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Offering the Model of E-Learning Quality Enhancement at Payame Noor University

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Abstract
The present study aims at identifying the appropriate approach to improve the quality of e-learning in Payame Noor University. The research is applied in terms of purpose, is descriptive in terms of nature, and is a mixed method in terms of implementation applying an interview and a survey. The research population consists of all professors and students in e-learning department of Payame Noor University studying in academic year of 2016-2017. The research samples, consisting of 327 students and 291 professors, were selected through stratified random sampling. For data collection, in the first stage, after reviewing the related literature and conducting a semi-structured interview with distance education professionals and experts, the quality indexes in e-learning were identified. Then, in the second stage, two researcher-made questionnaires, based on a 5-likert scale, were prepared and after verifying the content and construct validity and calculating the reliability through Cronbach's alpha formula above 0.70, they were distributed among students and professors. The results of study suggest that if we are to take steps to improve the quality of e-learning in PNU, in addition to paying attention to maintaining the current quality and keeping its improvement through two components of strategies, policies, and general objectives and technology infrastructures, which had the greatest impact on e-learning quality, we should also take action through these factors to increase the impact of other components. Also, in order to improve the quality of e-learning in PNU, strategies such as paying attention to the quality of interaction, preventing significant changes in management decisions at the university, and paying attention to the empowerment of all human factors were suggested.

Keywords
E-learning, Quality Improvement, Payame Noor University.

Introduction

In the digital world, all human achievements are moving towards electronic and flexible distance accessibility (1). ICT has affected many areas including the way of communication, thinking, work, practice, and in summary, it has changed human life (2). These technologies have also changed the face of education curriculum so that, today, the world's higher education system is undergoing enormous development as a result of rapid technological developments that t has led to the emergence of various types of university centers (3 & 4). Indeed, in FAVA age, university teaching and student learning methods have been changed greatly (5). Global education, joint educational programs, and virtual transfer of instructors and students, quickly transformed the prospect of the educational system, and distance learning universities were introduced as a new model of education with e-learning approach (6). These universities have been transforming the learning ecology through the use of ICT (7) to enable people, who have no chance to attend traditional classrooms for any reason, to continue their education or lifelong learning. In this while, coincide with the beginning of distance education and employing electronic learning methods, these universities have been faced with the

finger of the accusation of many opponents and critics (8). These critics, in particular, have been suspicious about e-learning quality as a serious issue (8 - 13).

Also, since in today's world, distance education is part of mega or super universities, by reducing the role of borders in the control and transfer of higher education applicants in the worldwide, universities are encountered with the competition for student recruitment and offering courses with academic degrees or free training for more applicants (14). This competition has gone so far that even in our country, traditional universities have moved towards offering e-learning course and competition has made all distance learning universities understand the need for improving the quality of e-learning. Therefore, studies on the quality improvement and providing local and international models to improve e-learning quality, especially at PNU, which symbolize distance education in our country, are necessary.

Regarding the above mentioned, and due to the overview in the Articles of Association of the University by the Ministry of Science, Research, and Technology in August 2012, the mission of PNU was assigned to develop e-learning. What the present research deals with is the recognition of the appropriate approach to improve the quality of e-learning at Payame Noor University. So the main research question is how the quality of e-learning system can be improved at Payame Noor University.

An overview on related literature shows that what we should pay attention to in terms of quality, is that quality is a general concept whose definition is complex, and hence is non-unit and multi-dimensional (15), in which Harvey and Green (16) consider it as an audience-centered concept. Ivancevich (17) also believes that what is central to the definition of quality is the opinion of the audience, so in order to clarify the concept of quality in e-learning, audience satisfaction along with the views of Rajasingham (9), Ivancevich (17), Deming (18), Juran (19), and Ishikawa (20) is the focus of this research.

Also, in terms of evaluation, quality evaluation is a process which aims to improve the quality and accountability to stakeholders in e-learning (21). In the shadow of evaluation, we can inform the function of the system and its strengths and weaknesses (22).

The research background also shows that researchers who study on this system have different views on the quality of electronic learning. Many of them believe that e-learning in universities is far from good quality (23, 12), while some others advocate this system and regard it with high quality (24; 25; 14; 26).

