

## Predicting Students' Quality of Life based on Self-differentiation, Mindfulness, and Social Intelligence

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### ABSTRACT

The present study was conducted to predict the quality of life based on self-differentiation, mindfulness, and social intelligence in students of Ahvaz Islamic Azad University. For this study, 198 students were selected as the sample by the available sampling method. In collecting data, the World Health Organization (WHO) quality of life questionnaires - short form, awareness of Brown and Ryan's conscious mind, Tromso's social intelligence, and Scorne self-differentiation were used. Data analysis was performed using correlation methods. The results of the Pearson correlation coefficient showed a significant relationship between the variables of self-differentiation, mindfulness, and social intelligence with quality of life at the level of one percent. Multiple regression results showed that; there are multiple correlations of 0.449 between the predictor variables of self-differentiation, mindfulness, and social intelligence with quality of life. In the meantime, mindfulness, unlike self-differentiation and social intelligence, does not help to predict the quality of life. Also, no significant difference was observed between the predictive power of social intelligence and self-differentiation. In the final analysis, which was performed using MATLAB software and artificial neural network statistical test, the results showed that; The accuracy of quality of life prediction based on these three variables is equal to 0.63. This accuracy of prediction by the artificial neural network in comparison with the prediction made by multiple regressions indicates a more accurate prediction of the artificial neural network.

### Keywords

Quality of life, Self-differentiation, Mindfulness, Social Intelligence.

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### Introduction

Students are the future leaders and organizers of the society of the country. They are affected by the prevailing social, cultural, and economic conditions in society and many cases do not have the necessary ability to deal with problems and challenges and are exposed to too much harm and moral and behavioral abnormalities. One of the influential factors in students' well-being is quality of life. Quality of life can predict the extent and impact of diseases, injuries, and disabilities and measure mental health in communities (Ogundare, 2017). The World Health Organization defines the quality of life as an individual's perception of his or her place in life, the cultural context, and the value system in which he or she lives and this position is related to the goals, aspirations, criteria, and priorities of that person (WHO,

2016). This definition of quality of life includes three components: welfare and Satisfaction subjective, functional status, and contextual factors. The first two components, quality of life, overlap with mental health (Mohammadi, Doran, Rabiei & Salimi, 2017). Various factors such as health status, ability, happiness, maintaining sensitive functions, and pain relief are among the characteristics of quality of life (Flynn & Gow, 2015). In general, it is important to identify the factors that affect the quality of life, because by identifying these factors, its positive consequences in the field of psychological issues, education, and material costs are prevented.

The extent to which individuals can separate their cognitive processes from the emotional processes they experience can affect their quality of life, this ability is called self-differentiation. The degree of self-differentiation indicates that; to what extent is

the person able to avoid behaviors that automatically arise from emotion? Self-Differentiation is one of the necessary areas for communication and psychological adjustment (Schif, 2014). Self-Differentiation is a personality trait that manifests itself at different levels inside and outside the psyche. At the psychosocial level, it includes my position and emotional responsiveness and the process that takes place within the individual and at the extra-psychological level, it is a process that occurs in relationships between individuals and involves emotional breakdown and integration with others. Self-differentiation means that; the individual has acquired the necessary ability between the mental and emotional process and becoming independent of others. Self-Differentiation from the main family keeps the ability to accept responsibility for thoughts, actions, and emotions at a high level (Maser, 2011).

When family members cannot distinguish themselves from the main family, they cause anxiety and stress them and their individual and social functioning will be disrupted, leading to feelings of inadequacy and poor self-esteem. Therefore, a lack of self-differentiation in these people reduces their quality of life. In a study that examined the relationship between self-differentiation and quality of married life, among the dimensions of their differentiation, the dimension of emotional separation and emotional response predicted marital discord (Skowron, 2000). Resilience and self-differentiation were studied as predictors of students' quality of life in the study (Ahadi & Alizade Asli, 2011). The results showed an increase in quality of life with a decrease in emotional problems due to high resilience. Also, high fusion means low self-differentiation because it is formed under the influence of the emotional system of the environment and the reaction of others has the greatest effect on reducing the quality of life.

