Mediating role of emotional well-being in the effect of metacognitive learning and self-directed learning on the level of e-learning in the managers of universities

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Abstract

Context: E-learning is one of the most important and favorable topics in the scientific society, which attempts to facilitate the complexity aspects of human beings' learning.

Aims: This research aimed to investigate the mediating role of emotional well-being on the effect of metacognitive learning and self-directed learning on e-learning level in universities' managers.

Settings and Design: The present study was a cross-sectional research.

Material and Methods: The research methodology was descriptive-correlational and in particular structural. The statistical population of this research was 478 university managers (including medical sciences and marine sciences in Islamic Azad University) in Mazandaran province in 2019, and 260 individuals were selected as the sample size in an available method. Pintridge and DeGrott Metacognitive Learning Strategies Scale (1990), Cheng's Self-Directed Learning Scale (2007), Watkins *et al*.'s E-learning Scale, and Keyes' Emotional Well-Being Scale (2003) were used.

Statistical Analysis Used: The collected data were analyzed using structural regression equations by SPSS 18 and Amos 23 software.

Results: The findings showed that the research model is fitted and 63% of the e-learning variables could be explained by metacognitive learning, self-directed learning, and emotional well-being ($P \leq 0.001$). Furthermore, emotional well-being had a mediating role in the effect of metacognitive learning and self-directed learning on the level of e-learning ($P \leq 0.001$).

Conclusions: The results of this research can provide practical implications for improving psychological status, emphasizing the mediating role of emotional well-being on the impact of metacognitive learning and self-directed learning on e-learning level in universities' managers.

Keywords: E-learning, Emotional well-being, Metacognitive learning, Self-directed learning

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INTRODUCTION

Cognitive research and theories in explaining the learning and academic performance emphasize on the matter that learners use cognitive strategies when acquiring, storing, and remembering the information and ignore the role of motivational variables.[1] "E-learning" is one of the important and favorable topics of the scientific society, which attempts to discover the learning complexities' aspects and to facilitate human being's learning.[2] On the one hand, none of the motivational and cognitive variables alone can explain the learning and learners' educational performance, but learning and performance of the learners can be explained better using self-directed learning strategies and considering the interaction between "cognitive" and "motivational" variables.[3] Accordingly, we have witnessed the development and expansion of various theoretical frameworks about "self-directed learning," which agree and share in the existence of cognitive, metacognitive, and emotional components in learning, in the recent decades.[4] Self-direction in learning refers to the active involvement of the learner in behavioral, motivational, cognitive, and metacognitive terms in learning process in order to maximize learning.[5] Ferla *et al.* have divided learning strategies into cognitive and metacognitive strategies.[6] Self-regulated learning theory is among the other outstanding theories in the field of self-regulated learning strategies, and the interplay between motivational variables and (cognitive and metacognitive) learning strategies in learning and academic performance of learners is emphasized in this model.[7,8] Recent researches indicate the importance of learning strategies in facilitating the learning, remembering, and reminding processes, and show the cognitive transformation role in utilizing the learning strategies.[9,10] The results of a research by Abili *et al.* (2017) indicate a significant causal relationship between motivational beliefs and cognitive and metacognitive strategies with academic achievement.[11] E-learning can be mentioned among the new ways of learning with regard to the increasing advancements[12] and cyber-learning with amazing references and facilities including the lack of need to location, have interactive information in specialized is one of it's prominent feature.[13] E-learning has unique abilities to support asynchronous and collaborative communication in a dynamic and adaptive training environment.[14] Like many of the changes that technology has made in our lives, e-learning is a cause of concern to some experts.[15] E-learning is defined in different ways, and different definitions of e-learning, online learning, technology-enhanced learning, and distance learning overlap with each other.[16] Studies by Bahreini *et al.* have shown that the level of well-being