Therefore, in the present study, with a review of the literature and the background of research conducted in the field of quality of e-learning institutions and the opinion of experts in this field, five main indicators that are relevant to the quality of e-learning have been identified. These indicators are strategies, policies, and general objectives [American Council on Education, (27); Zhang, W and Cheng, (28)], management and leadership [Kantoglu, Torkul, & Altunisik, (29)], technology [Mohanty, (8); Selim, (26); Dedić, Kuleto, & Marković, (30)], Support [Mohanty, (8); Selim, (26); American Council on Education, (27); Kantoglu, Torkul, & Altunisik, (29); Jung, (31)], human factors such as students, faculty members, and staff (8, 26).

Research Method

The present research is applied in terms of purpose, is descriptive in terms of nature, and a mixed method in terms of implementation applying an interview and a survey. The research population

consists of two groups: in the first part the population includes professionals, experts, and specialists familiar with the subject and the second part consists of all professors and students, consisting of 1197 and 12340 people respectively, in the e-learning center of Payame Noor Univerity. The sampling method in the community of professionals, experts, and specialists familiar with the subject of research was a snowball network and the sampling method in the group of students and professors was according to the size of the community that eventually the sample size was 372 students and 291 professors using Cochran's general formula.

After an extensive review of literature and valid documents in different educational backgrounds and extraction of quality indicators by researchers and then conducting a semi-structured interview with professionals in distance education, two researcher-made questionnaires with Likert scale were developed for professors and students. The face and content validity was confirmed by professionals and experts in the subject and construct validity was verified through confirmatory factor analysis technique. Cronbach's αlpha for verifying the reliability was above 0.70 indicating satisfactory internal consistency (Table 1).

Table 1. Cronbach's alpha coefficients of the research indicators

	indicators	Sub-components	Cronbach's a
The quality of e-learning	Strategies, policies, and general objectives	Goals, content, interaction, program, evaluation, feedback, learning-teaching approaches	.947
	Management and leadership	-	.709
	Technology infrastructure	Graphics and User Interface, Access	.761
	Human factors	Teacher, learner, technical and administrative staff	.720
	Support infrastructure	-	.867

Research Method

Data analysis in this research is done using descriptive and inferential statistical techniques..

Table 2 indicates demographic characteristics of the samples. As it is shown in Table 2, of 291 professors participated in the study, 79% was male, and of 372 students, more than half (52%) were male and 48% were female. The age range of the respondents, among the professors, 53% was between 26-35 years old, 35% between 36-45 years old, and 11% between 46-55. Among the students, 43% of them were in the age range of 36-45 and 38% in 26-35 age range. In addition, 89% of the professors were married and 11% was single. Also, 82% of the students were married and 18% was single.

Table 2. Demographic Characteristics of Research Samples

		professor		student	
		N	P	N	P
Gender	Male	230	79%	192	52%
	Female	61	21%	180	48%
Age	25 years old-18	-	-	18	5%
	35 years old-26	155	53%	142	38%
	45 years old-36	102	35%	161	43%
	46-55 years old	34	12%	47	13%
	55 and above old	-	-	4	1%
Marital status	Married	259	89%	307	82%
	Single	32	11%	65	18%
Total		291	100%	372	100%

Also, the multivariate regression has been used to investigate the effective factors on e-learning quality at Payame Noor University. The results are shown in Table 3.

Table 3. Regression Analysis of dependent variables on e-learning quality

Statistical Indicators	R	R^2	R^2_{adj}	F	Sig.
1	.788	.605	.600	114.760	.001

According to the data in Table 4, it is indicated that 60% of variance of e-learning quality is clarified by the independent variables at F=114.760 and significant level that was meaningful at error level of less than 0.05. It can be said that independent variables can explain the changes in e-learning quality. According to the Table, all components are among the factors affecting the quality. The indicators of strategies, policies, and general objectives have the most effect and the components of management and leadership have the least effect on e-learning quality. In addition, the effect of all variables on e-learning quality is rising, i.e. by increasing the quality of each factor, the quality of e-learning will increase. Since the direction of this relationship is positive, the change is direct and incremental.

Table 4. Statistical Indicators, extent and direction of the effect of independent variables on the quality of e-learning

Variable	Non standard R	Standard error	Standard	*t*	Sig.