A receptive and judgmental awareness of what is happening now seems to affect the quality of human life. This cognitive construct, known as mindfulness, means that; Mindful people perceive internal and external realities freely and without distortion and they have a great ability to deal with a wide range of thoughts, emotions, and experiences (both pleasant and unpleasant). In this

regard, we were faced with an increase in psychological and medical research on mindfulness, which can reveal new dimensions of the relationship between mind and body (Francesco, Katherine & Deborah, 2018). Examined students' mindfulness and quality of life, the results showed that; Mindfulness has a direct and significant relationship with the quality of life in students. The more mindfulness students had the less mental illness they had and this had a positive effect on their quality of life. According to (Kabat & Zein, 2005). Mindfulness is not an altered state of consciousness; rather, it is a state of self-observation, without evaluation and attention to the present reality. Researchers have treated a wide range of physical and mental disorders using mindfulness-based therapies. The results show the great effect of mindfulness therapies in the treatment of migraine headaches and improving the quality of life (Afzali, Ghaemi, Dortaj & Bagheri, 2020). Most research has focused on evaluating the effectiveness of mindfulness-based interventions. Mindfulness intervention is a systematic and intensive approach that is used to acquire new types of control and wisdom based on internal capabilities for relaxation, attention, awareness, and insight. The results show that; This type of intervention has been effective in treating both psychological and physical symptoms. Mindfulness-based cognitive therapy interventions in the treatment of depressive symptoms, obsessive-compulsive disorder, and anxiety symptoms have been confirmed in many studies conducted in the country (Sadighi & Arfaei, 2015). Some studies have shown that; Mindfulness has a significant impact on quality of life (Izadi & Nemat Tavoosi, 2016; De Frias, & Whyne, 2015). Also (Amani & Khazaei, 2020) in a study concluded that; Mindfulness regulates the relationship between the rate of artistic activity and the quality of life And doing artistic activities in leisure time can increase people's quality of life by increasing mindfulness.

Another factor that may be related to the quality of life is social intelligence. The term social intelligence was first used in the psychological literature about 90 years ago. But it seems that since 2003, with the writings of Daniel Gelman, this phrase has been used more and more and has

become popular. Social intelligence is "the ability to understand and manage the men, women, boys, and girls around them through wise behavior in human relationships." In other words, it can be called the equivalent of "interpersonal intelligence". In general, social intelligence is a person's ability to optimally understand and react to the people around him and one of the reasons for receiving social support. Social intelligence (intelligence related to otherness); this type of intelligence refers to the ability to understand the emotions and behavioral motivations of other people. Social intelligence or adaptive behavior means the power to get along with and communicate with others, that is, to cope with negotiations, conflicts, mistakes, and other situations. Increasing intelligence or adaptive behavior with social benefits helps man to communicate with everyone with power. By cultivating adaptive behavior, one can understand one's personal needs (Dogan, & Çetin, 2009). There are no studies that examine all of these variables together but there are studies that have looked at each of the variables separately. In the field of social intelligence and quality of life (Hakiminia, Pourafkari & Ghaffari, 2017). By examining the factors affecting the quality of life with emphasis on social intelligence and social health, the following conclusions were reached: The findings of the structural equation model show a positive correlation between the quality of life and social intelligence and social health. The obtained results showed that; Scales made for the three main variables of research, namely quality of life, social intelligence, and social health, are a reliable tool for measuring the quality of life and social intelligence.

(Nazemi, Nazer Azary & Jabbari, 2020) By presenting a model of social intelligence and financial intelligence on teachers' quality of life and examining the mediating role of risk management, they achieved the following results: Social intelligence and financial intelligence have a positive and direct impact on risk management, social intelligence, financial intelligence and risk management have a positive and direct impact on quality of life and social intelligence and financial intelligence have a positive and indirect effect on the quality of life through risk management. A study was conducted on the effect of neuroticism

and mindfulness on the quality of diabetic patients. The results showed the effect of neuroticism on reducing the quality of life and mindfulness on increasing the quality of life of patients (Karami, Karimi & Sepahvand, 2019). In a meta-analytic study that examined students' mindsets, they concluded that; Mindfulness can improve anxiety, depression, and consciousness with small to moderate effects and to some extent affect the quality of life of students (Dawson, Brown, Anderson, Datta & et.al, 2020). But in this field, more extensive and in-depth studies are needed to examine the various factors that affect the quality of life of students.

