

## Designing and Validating a Model of Effective Skill Training in Scientific-Applied Centers

### Article info

#### Article Type:

Original Research

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#### Article Cite:

Hedayat Kia Lashkai, Abbas Khorshidi, Kamran Mohammadkhani, Ali Akbar Khosravi Babadi. Designing and Validating a Model of Effective Skill Training in Scientific-Applied Centers, Curriculum Research 2020: 1(2): 87-98

#### Article History:

Received: 2020/07/02

Accepted: 2020/09/16

Published: 2020/11/01

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### Abstract

**Purpose:** The aim of this study was to design and validate the model of effective skills training in scientific-applied centers.

**Methodology:** The method of the present study was applied based on the purpose and mixed type based on the nature of the data. The statistical population in the qualitative part of the research included all experts in the field of effective skills training, and 30 experts were selected using targeted snowball sampling method. The second group of the statistical population of this study in the quantitative part included all the official teachers of applied science centers in Mazandaran province in the number of 3,000 people who were selected by random sampling and snowball method of 608 people as the sample size. In the qualitative part of the present study, semi-in-depth interviews were used and in the quantitative part, a researcher-made questionnaire was used. The validity and reliability of both instruments were evaluated and confirmed. The method of data analysis in the qualitative part of the theoretical coding was taken from the method of data theory of the foundation and in the quantitative part, confirmatory factor analysis was used to validate the model and determine the relationship between the identified factors.

**Findings:** The results showed that in a total of 6 dimensions of career goals, instructor, environment, student, content and management, 28 components and 252 indicators of the dimensions of the skill training model are effective.

**Conclusion:** Based on the obtained coefficients, it can be said that all indicators have an important and significant role in measuring the dimensions and components of the model of effective skills training system for scientific-applied centers of Mazandaran province

**Keywords:** Skills training, effectiveness, scientific-applied centers

## Introduction

The requirement for the permanence and permanence of human beings and organizations and social institutions in the field of rapid change today, is to pay more attention to the educational system, especially skills training. Rapid developments in educational centers are more than other organizations. Thus, educational centers need to re-test their habits and procedures and take a critical look at a better path to entrepreneurship. In today's world of borderless management, which is called the phenomenon of globalization in the global arena, organizations, especially educational organizations, need to think about their area of protection, and the greater the impact of environmental factors on organizations, educational decisions become more strategic. he does. In other words, the greater the ray of hope, the more phenomena appears on decision-making. Accordingly, the viability of educational organizations is a function of their variability. Access to education and financial bottlenecks - lack of training and irresponsibility and all other factors affecting education, increase the attention and importance to the education system with an entrepreneurial approach (Kh, 2018).

Currently, global developments have put entrepreneurs at the forefront of technological development and economic development (Durrani, 2014). Numerous studies show that countries that have a better workforce and have chosen growth and development policies, their investment in developing skills and effective skills training methods, has helped increase productivity. In other words, increase training Proper, especially effective skills training can reduce unemployment, increase entrepreneurship education, students' confidence, knowledge and skills, and empower them to start a business. (Salmani Denglani, Safazade, Azma, 2015).

In this regard, the scientific-applied centers of the country, in order to improve the knowledge of learners and create the necessary skills and actualize latent talents, prepare them for jobs, professions and businesses in various jobs and their ability to do work that They are assigned to increase to the desired level. Numerous studies have shown that entrepreneurs play a key role, especially in creating small and medium-sized economic units that lead to high employment. For example, the employment situation in the 1980s in the United States, where science-applied colleges in Decade 5% of newly established small companies - 77% created job opportunities for graduates (Sedighi Afai, No, 2018)

In fact, in this study, the role of effective skills training in entrepreneurship of graduates - employed and non-employed in scientific-applied centers It has been very effective and useful in creating business. In the current situation of the country and the process of international change and on the other hand the increase of educated job seekers is necessary to develop entrepreneurship as a strategic plan and on the other hand the saturation of government employment capacity and the inability of the private sector to employ people have caused problems in recent years. Unemployment among university graduates should show itself strongly that if we do not pay attention to these issues and do not anticipate the basic and appropriate solutions to this problem that has already created economic, socio-cultural, political and ... problems, Our society will face many crises in the not too distant future. Now the question arises, what should be done to solve this problem? The answer lies in one word, and that is to create, strengthen and develop applied skills in graduates and volunteers to enter the university. Instead of working in government centers, they are looking for entrepreneurship and can employ people. Accordingly, applied science centers Established to achieve this goal. In other words, scientific-applied centers, if properly established developed and strengthened, can be used as a compass for entrepreneurship in the country and the movement of the Islamic Republic of Iran in terms of entrepreneurship from one day to plan to explain.

