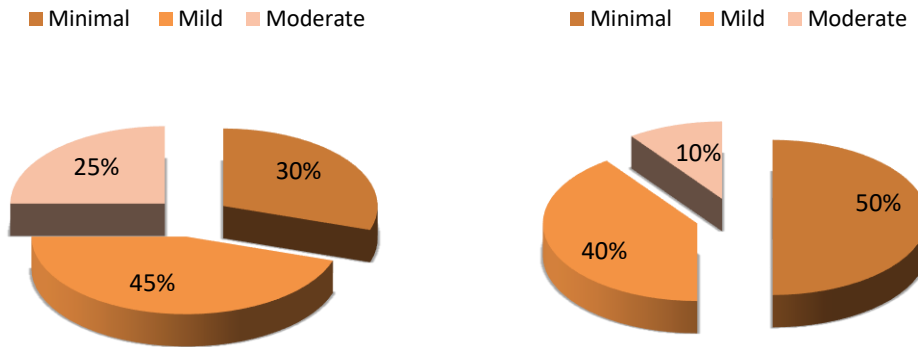


Fig. 1. PHQ-9 depression pre- and post-experiment questionnaire in the experimental group:
 a – the severity of depression in students before treatment; b – the severity of depression in students after treatment

According to the PHQ-9 depression scale, the most dangerous type of depression is severe depression. Fortunately, the PHQ-9 depression test results showed there are no students with severe depression in both groups. Nevertheless, we found that there were students with moderate, mild and minimal (where minimal depression is the lightest type of depression) depressive symptoms. The results of the questionnaire in the experimental group before and after treatment showed that the number of students who suffer from moderate depression decreased by 15%. By comparison, the percentage of students with minimal depression has risen to 20%. The changes in terms of mild depression are minor: 45% before treatment and 40% after treatment.

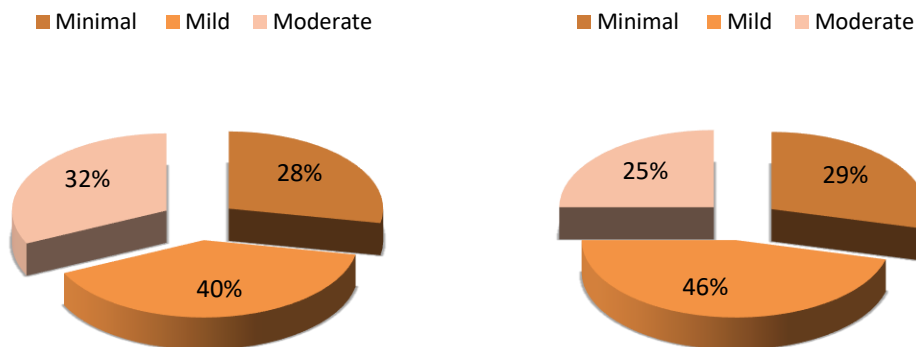


Fig.2. PHQ-9 depression test results at the beginning and the end of the semester in the control group:
 a – the severity of depression in students at the beginning of semester; b – the severity of depression in students at the end of semester

As is seen from the chart, the shift towards the lighter type of depression is not significant. For example, the improvement of indicators equals 6% in the context of mild depression. During the experiment, we used precisely those mindset exercises that have a twofold purpose: improving grammar and vocabulary and enhancing the psychological well-being of engineering students.

A comparative pedagogical experiment was carried out to identify the effectiveness of EFL teaching through mindset activities in improving the EFL grammar and vocabulary skills of engineering students. For this purpose, in the experimental group ($n_1 = 30$) the training was carried out according to the experimental, mindset-based methodology and in the control ($n_2 = 35$) according to the traditional (generally accepted). At the final stage of the experiment, the EFL grammar and vocabulary skills of the students were assessed as “passed”, and “not passed”. The following results were obtained:

- in the experimental group, 25 participants of 30 participants performed exercises, the percentage of which was 83.3% ($25/30 \times 100\%$);
- in the control group, the exercise was performed by 20 participants of 35 participants, the percentage of which was 57.1% ($20/35 \times 100\%$).

Although the test results of the experimental group are significantly higher than the test results of the control group in percentage terms, there is no reason to confirm that these differences are reliable. Therefore, we will check the reliability of differences based on the criterion of Fisher’s angular transformation and find out the effectiveness of the experimental teaching methodology. To begin with, we determined those values of the trait that will be the criterion for dividing the subjects into those who “have an effect” and those who have “no effect”. We considered the students who performed the exercise at the end of the pedagogical experiment to be the subjects who “have an effect” (25 students of 30 students in the experimental group and 20 students of 35 students in the control group). We included the students who did not perform the test to the category of “no effect”, respectively (5 students of 30 in the experimental group and 15 students of 35 in the control group). The results are given in Table 1.