Quality of life is very important in the mental health of people, especially students and plays an important role in their learning and academic success. Therefore, recognizing the factors that can increase the quality of life of this group is considered important and should be considered. According to the research literature, no mini-research has been done on the factors affecting the quality of life such as self-differentiation, mindfulness and social intelligence with students' quality of life and the relationship between the set of these variables and quality of life is still a research question. Therefore, this study answers the question; can students' quality of life be predicted based on their differentiation, mindfulness, and social intelligence? Accordingly, the research hypotheses are Hypothesis 1: self-differentiation predicts the quality of life of students. Hypothesis 2: Mindfulness predicts the quality of life of students. Hypothesis 3: Social intelligence predicts the quality of life of students.

## Methodology

### Research Method, Statistical Population, and Sample

The present study is a correlation of artificial neural networks. The statistical population of the present study included all students of the Islamic Azad University of Ahvaz who were studying in the academic year 2020-2021. Using the available sampling method, a sample of 198 students was selected. Adequacy of sample size was estimated using the test power index and since the test

power was more than 80%, it indicates that the sample size is sufficient.

### **The Assessment Tool**

#### **World Health Organization Quality of Life Questionnaire- Short Form**

The WHO Quality of Life Short Scale has 26 questions and measures 4 dimensions of physical, mental, social, and physical health which is used as a comprehensive scale and includes overall quality of life and general health levels. This scale was created in 1996 by a group of experts from the World Health Organization by modifying the items of the 100-question form of this questionnaire. Questionnaire questions are 5 options; it is never scored equal to 1 and very much equal to 5. It is necessary to mention; Questions 3, 4, and 26 are scored in reverse. The minimum score on this scale is 26 and the maximum score is 130. In the results reported by the constructors of the World Health Organization Quality of Life Scale conducted in 15 international centers of the organization, Cronbach's alpha coefficient was reported between 0.73 and 0.89 for the four subscales and the whole scale (Nasiri, 2006). In Iran (Nasiri, 2006) for the reliability of the scale, he used the retest method with a three-week interval, halving and Cronbach's alpha which was equal to 0.67, 0.87, and 0.84, respectively. It has also measured the reliability of the quality of life scale (Rahimi, 2015) and Cronbach's alpha coefficient for the whole scale was equal to 0.88 for physical health 0.70 for mental health 0.77, and social relations 0.65 for quality of living environment equal to 0.77. In the present study, Cronbach's alpha method was used to determine the reliability of the quality of life questionnaire, which was 0.87 for the whole questionnaire.

#### **Mindfulness Questionnaire**

The Consciousness Scale for Conscious Mind Design was developed by Brown and Ryan (2003). This scale consists of 15 items and its scoring is in the form of a 6-point Likert scale

from 1 for always to 6 for never. The validity of this scale has been confirmed by the internal consistency method for reliability and confirmatory factor analysis and a criterion for determining validity approved by Katz and Nell (2016). In the study (Zezeibi Ghanad & et. Al, 2017), the reliability of this scale has been reported using Cronbach's alpha coefficient of 0.80 and its structure was confirmed by factor analysis. In the present study, Cronbach's alpha method was used to determine the reliability of the Mindfulness Questionnaire, which was 0.84 for the whole questionnaire.

#### **Tromso Social Intelligence Scale (TSIS)**

It has 21 questions and its purpose is to measure individuals' social intelligence and its subscales (social information processing subscale, social awareness subscale, and social skills subscale. A 7-point Likert method is used to score it which includes (strongly agree, somewhat agree, somewhat agree, have no opinion, slightly disagree, somewhat disagree, and strongly disagree). The scoring method for questions 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21 is the reverse. In a study (Rahimi, 2015) the validity of the questionnaire was 0.79 and the reliability of the questionnaire was (91 questions) 0.91 and separately for social information processing from (8 questions) 0.84 and social skills from (6 questions) 0.81 were obtained, which indicates the high reliability of this questionnaire. In the present study, Cronbach's alpha method was used to determine the reliability of the social intelligence questionnaire, which was 0.85 for the whole questionnaire.

#### **Self-differentiation Questionnaire**

The self-differentiation questionnaire was developed by (Skowron, 2000), 46 questions are used to measure the degree of differentiation of individuals. This questionnaire is graded with a Likert scale in a 6-item row. The questionnaire consists of 4 subscales of emotional integration with others, my position, emotional escape, and emotional reactivity. Also, Cronbach's alpha coefficient calculated by Scorne and Fried Lander is 0.88. The alpha coefficient of this questionnaire



in a study conducted by (Plachpapco, 2004) has been reported to be 0.86. Skian (2005) in his research reported Cronbach's alpha coefficient for this questionnaire as 0.81 (Sanaei, 2007). Research (Karami, 2017) the reliability coefficient of this questionnaire was 0.89 using Cronbach's alpha method. In the present study, Cronbach's alpha method was used to determine the reliability of the mental health questionnaire, which was 0.83 for the whole questionnaire.