			R		
constant number	.672	.108	-	6.194	.001
Strategies, policies, and general objectives	.388	.036	.374	10.755	.001
Management and leadership	.082	.035	.078	2.425	.016
Technology infrastructure	.237	.042	.212	5.591	.001
Human factors	.118	.034	.111	3.470	.006
Support infrastructure	.157	.050	.086	3.140	.010

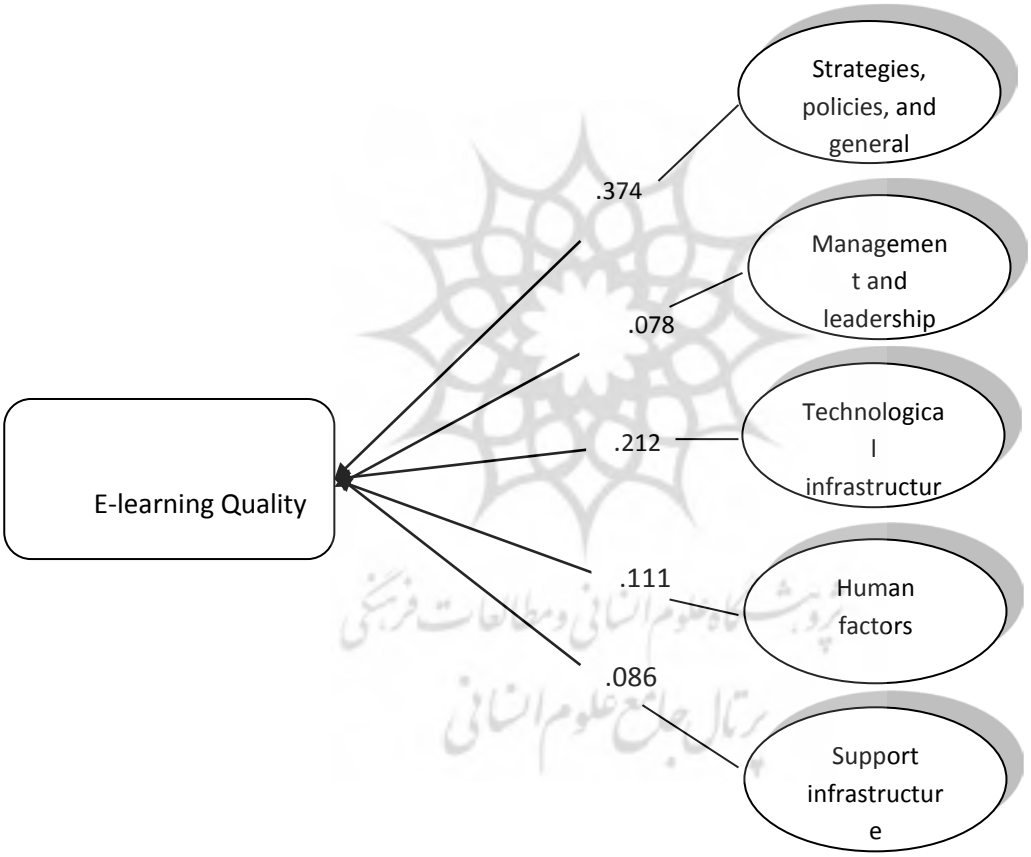


Figure 1. The Impact of Factors Affecting E-learning Quality

Also, given that in the previous stage (Model No. 1), the element of strategies, policies, and general objectives had the greatest impact on e-learning quality (Model 1), in this part, this element was selected as dependent variable and the effect of other elements was examined through Multivariate Regression that is presented in Table 5.

Table 5. Regression analysis of the effect of independent variables on strategies, policies, and