Table 1

Test performance in experimental and control group

Groups	“Have an effect”	“Have no effect”
Experimental group	25 (83.3%)	5 (16.7%)
Control group	20 (57.1%)	15 (42.9%)

We calculated the number of subjects according to the criterion “performed” and “did not perform” in each group, determining the percentages of subjects who “have an effect” by assigning their number to the total number of subjects separately for each group. Then we checked whether one of the matched percentages was not zero and whether there were other restrictions on using the Fisher φ criterion to calculate the reliability of differences. The analysis of Table 1 indicated that there were no restrictions that could prevent the usage of this criterion.

Since only the percentages in the “Have an effect” column, i.e. “exercise completed”, were used to calculate the reliability of the differences for comparison, it was necessary to determine the values of φ for each group separately. According to the values of the angle φ (in radians) for different percentages: $\varphi = 2 \cdot \arcsin P$ [16], we determined the values of φ corresponding to the percentages in each group:

$$\varphi_{exp}(83.3\%) = 2.300; \varphi_{contr}(57.1\%) = 1.713 .$$

Let us calculate the empirical value φ_{emp} by formula (1):

$$\varphi_{emp} = (\varphi_{exp} - \varphi_{contr}) \times \sqrt{\frac{n_1 \times n_2}{n_1 + n_2}} , \quad (1)$$

where φ_{exp} – angle corresponding to a greater % fraction;
 n_1 – number of subjects in the experimental group (30 participants);
 n_2 – number of subjects in the control group (35 participants).

Let us substitute the received values into the specified formula:

$$\varphi_{emp} = (2.300 - 1.713) \times \sqrt{\frac{30 \times 35}{30 + 35}} = 0.587 \times \sqrt{16.15} = 2.359$$

Further, to determine the reliability of the differences, we compared the value of φ_{emp} with the critical (tabular) value of φ_{crit} . If $\varphi_{emp} \geq \varphi_{crit}$, then the differences are considered reliable and in this case we can talk about the greater effectiveness of the experimental technique. In the case where $\varphi_{emp} \leq \varphi_{crit}$ the differences between the results obtained are unreliable.

According to levels of statistical significance of different values of the Fisher φ criterion [16], the critical value (φ_{crit}) is equal to 1.64 at $P_{0.05}$ and is equal to 2.31 at $P_{0.01}$.

The next step would be to compare φ_{emp} and φ_{crit} . In our experiment $\varphi_{emp} = 2.359 > \varphi_{crit} = 1.64$ at $P < 0.05$.

The data obtained suggest that the experimental mindset-based teaching of grammar and vocabulary was more effective than the traditional one.

The results of the present study demonstrate two things. First, all the participants of the experiment have different depression rates. The test results showed that 57% of students in the experimental and control groups have moderate depression that can affect a person's ability to function normally. Second, EFL teaching in wartime should incorporate learning activities that can have a positive impact on EFL skills and the psychological well-being of students. We obtained good results with the mindset-based method. In line with previous studies [2; 4; 5] our paper also states that war causes irreparable damage to the emotional health of people, especially the younger generation [4]. We agree that educational institutions can ensure assistance to traumatized students [1; 7] by providing not only high-quality educational services but also psychological assistance.

Conclusions

1. Moderate, mild and light types of depression caused by war were revealed among first-year engineering students in Ukraine.
2. Teachers should explore war-adapted strategies in education. Firstly, to provide a positive and supportive psychological climate in the university as a whole and the EFL classroom in particular. Secondly, they can help improve students' academic performance.
3. The results obtained showed that using mindset activities in EFL classrooms with engineering students can improve their grammar and vocabulary skills and lower levels of depression.

Author contributions

Indicate the contribution of each author. Example: Conceptualization, O.C.; methodology, O. P. and L.K.; software, L.K.; validation, O.C. and M.I.; formal analysis, O.P. and L.K.; investigation, O.C., O.P., L.K. and M.I.; data curation, O.P.; writing – original draft preparation, O.C.; writing – review and editing, M.I.; visualization, L.K.; project administration, O.C. All authors have read and agreed to the published version of the manuscript.

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