## Procedure

WhatsApp application was used for sampling due to the prevalence of corona. Questionnaires were prepared electronically and the questionnaire link was sent to the students. After the samples have reached the quorum; In this study, which was 198 people, sampling is completed. The data is then entered into SPSS software to be analyzed.

## Results

The mean and standard deviation of the age of the subjects were 21.15 and 2.07, respectively. First, the data were monitored for pertinent data, normality, and regression assumptions. Alignment and variance inflation factors were controlled. Because the tolerance index for self-differentiation (0.532), mindfulness (0.436), and social intelligence (0.621) are more than 0.10 and the variance inflation factor for self-differentiation (1.482) is mindfulness (2.019) And social intelligence (1.916) was less than 10, this assumption is also observed. Watson's camera test

was used to evaluate the independence of errors. Since the Watson camera statistic value (1.44) is in the range of 1.5 to 2.5, this assumption has also been observed. In Table 1, the mean, standard deviation, and Pearson correlation coefficient are given.

**Table 1.** Mean standard deviation, number, and Pearson correlation coefficient in research variables

Statistical indicators variable	Mean	standard deviation	Pearson correlation coefficient
Quality of Life	67.16	10.19	1
Self-differentiation	112.32	15.64	**0.385
Mindfulness	44.74	7.59	**0.257
social intelligence	61.02	8.35	**0.334

Based on Table 1, descriptive statistics of variables are presented. Also, according to the above table, the relationship between all variables of self-differentiation, mindfulness, and social intelligence with quality of life at the level of 0.01 is significant.

Then, to predict the quality of life of students using multiple regression tests, the following results were obtained.

**Table 2.** Results of quality of life of students using multiple regression tests

Criterion variable	Predictive variables	R $R^2$	F P	$\beta$	p	Confidence interval	
						High limit	low limit
Quality of Life	Self-differentiation	0.449 0.189	16.32 0.0001	0.292	0.0001	0.128	0.046
	social intelligence			0.200	0.006	0.199	0.033
	Mindfulness			0.087	0.227	0.325	-0.078

According to the results of the table 2, there are multiple correlations of 0.449 between predictor variables, self-differentiation, social intelligence, and mindfulness with quality of life. Also, mindfulness does not help to predict the quality of life but self-differentiation and social intelligence

are significantly able to predict the quality of life and of course, due to the overlap of confidence intervals between the two variables of self-differentiation and social intelligence, there is no significant difference between the predictive powers of the last two variables.

Now, to obtain an accurate formula for predicting quality of life, a neural network was designed and built using MATLAB software. First, the data to be entered into the network were divided as follows:

- 70% as a set of educational
- 15% as a set of evaluation
- 15% as a test set.

Three inputs and one output were given to the network in the form of an Exel file and the form of a matrix. According to the obtained results, the best result was obtained by using two hidden layers that had 3 neurons in the first layer and 9 neurons in the second layer, as shown in the following Fig.