Considering what has been said and other cases, the importance of establishing scientific-applied centers and implementing effective skills trainings is very necessary, so that in the future the system does not suffer from a special crisis and consequently it is necessary to conduct research in this field. The question is, what is the model of effective skill training for applied science centers? Although studies have been done in the field of effective skill training and it has grown a lot in terms of quantity, but this qualitatively requires more practical work, the obvious reason for which is the lack of a model for effective skill training in

applied science centers. The researcher intends to provide a model of effective skills training. The following table summarizes domestic and foreign research:

**Table1.** Research results of domestic and foreign experts and researchers

Name of researcher and year of research	Research title and summary
Davoodi, Gholami, Daneshfard, (2020)۴	Presenting the model of general effective skills with the approach of organizational effectiveness and productivity, 18 factors were identified which were evaluated by 59 items. In exploratory factor analysis technique, 18 factors were divided into three categories: occupational factors, organizational factors and individual factors. Using confirmatory factor analysis technique, items, sub-factors and main factors were examined.
Ghanbari, et all (2020)	Designing a model for evaluating the performance of skills training of the Technical and Vocational Education Organization of the country with emphasis on financial approach
Hosseinpour, , Sayad Niqab(2019)	Confirmatory factor analysis was used to fit the model, and then the status of the components was assessed using t-test, and finally the components were evaluated and compared in terms of their importance and current status. The results show that the specified indicators and components are approved with a high percentage and if considered by managers will be very effective in improving the performance of the organization and optimizing resources.
Shariati, et all(2019)	Designing an educational evaluation model for the effectiveness of military organization training courses
Hosseinzadeh, et all (2018)	The evaluation model of the effectiveness of educational courses had four main categories and 42 sub-categories. The findings of the research in the quantitative stage indicated that all model coefficients were significant with a confidence level of 0.99. The sum of the findings and results of the analysis showed that the designed model has a high robustness to evaluate the effectiveness of training courses. The proposed model consisted of four dimensions: evaluation of input, processes, results and consequences with path coefficients of 0.77, 0.787, 0.84 and 0.82, respectively. Among the mentioned dimensions, the dimension of results with a weight coefficient of 0.643 was the most important and the dimension of input with a weight coefficient of 0.476 was the least important. This model, in line with the theoretical foundations, research background of the subject and considering the Cologne doctrine, growth plan as well as the plan of transformation and excellence of the organization, is localized and is suitable for implementation in the educational evaluation subsystem of the organization.
Dietan(2020)	A model for improving the quality of technical and vocational education: Based on the results, this model has causal conditions such as (professional competencies of coaches, educational factors and managerial factors), contextual (cultural context and economic context), intervening (International factors and technological factors), strategies (outsourcing, empowerment, development and expansion of information and communication technology, policy and educational planning) and consequences (economic growth, improving educational factors and social development).
Bilman(2020)	The role of skills and entrepreneurship training in job development
Yunee(2019)	The present study designed an educational model of skills for the effectiveness of the educational system, evaluated the dimensions of the skill model in four categories: 1) specialized knowledge, 2) educational environment, 3) behavioral indicators, and 4) attitudes toward education and training. Each of the dimensions of the respective indicators was obtained
Roaal(2018)	The effect of technical and vocational training on the specialized performance and effectiveness of skill jobs. Findings showed a significant relationship between technical and vocational training and specialized performance of employees. There was also a positive and significant relationship between the job effectiveness of trained workers

and technical and vocational training. Also, technical and vocational training has had a positive and significant effect on workers' job satisfaction. Finally, technical and professional planners have been offered to design applied trainings in accordance with the needs of different industries in the form of codified training programs.