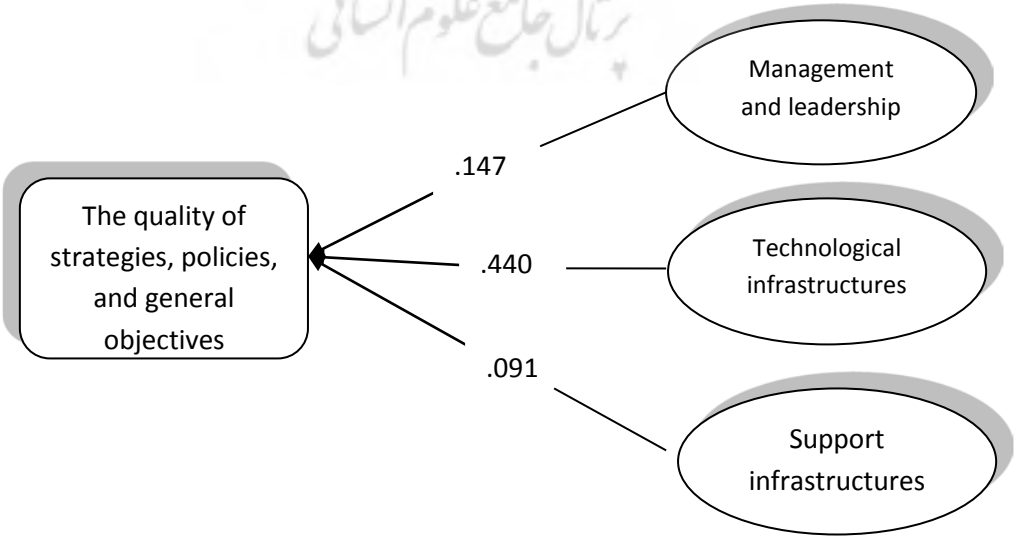
general objectives of e-learning

Statistical indexes	R	R^2	R^2_{Adj}	*F*	*Sig*
1	.718	.515	.510	89.687	.001

Table 6. statistical indicators, extent, and direction of the effect of independent variables on strategies, policies, and general objectives of e-learning

Variable	Non standard R	Standard error	Standard R	*t*	Sig.
constant number	.492	.114	-	4.310	.001
Management and leadership	.150	.036	.0147	4.193	.001
Technology infrastructure	.473	.041	.440	11.431	.001
Human factors	.019	.036	.021	.521	.603
Support infrastructure	.189	.053	.091	3.560	.001

The Table shows that 51% of variance of the quality of strategies, policies, and general objectives of e-learning is explained by independent variables and considering the value of F=89.687 and the significant level, which is less than .05 at the error level, it can be said that independent variables can explain the changes in strategies, policies, and general objectives of e-learning. According to the Table, three factors of management and leadership, technology infrastructure, and support infrastructure are the factors that affect the quality of strategies, policies, and general objectives of e-



learning.

Figure 2. The Impact of Factors affecting the quality of strategies, policies, and general objectives of e-learning

Also, given that in the previous stage, the element of technological infrastructures had the greatest impact on strategies, policies, and general objectives of e-learning, in this part, the element of technological infrastructure was selected as dependent variable and the effect of other elements was examined through Multivariate Regression that is presented in Table 7**.**

Table 7. Regression analysis of the effect of independent variables on technological infrastructure of e-learning

Statistical indexes	R	R^2	R^2_{Adj}	*F*	*Sig*
1	.710	.504	.500	84.439	.001

Table 8. statistical indicators, extent, and direction of the effect of independent variables on technological infrastructures of e-learning

Variable	Non standard R	Standard error	Standard R	*t*	Sig.
constant number	,828	.101	-	8.183	.001
Management and leadership	.245	.032	.285	7.707	.001
Human factors	.111	.033	.137	3.354	.001
Support infrastructures	.195	.048	.212	4.020	.001

The Table shows that 50% of variance of the quality of technological infrastructures in e-learning is explained by independent variables and considering the value of F=84.439 and the significant level, which is less than .05 at the error level, it can be said that independent variables can explain the changes in the quality of technological infrastructures. According to Table 8, all elements influence the quality of technological infrastructures of e-learning.