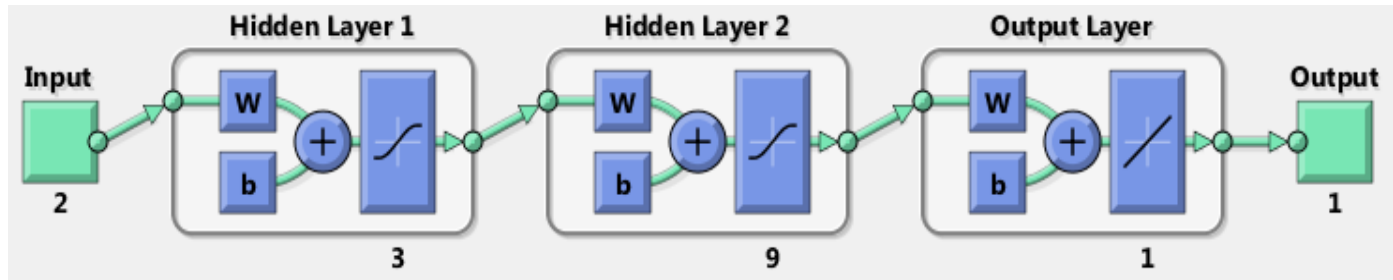


Fig. 1. Number of layers and neurons in the best predictive state

Due to the uncertainty of the optimal amount of training repetition, according to the Early Shopping Method, at the same time as presenting the training set data and optimizing the network weights, the evaluation set data are presented to the network only to obtain predictions and until the error correction is very small, the training repetitions will continue. Finally, the best repetition rate is confirmed and selected based on the minimum amount of training data set. Figures 2 and 3 show how the neural network training process proceeds from the input data. According to the settings, the network was stopped with 6 consecutive repetitions in the evaluation set error. This stop occurred in repetition 10.

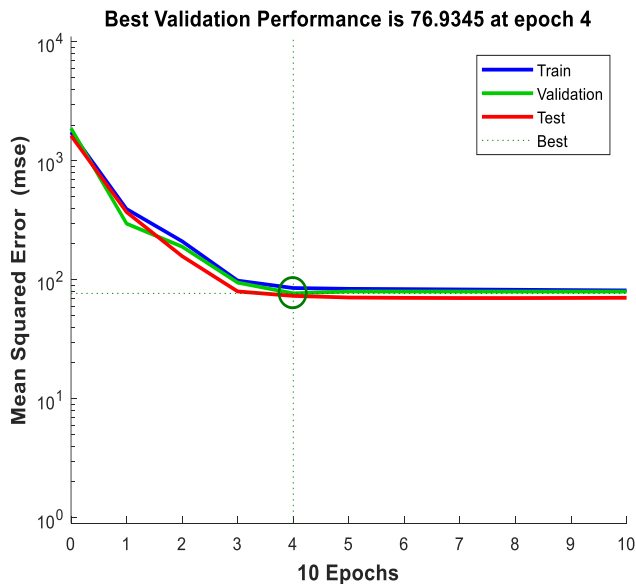


Fig. 2. Network efficiency chart

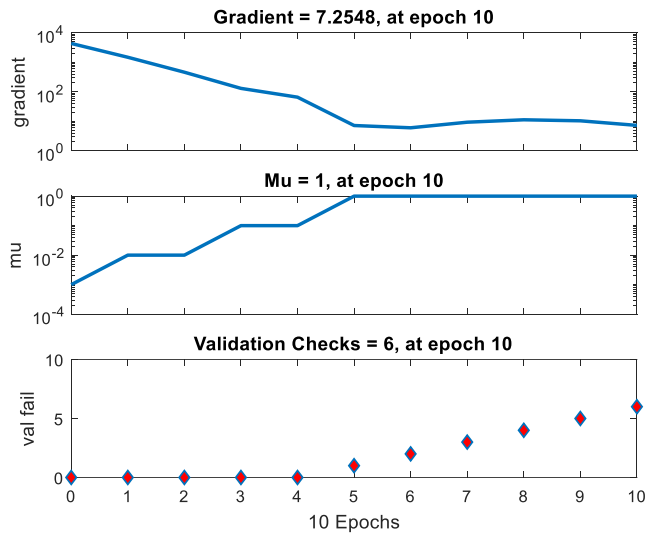


Fig. 3. How to stop training

According to Figures 2 and 3, it is determined:

- 1. The final mean square error is small.

- 2. The error of the experimental set has almost the same behavior and characteristics as the error of the evaluation set.
- 3. Until repetition 4 (which is the best performance of the evaluation set), no further fitting has occurred.

Figure 4 also shows the accuracy of the network in predicting high-risk behaviors, which is shown in 4 parts: training, evaluation, experimental and total. This Fig shows the proximity of network outputs to real values. The closer the points are to the diagonal axis of the graph and the more they accumulate, the closer the output values are to the actual values. Below are Figs of the forecast equations in each of the training, evaluation, testing, and total stages.