and emotional interactions are among the essential components in learning route;[17] individuals with a high sense of well-being experience positive emotions and have a positive evaluation of the learning pathway in the events and occurrences around themselves.[18] In general, emotional well-being is defined as the development of the real emotional talents of an individual, and an increase in the capacity of positive states and a reduction of negative states of emotions are defined as optimal well-being.[19] Zanjani *et al.* showed that there is a significant relationship between the components of self-directed learning readiness with e-learning acceptance and academic achievement.[20,21] Qureshi *et al.* showed that software-based training of native e-learning model impacts on self-direction in students' learning and its components (self-management, willingness to learn, and self-control).[21] Lamb and Snodgrass showed that among the requirements for improving teachers' efficiency in emotionally dealing with e-training issues is to pay attention to positive and negative orientation patterns of their lives and the extent of cognitive strategies in these interactions.[5] Hsu and Lin showed that the extent of metacognitive guidance by the teachers for the learners could play a substantial role in enhancing the improved environment in e-learning.[15] D'Errico *et al.* showed that enhanced emotional well-being and emotional interactions cause an increase in students' participation in e-learning processes.[18] Bannert *et al.* showed that the short-term and long-term effects of students' metacognitive patterns impact on self-control behavior, self-direction, and e-learning performance.[7]

In summary, as the basis of e-training is pervasive oriented, even with regard to the verbal meaning (literal sense) of the word "pervasive," meaning someone who must himself/herself seek to acquire knowledge and science, e-training provides the correct example of this word. Interactions in cyberspace are not limited to the walls of classrooms, books of one or more libraries, and a limited number of professors and students, but provide a classroom with an immense area of cyberspace without time and spatial constraints with the student. Web has a high potential to establish a very high convergence and cost reduction in delivering educational materials. The basic structure and concept of the worldwide web is the source of information storage and a tool to retrieve them, while e-learning technology is not limited by time and space. The cyberspace broadens the social interaction of participatory learning and changes its structure. From the educational viewpoint, e-learning should also be considered from the perspective of the nature of human being's interaction as shown in Figure 1, so the main question of the present research, have effect
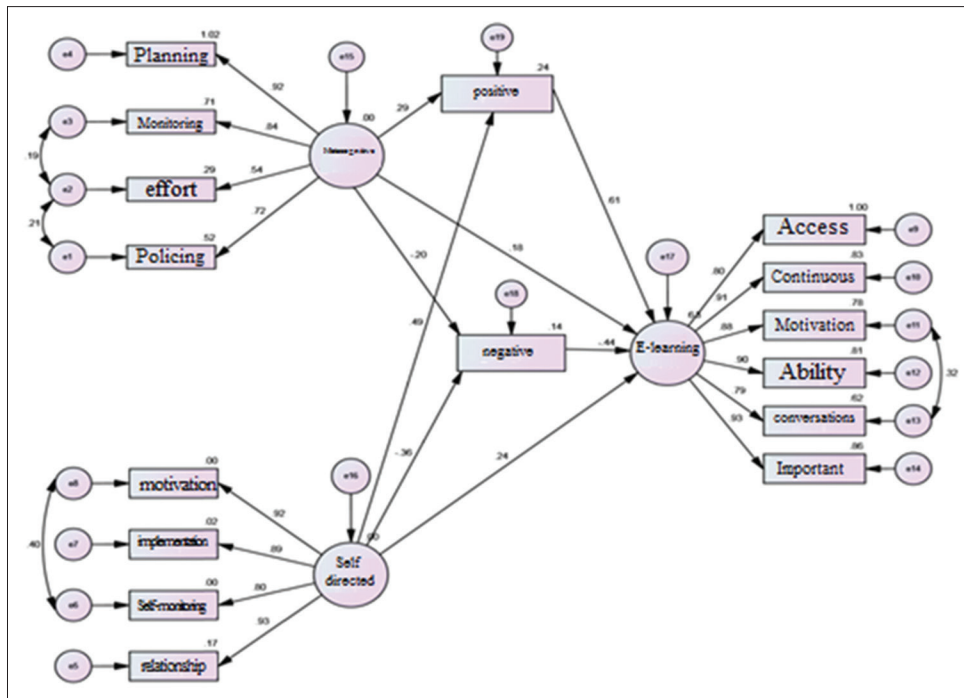
Figure 1: Final tested model along with standardized prediction statistics

metacognitive learning and self-directed learning on the level of e-learning mediated by the role of emotional well-being in the managers of Mazandaran province universities?