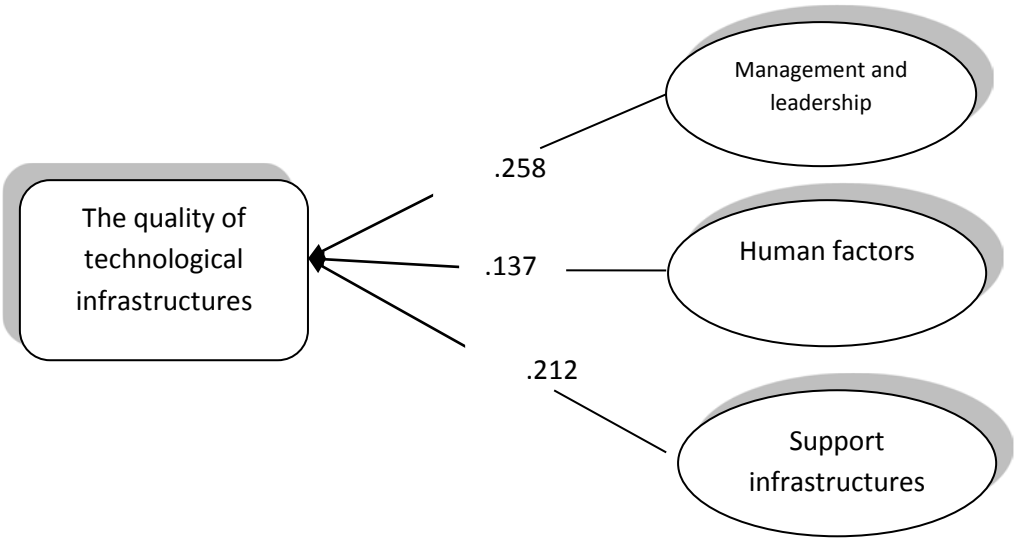


Figure 3. The Impact of Factors affecting the quality of technological infrastructures of E-Learning

In the next stage, using path analysis, the factors that affect the quality of e-learning at Payame Noor University were examined. It should be noted that in the results of path analysis, the variables of "strategies, policies, and general objectives", "management and leadership", "technological infrastructures", "human factors", and "support infrastructures" were introduced as independent variables and "e-learning quality" as main and ultimate dependent variable.

It should be noted that also the independent variables influence the quality of e-learning as dependent variable in three ways of: A) purely direct effect, B) purely indirect effect, and C) both direct and indirect effect, with different impact factors. The following is the relative contribution of each of these three methods, respectively.

1- Variables that only directly affect the dependent variable.

According to the results of path analysis it is clear that the element of "strategies, policies, and general objectives" as a key and intermediate variable that is influenced by other variables and affects the quality of e-learning. The results show that the element of strategies, policies, and general objectives has the positive impact on the quality of e-learning with coefficient of 0.374.

2- The variable that in addition to direct impact, has indirect affect on the quality of e-learning (Intermediated by other variables of: strategies, policies, and general objectives; management and leadership; and technological infrastructures).

- The "management and leadership" element in e-learning (with a coefficient of 0.078), in addition to the direct impact on e-learning quality, has increasing impact on e-learning qaulity by intermediating the element of strategies, policies, and general objectives with the coefficient of 0.147.
- The element of "technology infrastructure" in e-learning (with a coefficient of 0.212), in addition to direct impact on the quality of e-learning, has increasing affect on e-learning qaulity by intermediating the element of strategies, policies, and general objectives with the coefficient of 0.440.
- The element of "human factors" with a coefficient of .111, in addition to direct impact on the quality of e-learning, has increasing impact on e-learning quality by intermediating the element of technological infrastructure with a coefficient of 0.137.

- The element of "support infrastructures" with a coefficient of .086, in addition to direct impact on the quality of e-learning, has rising impact on e-learning quality by intermediating the elements of "strategies, policies, and general objectives" (with a coefficient of 0.091) and "technological infrastructures" (with a coefficient of 0.212).

The results of path analysis of factors influancing the quality of e-learning are shown in Table 9.

Table 9. the results of path analysis of direct and indirect impacts of factors influencing e-learning quality

Independent variable	Dependent variable	Direct impact	Indirect impact	Total impact
Strategies, policies, and general objectives	e-learning Quality	0.374	----	0.374
Management and leadership		0.078	(.147)*(.374)=(.055)	0.133
Technological infrastructures		0.212	(.440)*(.374)=(.164)	0.376
Human factors		0.111	(.137)*(.212)=(.020) (.137)*(.440)*(.374)=(.022)	0.162
Support infrastructures		0.086	(.091)*(.374)=(.034) (.212)*(.212)=(.044) (.212)*(.440)*(.374)=(.034)	0.198