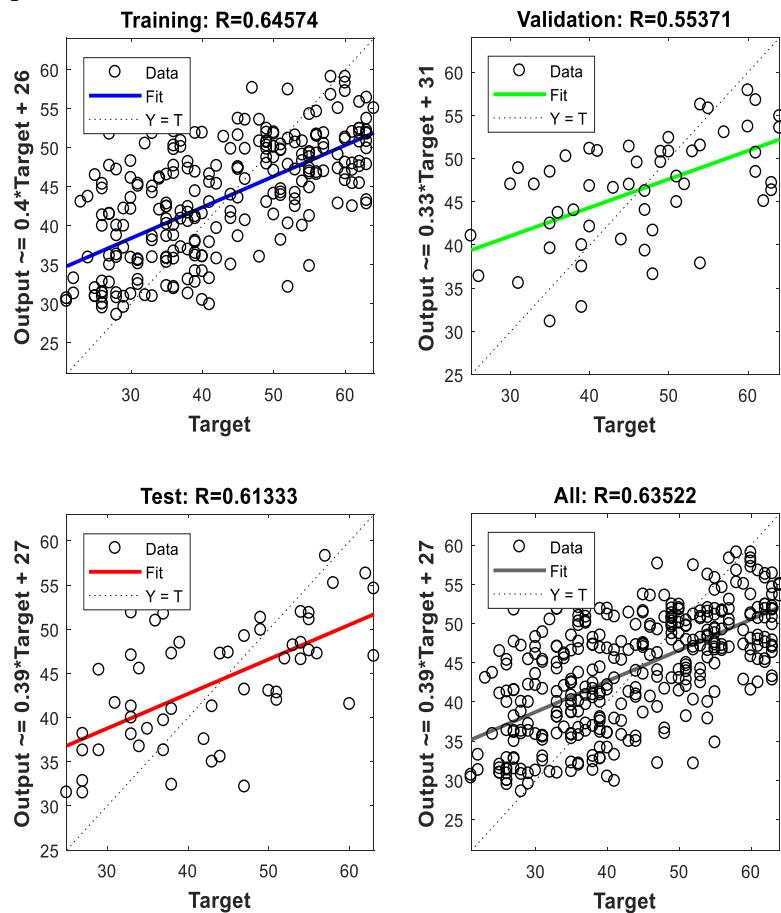


Fig. 4. The regression equation between the values of quality of life and the estimated amount

According to the above Figs, in the training phase, the neural network was able to predict the quality of life with an accuracy of 0.64. At this point, the forecast equation was as follows:  
Output= 0.4 \* Target + 31

Also, in the evaluation phase, the neural network was able to predict the quality of life with an accuracy of 0.55. At this point, the forecast equation was as follows:  
Output= 0.33 \* Target + 21

In the experimental stage, the neural network was able to predict the quality of life with an accuracy of 0.61. At this point, the prediction equation was as follows:

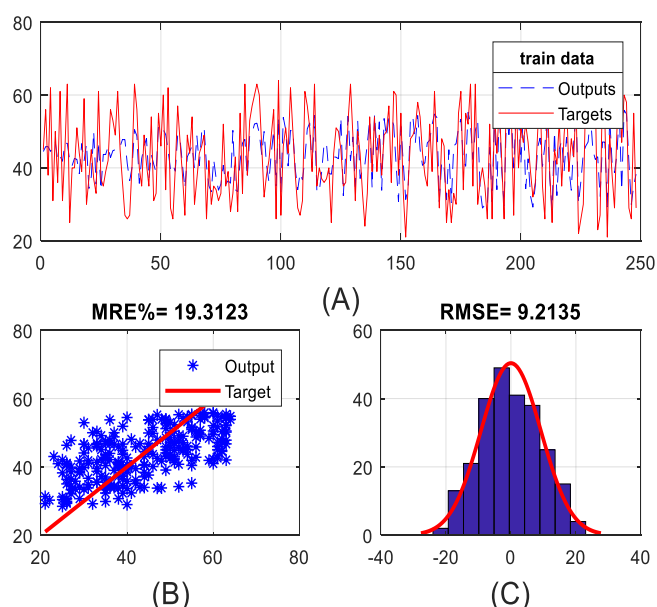
$$\text{Output} = 0.39 * \text{Target} + 27$$