MATERIAL AND METHODS

The present study was a cross-sectional research. The statistical population of this research consisted of 478 managers in Mazandaran province universities in 2019 (Universities including medical, marine sciences and Islamic Azad University) in Mazandaran province, and 260 individuals were selected as the sample size in an available method in this research to specify the sample size with regard to the number of observed variables and allocation of the coefficient of 15 for each observed variable (17 variables observed in the model), considering the probability of the existence of incomplete questionnaires.

Inclusion in the research criteria

Managers (including medical and marine sciences in Islamic Azad University) of Mazandaran province universities, with minimum educational qualification of bachelor's degree, within the age range of 30–60 years, belonging to Mazandaran province, those with agreement to participate in the research project, those with lack of existence of illness or physical problems that interfere in the project, as well as those with the absence of uncontrolled psychotic and mood disorders were included in the study.

Exclusion criteria were incomplete questionnaires and insufficient accuracy in completing the questionnaires.

In executive process, before starting the sampling, the participants were informed about the purpose of the study and maintaining the confidentiality of the materials and concurrently, informed consent was received from the students about the samples' participation in the research, and then the questionnaires were received from the samples. In addition, the present study is registered at Azad University of Chalus by the code of ethics IR.IAU.CHALUS.REC.1398.034.

The collected data were analyzed using structural regression equations using SPSS 18 and Amos 23 software (SPSS 18, Amos 23, Stanford University, California, USA).

Research tool
Emotional Well-Being Scale
Having 12 questions, the Emotional Well-Being Scale by Keyes *et al.* (2002) is used to measure the emotional well-being and has both positive and negative aspects.[22] It is scored using a 5-choice Likert's scale ranging from 1 = strongly disagree to 5 = strongly agree. The validity of construct and content was confirmed by the developers, and the reliability was 0.84 and 0.87 for positive and negative aspects, respectively, by Cronbach's alpha method. In Golestanibakht's study, the validity of construct and content was confirmed and reliability was confirmed by

Cronbach's alpha method for positive and negative aspects at 0.79 and 0.83, respectively.[23] In the present research, the reliability by Cronbach's alpha method for positive and negative aspects was 0.77 and 0.80, respectively.

Metacognitive Learning Strategies Questionnaire

The Metacognitive Learning Strategies Questionnaire was designed by Pintrich with 47 questions.[24] Resource management and metacognitive strategies 9 question as follows: planning, monitoring and control, effort and perseverance, and policing activity. It is scored based on a 5-choice Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The validity of construct and content was confirmed by the developers, and reliability through Cronbach's alpha method for planning, monitoring and control, effort and perseverance, policing activity, and the total in Cronbach's alpha method were 0.89, 0.87, 0.75, 0.83 and 0.74 respectively. Validity of the construct and content was confirmed in Mousavi Nejad's research and reliability through Cronbach's alpha method for planning, monitoring and control, effort and perseverance, policing activity, and the total were 0.82, 0.84, 0.65, 0.80 and 0.71 respectively.[25] In the present research, reliability in Cronbach's alpha method for planning, monitoring and control, effort and perseverance, policing activity and the total were obtained 0.80, 0.81, 0.63, 0.77 and 0.7, respectively.

Self-Directed Learning Scale

The Self-Directed Learning Scale developed by Cheng *et al.* comprises twenty questions and four sub-scales including learning motivation, planning, and implementation; self-monitoring; and interpersonal relationship.[26] It is evaluated based on a 5-choice Likert scale with scoring ranging from 1 = strongly disagree to 5 = strongly agree, and the validity of construct and content was confirmed by the developers and reliability was 0.76, 0.75, 0.86, 0.8 and 0.91, respectively by Cronbach's alpha method for learning motivation, planning and implementation, self-monitoring, interpersonal relationship and total tool. In Nadi and Fooladvand's research, the validity of construct and content was confirmed and reliability was 0.72, 0.7, 0.81, 0.78 and 0.88, respectively by Cronbach's alpha method for learning motivation, planning and implementation, self-monitoring, interpersonal relationship and total tool.[27] In the present research, reliability was 0.7, 0.72, 0.84, 0.71 and 0.88, respectively by Cronbach's alpha method for learning motivation, planning and implementation, self-monitoring, interpersonal relationship and total tool.