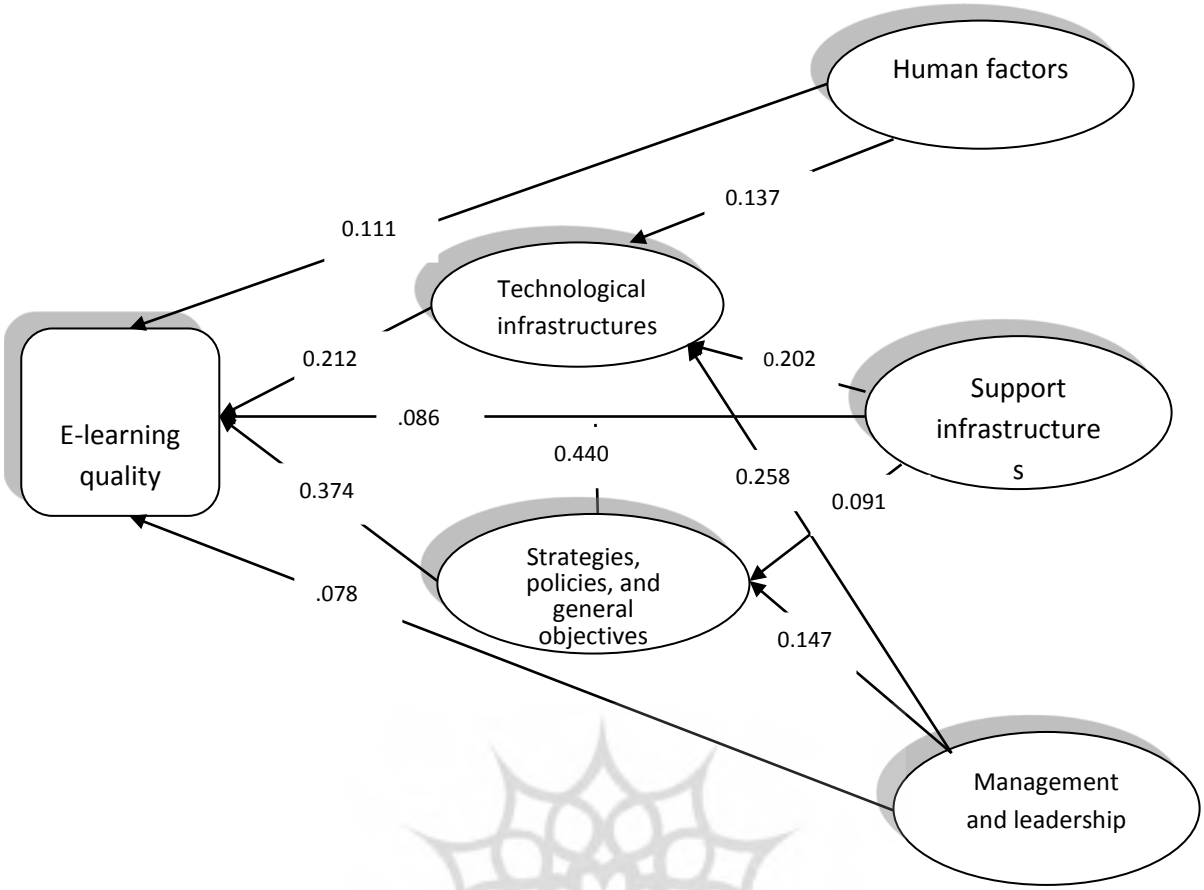


Figure 4. Path Analysis Model

Discussion and Conclusion

The quality of higher education is considered as the comparative advantage of universities, so any educational organization that determines, measures, and achieves the required quality, has a head start over the other organizations. Therefore, it is essential that educational institutions, continuously, ensure their quality and desirability and put the quality assurance as part of their core programs. The present study has been conducted with the aim of identifying the appropriate approach to improve the quality of e-learning at Payame Noor University and to answer the research question of how the quality of e-learning of PNU could be improved. The results of multivariate regression to test the factors affecting the quality of e-learning showed that 60% of variance of dependent variable (e-learning quality) is explained by independent variables (strategies, policies, and general objectives; technological infrastructures; support infrastructures; human factors; and management and leadership). It should also be noted that the impact of all factors on the quality of e-learning is incremental, which means e-learning quality improves by enhancing each factor among which the element of strategies, policies, and general objectives has the most and management and leadership in e-learning has the least impact on the quality, respectively.