In general, the neural network was able to predict the quality of life with an accuracy of 0.63. At this point, the forecast equation was as follows:

$$\text{Output} = 0.39 * \text{Target} + 27$$

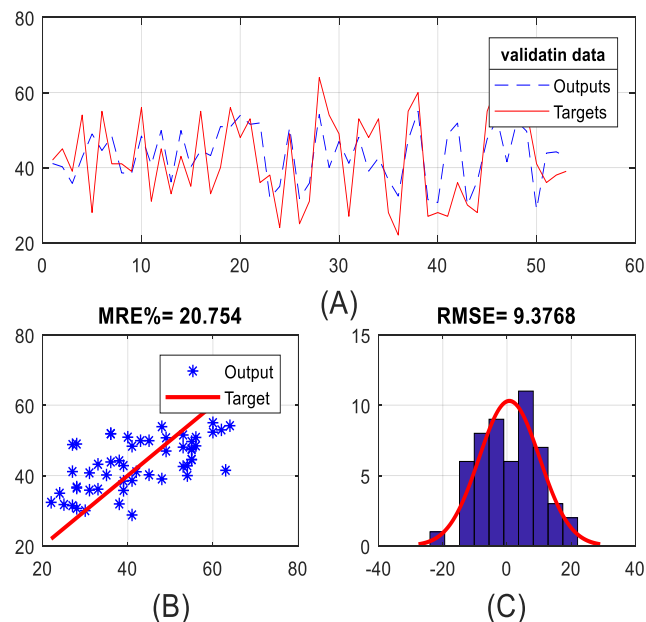
In addition to the prediction equations, it is possible to evaluate the performance of different models using RMSE and MRE factors.

In the following, neural network performance evaluations are presented in the training, evaluation, and experimental stages.



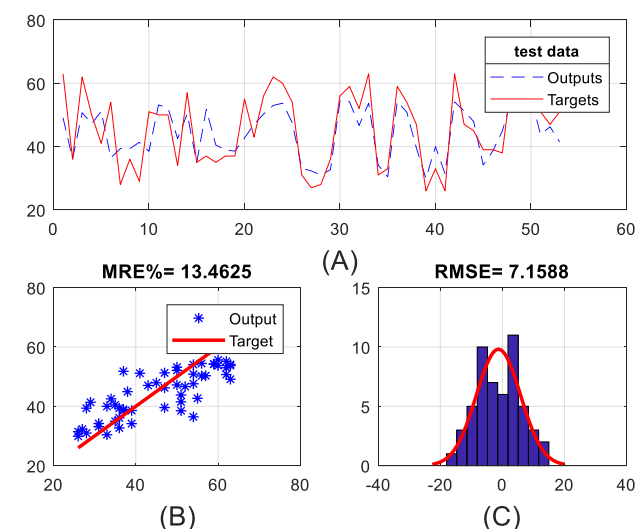
**Fig. 5.** Evaluation of model performance in the training phase

According to the above Fig, in the training phase, the values of  $\text{RMSE} = 9.213$  and  $\text{MRE} = 19.319$  were obtained.



**Fig. 6.** Evaluation of model performance in the evaluation phase

According to the above Fig, in the evaluation stage, the values of  $\text{RMSE} = 9.376$  and  $\text{MRE} = 20.754$  were obtained.



**Fig. 7.** Evaluation of model performance in the experimental stage

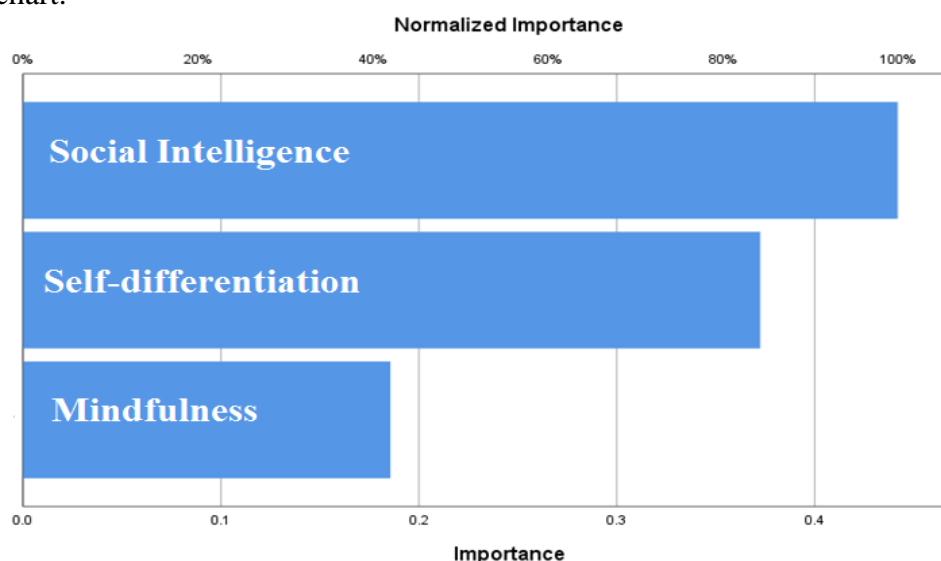
According to the above Fig, in the experimental stage, the values of  $\text{RMSE} = 7.158$  and  $\text{MRE} = 13.462$  were obtained.