Standardized E-Learning Questionnaire

Watkins *et al.*'s Standardized E-Learning Questionnaire has 27 questions and six subscales of access to technology, continuous communication skill, motivation, learning ability through media, and group online conversations, which are key to success in e-learning.[28] It is evaluated based on a 5-choice Likert scale with scoring ranging from 1 = strongly disagree to 5 = strongly agree, and the validity of construct and content was confirmed by the developers and reliability was 0.84, 0.73, 0.69, 0.81, 0.84, 0.79, and the total 0.88, respectively by Cronbach's alpha method. In Iran, Zajerdi and Leghaie confirmed the construct and content's validity and reliability was 0.81, 0.66, 0.62, 0.74, 0.80, 0.73 and its total 0.85 respectively in Cronbach's alpha method.[29] In the present research, reliability in Cronbach's alpha method was 0.84, 0.61, 0.65, 0.70, 0.82, 0.75 and the total 0.83, respectively.

RESULTS

Initially, the data normality was verified by statistical assumptions using tests of kurtosis and skewness, box, Kolmogorov–Smirnov, and after investigating the data normality, the model to measure the variables of emotional well-being, metacognitive learning, self-directed learning, and e-learning was investigated and verified.

The results in Table 1 show a significant positive correlation between positive emotional well-being, metacognitive learning, self-directed learning, and e-learning, which exist at 0.01 level. In addition, there was a negative significant correlation between negative emotional well-being with e-learning at 0.01 level.

According to Table 2, the root mean square error of approximation value is equal to 0.042 which is <0.1, which indicates that the mean square errors of the model are appropriate and the model is acceptable. In addition, the Chi-square value with degree of freedom (2.421) is between 1 and 3, and the Goodness-of-Fit Index, Comparative Fit Index, and Normed Fit Index values are approximately ≧0.9, indicating that the research variables' measurement model is an appropriate one.

According to Table 3, emotional well-being, metacognitive learning, and self-directed learning pathways have a significant direct effect on e-learning. Specifically, metacognitive learning have affect 0.246 on e-learning. self-directed have affect 0.514 on e-learning. positive emotional well-being have affect 0.213 on e-learning. negative emotional well-being have affect on -0.196 e-learning.

As shown in Table 4, four indirect pathways considered with regard to the values obtained in bootstrap method at 0.01 level were significant and confirmed.

Table 1: Average, standard deviation, and correlation of variables of emotional well-being, metacognitive learning, and self-directed learning with e-learning