The results also demonstrate that in the present study, the impact of all factors is not in the same degree in enhancing the quality of e-learning, i.e. each of these factors affects the quality with different intensity. In addition, it is worth mentioning that the factor of strategies, policies, and general objectives is the only factor that affects the quality of e-learning directly. The Beta coefficient of this factor (0.374) shows that for each unit increase in this factor, 0.374 unit increases comes about in the

quality of e-learning and since the direction of this relationship is positive, the change is direct and incremental. These findings are in line with the findings of Zhang and Cheng (28), American Council on Education (27), and Dasher, Alston, and. Patton (32). In explaining this finding, it can be said that the more education is associated with the goals and strategic objectives and missions of organization, the quality of organization service will increase. Therefore, what should be considered by practitioners in e-learning system to achieve quality improvement is to proportionate the policies and general objectives of the organization with the needs of all stakeholders and inform students, professors, and staff about the objectives of organization/institution, and courses. In addition, in order to achieve the goals, the curriculum and content of the courses should be organized in a way that coordinates with the characteristics of learners and their needs. In such situations, students learn with more enthusiasm and motivation towards the effectiveness of their learning materials, which in turn will improve the quality of e-learning.

In addition to what mentioned, the other factors, besides direct impact, have indirect influence on the quality of e-learning as follows.

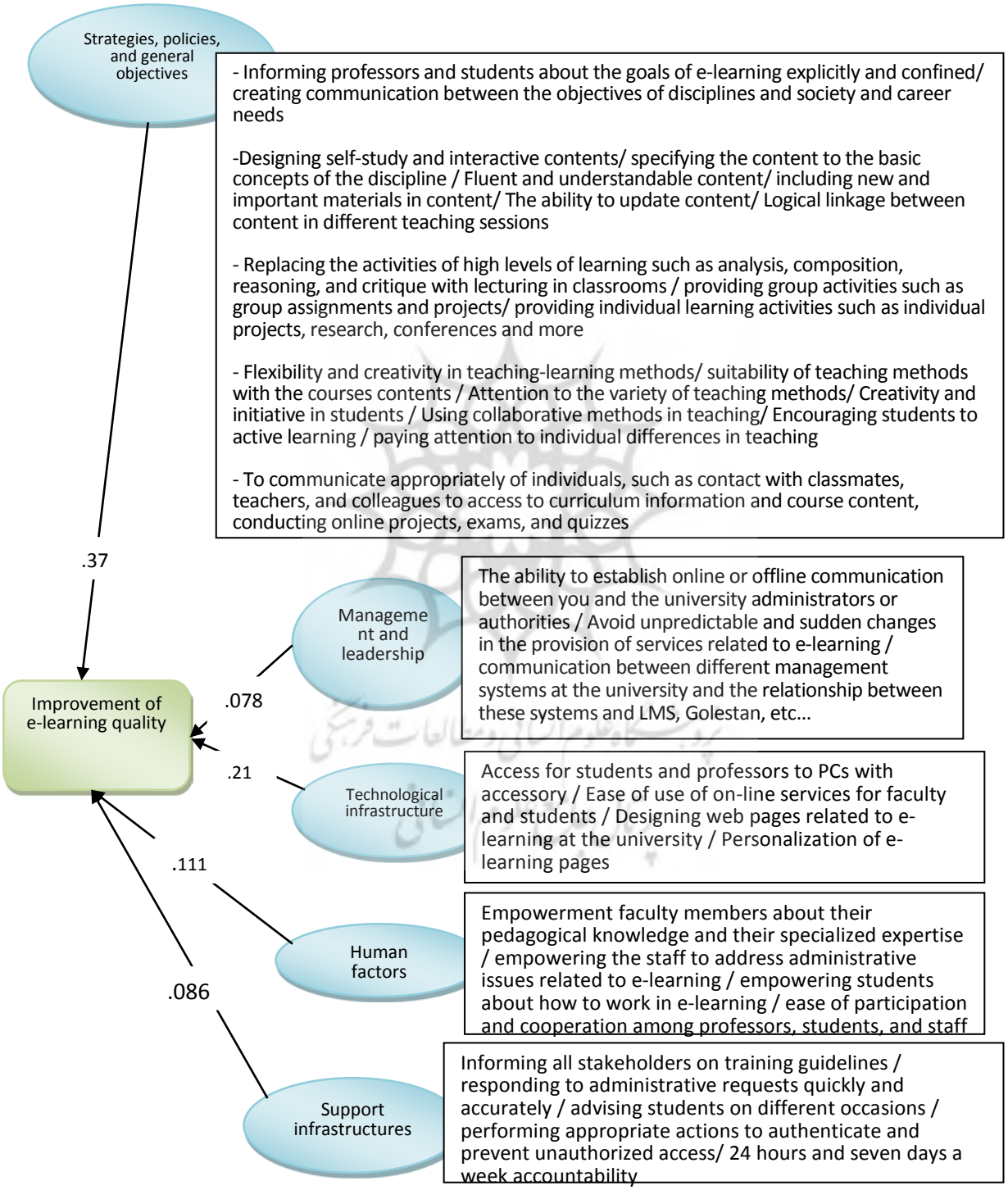
The element of technological infrastructure had direct impact with coefficient factor of 0.212 and indirect impact by intermediating the strategies, policies, and general objectives element with coefficient of about 0.376 on e-learning quality. The impact of this factor is even more than the effect of strategies, policies, and general objectives. It is also worth mentioning that this effect is direct and incremental. This finding is consistent with the results of researches done by Mohanty (8), Selim (26), Zhang and Cheng (28), and Dedić, Kuleto and Marković, (30). In explaining this result, one can refer to the undeniable impact of technology in e-learning as an important intermediate element of all teaching-learning activities in this system.