The results showed that the neural network had a good estimate in predicting quality of life.

Also, the results of the analysis of the importance of the variables of self-differentiation, mindfulness, and social intelligence in predicting



the variable of quality of life of students are given in the following chart.



**Fig. 8.** Relative importance of predictor variables

According to the above chart, the variables of social intelligence, self-differentiation, and mindfulness are of relative importance in predicting the quality of life of students, respectively.

### Discussion and Conclusion

To predict the quality of life of students based on their differentiation, mindfulness, and social intelligence, the questionnaires were administered to a sample of students. The first finding of this study was that; there is a significant relationship between self-differentiation and students' quality of life. This finding was consistent with the findings of Khajavi and Tajrobeh Kar (2014) and Askari et al. (2015). In explaining this finding, it can be said that; increasing one's self-differentiation helps one to have more control over oneself in different situations, and also improves one's quality of life by increasing one's ability to gain a place in interpersonal communication.

The next finding was that there is a significant relationship between mindfulness and students' quality of life. This finding was consistent with the findings of Kimberly et al. (2018), Astrid et al. (2018), and Afzali et al. (2020). Explaining this finding, it can be said that mindfulness increases the quality of life by reducing stress and increasing relaxation.

It was also found that there is a significant relationship between social intelligence and students' quality of life. This finding is consistent with the findings of Hakiminia et al. (2016). Explaining this finding, it is inferred that the four indicators of social intelligence have a direct impact on quality of life. Thus, with the increase of social relations, the degree of influence of individuals, leadership and management and group capacity, a high level of quality of life will be experienced by individuals.

Of course, the main purpose of this study was to predict the quality of life of students. For this purpose, the first regression test and then artificial neural network test were performed. Regression results showed that; There are multiple correlations of 0.449 between predictor variables, self-differentiation, social intelligence, and mindfulness with quality of life. Mindfulness in the presence of other predictors cannot predict the quality of life But self-differentiation and social intelligence are significantly able to predict the quality of life And of course, due to the overlap of confidence intervals between the two variables of self-differentiation and social intelligence, there is no significant difference between the predictive power of the last two variables. In explaining this finding, it can be said that; Mindfulness is a personal ability that affects various components of individual and social life. As seen in the Pearson correlation results.

The mindfulness variable had a significant relationship with quality of life. However, according to the special features of the regression statistical test, when the variable of mindfulness is placed next to other variables such as self-differentiation and social intelligence, it does not have a significant relationship with quality of life. In the regression test, contrary to Pearson correlation, the relationships of predictor variables with the criterion variable are calculated not independently of other predictor variables but despite their presence. This feature of the regression test makes the presence of two important predictor variables such as self-differentiation and social intelligence, the amount of the remaining share of the explanation of the quality of life variable by mindfulness is not significant.

Finally, the results of predicting quality of life-based on their differentiation, mindfulness, and social intelligence using MATLAB software and artificial neural network statistical test, showed that; The neural network was able to predict the quality of life with an accuracy of 0.63. This accuracy in neural network prediction, compared to the prediction accuracy with multiple regressions equal to 0.449, indicates a more accurate prediction of the neural network. In explaining this finding, it can be stated that; Artificial neural network for major reasons including Having the ability to recognize the pattern, Less sensitivity to errors in input information, Completely parallel processing process (Ashrafzadeh, 2008; Soltani, 2002), Need for fewer input data and faster and easier validation and calibration process (Borhani & Fatehi, 2008), Ability to discover and predict the relationship between variables (Green & Stephenson, 1986; Souza Filho & Lall, 2003), Simulation of any nonlinear system without prior assumption of process and the ability to simulate despite incomplete or ambiguous input data (ASCE, 2000), Distributed nonlinear conversion process and information processing system (Zhu & Zhou, 2007), Able to categorize inputs for output, generalizability and the ability to learn sustainability, a good relationship between input and output, which gives a more acceptable result than other modeling methods.

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