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Planning	6.57	1.45	1																		
Monitoring and control	12.54	3.41	0.79**	1																	
Effort and perseverance	6.27	1.72	0.71**	0.51**	1																
Policing activity	3.45	1.15	0.55**	0.52**	0.29**	1															
Metacognitive learning	28.83	6.52	0.94**	0.85**	0.79**	0.69**	1														
Learning motivation	20.96	3.58	0.28**	0.38**	0.35**	0.36**	0.31**	1													
Planning and implementation	20.33	3.66	0.21**	0.17**	0.13**	0.27**	0.23**	0.51**	1												
Self-monitoring	10.64	3.23	0.21**	0.14**	0.18**	0.18**	0.22**	0.45**	0.37**	1											
Interpersonal relationship	11.24	3.46	0.35**	0.24**	0.24**	0.30**	0.34**	0.35**	0.22**	0.20**	1										
Self-directed learning	63.20	8.93	0.23**	0.29**	0.16**	0.38**	0.43**	0.70**	0.66**	0.75**	0.69**	1									
Positive aspects	14.21	3.66	0.37**	0.25**	0.29**	0.28**	0.28**	0.37**	0.24**	0.16**	0.27**	0.45**	1								
Negative aspects	11.58	1.85	-0.56**	-0.45**	-0.29**	-0.40**	-0.45**	-0.32**	-0.22**	-0.19**	-0.21**	-0.35**	-0.55**	1							
Access to technology	10.62	1.15	0.15**	0.11*	0.21**	0.18**	0.19**	0.12*	0.21**	0.37**	0.30**	0.37**	0.21**	-0.21**	1						
Continuous communication skill	32.02	3.65	0.19**	0.16**	0.18**	0.12**	0.18**	0.27**	0.12*	0.24**	0.29**	0.35**	0.23**	-0.27**	0.63**	1					
Motivation	7.95	0.856	0.18**	0.15**	0.26**	0.24**	0.19**	0.24**	0.20**	0.17**	0.23**	0.25**	0.29**	-0.25**	0.59**	0.33**	1				
Ability to learn from the media	12.89	1.74	0.22**	0.16**	0.18**	0.10**	0.15**	0.21**	0.22**	0.28**	0.17**	0.29**	0.18*	-0.30**	0.41**	0.47**	0.46**	1			
Group conversations	12.87	1.42	0.20**	0.12*	0.21**	0.17**	0.19**	0.10*	0.12*	0.36**	0.21**	0.22**	0.27**	-0.23**	0.53**	0.39**	0.53**	0.50**	1		
Important issues of success	11.04	1.23	0.18**	0.16**	0.18**	0.19**	0.20**	0.22**	0.24**	0.24**	0.23**	0.24**	0.21*	-0.28**	0.42**	0.44**	0.58**	0.47**	0.41**	1	
E-learning	87.81	8.32	0.22**	0.24**	0.21**	0.32**	0.43**	0.33**	0.21**	0.29**	0.28**	0.27**	0.26**	-0.31**	0.43**	0.69**	0.74**	0.82**	0.77**	0.68**	1

**Significant at the level of 0.01, *Significant at the level of 0.05. SD: Standard deviation

Table 2: Fit indices derived from data analysis and variables

Test name	Explanations	Acceptable amounts	Achieved amount
χ^2/df	Relative Chi-square/degree of freedom	>3	2.421
RMSEA	The root mean square error of approximation	>0.1	0.042
GFI	Goodness-of-Fit Index	<0.9	0.981
NFI	Normed Fit Index	<0.9	0.969
CFI	Comparative Fit Index	<0.9	0.972
df	Degree of freedom (187)		

Table 3: Direct model estimation by maximum likelihood (ML³) method

Variable	B	β	R^2	t	Significant
Metacognitive learning on e-learning	0.246	0.174	0.042	6.364	0.004
Self-directed learning on e-learning	0.514	0.238	0.122	4.567	0.001
Positive emotional well-being on e-learning	0.213	0.184	0.039	3.567	0.002
Negative emotional well-being on e-learning	−0.196	−0.163	0.031	3.458	0.006

Table 4: Direct estimation of model by bootstrap method

Variable	Amounts	Lower limit	Upper limit	Significance
Meta-cognitive learning on the level of e-learning mediated by the role of positive emotional well-being	0.241	0.174	0.339	0.001
Meta-cognitive learning on the level of e-learning mediated by the role of negative emotional well-being	−0.196	−0.112	−0.286	0.007
Self-directed learning on the level of e-learning mediated by the role of positive emotional well-being	0.237	0.186	0.324	0.002
Self-directed learning e-learning mediated by the role of negative emotional well-being	−0.203	−0.149	−0.280	0.004

According to model 2, it is shown that e-learning variable scattering of 0.63 is affected by metacognitive learning, self-directed learning, and emotional well-being.