Also, the support infrastructure factor through direct effect (0.086) and indirect effect through two factors of strategies, policies, and general objectives (0.034), and technology infrastructure (0.044), have a total effect of about (0.198) on e-learning quality, which is a direct and increasing impact. This finding is in line with the results of studies of Mohanty (8), Kantoglu, Torkul, and Altunisik (29), Jung, (31). In explaining these findings, it can be said that e-learning quality requires 24-hour and seven days a week support because in the e-learning cycle, through continuous support, unpredictable changes in the quality of service delivery because in the e-learning cycle, through continuous support, the unpredictable changes in service delivery, which might lead to the quality loss, can be prevented.

In addition, human factors through direct impact (0.111) and indirect impact through the technology infrastructure (0.029) and strategies, policies, and general objectives (0.022), have a total effect of (0.162) on e-learning quality. This is a direct and increasing impact as well. These findings are in line with the results of Mohanty's (8) and Selim's (26) studies.

In explaining this finding, it can be said that for increasing the impact of human factor on the quality of e-learning system through strategies, policies, and objectives, it is necessary to invite the most expert professors in teaching in e-learning part of the university without having the concern of the place and physical presence of professors. The level of skill in working with technology should also be addressed in teachers, learners, and technical and administrative staff, and in the case of defect in this area, the restorative and supplementary training is required before entering virtual courses. Finally, the management and leadership factor is the last factor in this study that had the least impact on the quality of e-learning. This factor has direct effect (0.078) and indirect influence through the technology infrastructures (0.055), with a total impact of about 0.133 on e-learning quality, which is a direct and incremental impact. This finding is consistent with the results of the research of Cantaglou

and Turkl (29). In explaining this finding, it can be said that although management and leadership had less impact than other factors, but at the beginning of launching e-learning system, this factor is one of the most important activities. But if systematic planning is carried out, particularly in technology-based planning, the effectiveness of management and leadership can be reduced by increasing automated processes through deploying automated activities for predetermined tasks and employing artificial intelligence to identify logical solutions for unpredictable tasks in later stages.



Regarding the above mentioned, if we are to take steps to improve the quality of e-learning in Payame Noor University, in addition to pay attention to maintaining the quality and keeping its improvement through two components of strategies, policies, and general objectives and technology infrastructures, which had the greatest impact on e-learning quality, we should also take action through these factors to increase the impact of other elements of human factors, support infrastructures, and management and leadership. Figure 5 illustrates some proposed strategies to improve the quality of e-learning at Payame Noor University.

According to the findings of the research, it is suggested that, in e-learning section of the university, practitioners pay more attention to interaction component that is an important issue in increasing the quality of strategies, policies, and goals because the higher the quality of the interaction, the greater the quality of e-learning will take place. Also, Payame Noor University, by adopting decisions based on proper management and leadership and preventing significant changes in decision making, will prevent loss of quality. Moreover, it is suggested that, in order to increase the quality in the index of human factors, some instructions be considered to improve the skills of all human factors. Also, attention to types of support will improve the quality of e-learning at the university.

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