DISCUSSION

The purpose of the present research was to investigate the mediating role of emotional well-being on the impact of metacognitive learning and self-directed learning on the level of e-learning in universities' managers and with regard to the final model of the research, the impacts of direct and indirect paths of 63% of e-learning variable can be explained by metacognitive learning, self-directed learning, and emotional well-being in total. In general, the research model was approved. In this regard, Zanjani *et al.* showed that there is a significant relationship between the components of learning self-direction readiness with e-learning acceptance and academic achievement.[20] Qureshi *et al.* showed that software-based training of native e-learning model has an impact on students' learning self-direction and its components (self-management, willingness to learn, and self-control).[21] Lamb and Snodgrass showed that among the requirements for improving teachers' efficiency in emotionally dealing with e-training issues is to pay attention to positive and negative orientation patterns of their lives and the extent of cognitive strategies in these interactions.[5] Hsu and Lin showed that the extent of metacognitive guidance by the teachers for the learners could play a substantial role in enhancing an improved environment in e-learning.[15] D'Errico *et al.* showed that enhanced emotional well-being and emotional interactions cause an increase in students' participation in e-learning processes.[18] Bannert *et al.* showed that the short-term and long-term effects of students' metacognitive patterns impact on self-control behavior, self-direction, and e-learning performance.[7]

In metacognitive learning, metacognition state is another type of metacognition in which one's transient and variable states in rational situations are defined and vary in intensity at different times and include planning, monitoring, self-correction, cognitive-emotional strategies, and self-awareness.[30] Metacognitive learning affects managers' goal-setting, self-regulation, and planning, which can influence cognitive-behavioral motivations as well as performance in a variety of situations including in using cyberspace. Therefore, the metacognitive state will help to improve the level of managers' performance.[19] On the other hand, one of the cognitive processes involved in human learning process is problem-solving. Problem-solving, as a cognitive process of higher levels, interacts with many other cognitive processes such as abstraction, searching, learning, decision-making, inference, and analysis.[31] In general, metacognitive learning is a function of the degree of interaction, affection, companionship, and attention of family members, friends, and other individuals in this age range. Some perceive the social support as a social reality and some do it due to one's perception.[17] Actual support is

the type and frequency of specific supportive interactions by which the individual receives instrument, emotional, and informational supports from other individuals in social relationships, and individuals make use of the supportive sources to meet their needs based on social relationships and the type of links they have so that the wider the social relationships in the training environment, the greater the access to supportive resources, and possibly these social support resources can enhance metacognitive learning and improve efficiency or learning and act as a defensive umbrella against stressful factors at this time interval.[7] One of the outcomes and products of effective metacognitive learning seems to be proper emotional well-being. Empathetic or emotional well-being refers to resources associated with having those to whom one can refer for empathy and sense of confidence. People who have enough emotional resources typically feel that they have other individuals to whom they can refer when dealing with problems.

Achieving a better emotional well-being seems to be one of the main motivations in and toward cyberspace, but the support that is apparently beneficial on the individual's side[32] will not actually make a positive effect on the person, but with regard to the speculation that the social support is achieved by cyberspace connection sooner and easier with less responsibility, it can be stated that self-efficacy has always been posed in a tendency to behave differently in different situations, even the tendency has been named as a mechanism for emotion regulation. In addition, metacognitive learning strategies are among the most important determinants of individuals' responsiveness to their personal well-being, and increased use of maladaptive strategies is associated with pathology and development and persistence of disorders, which is due to effective metacognitive states.

The statistical population being limited to all managers of the universities (including medical sciences and marine sciences in Islamic Azad University) in Mazandaran province, not considering demographic characteristics such as ethnicity and ethnic culture as control variables, can be mentioned as the limitations of the research. This study was limited to year 2019. The cross-sectional nature of the research method in a way that the individuals' psychological and mental states and personal status in the interval of completing the instruments influence on how the instruments were completed was another limitation. In addition, reliance on individuals' mental reports is one of the most important limitations of the research, which may lead to bias in its reports.

CONCLUSIONS

This research showed that emotional well-being has a mediating effect in the impact of metacognitive learning and self-directed learning on the level of e-learning in university managers and 0.63 of the scattering of e-learning variable is affected by metacognitive learning, self-directed learning and emotional well-being. It is suggested that using training packages can lead to improved level of effective learning strategies and optimized relationships, and ultimately, it can improve e-learning level with regard to the existing intervention patterns to use managers' emotional management and metacognitive strategies.

Conflicts of interest
There are no conflicts of interest.

Authors' contribution
All authors participated in the study.

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