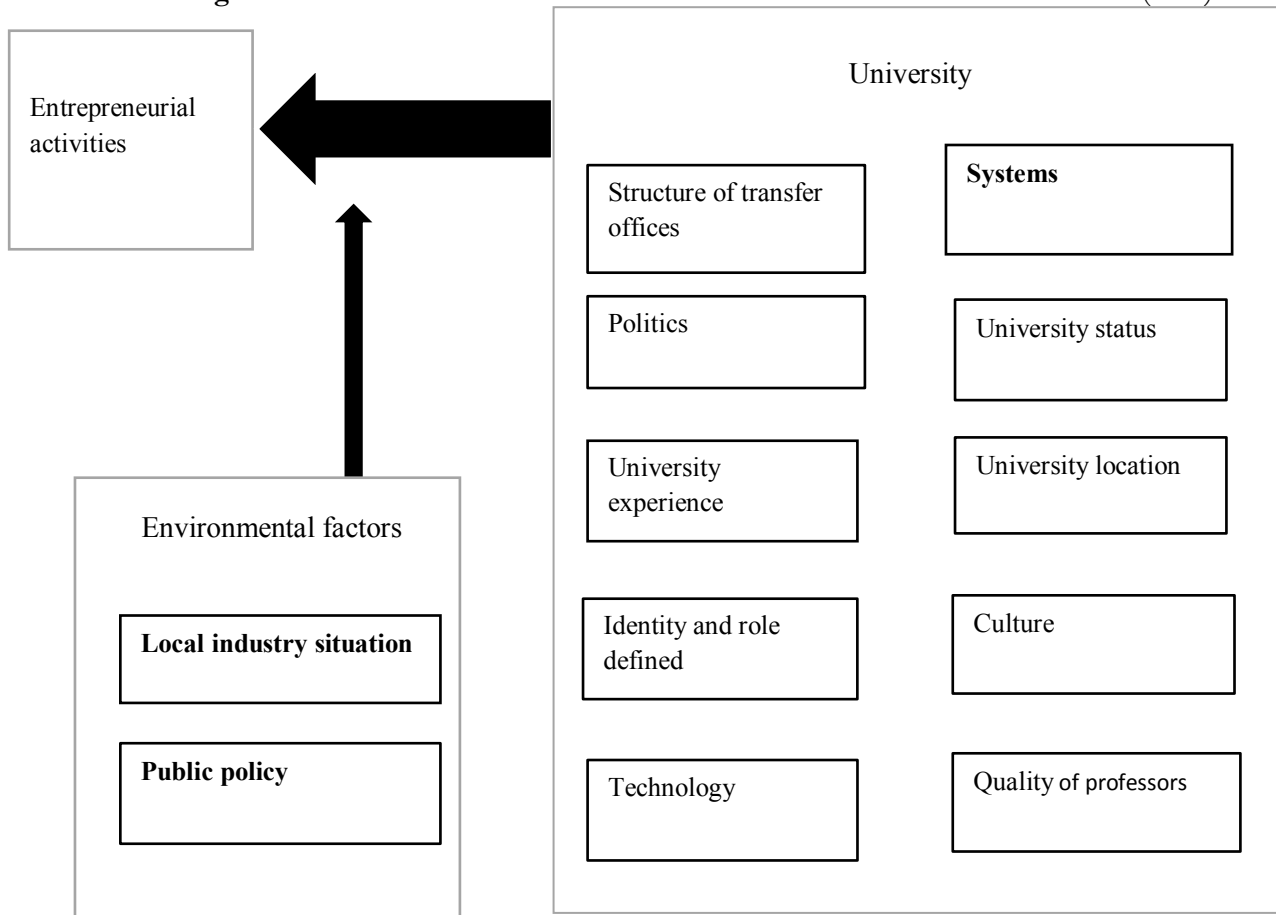
Bennell(2015)

Assessed the effective skills of university administrators. Based on the research findings, the effective factors of educational managers' skills were classified into five factors based on the results of factor analysis. They are: management and leadership factor, research factor, education factor, teaching factor, professional ethics factor.

The theoretical framework of the present study is the model of Rottermil, et al (2013). In addition to organizational structures, other studies have focused on the characteristics and role of professors and the nature of the technology being commercialized. The above factors constitute elements within the university that affect entrepreneurship in the university. However, researchers have found that the process of academic entrepreneurship is also influenced by external factors such as policies and laws, the state of the environmental industry and regional conditions, and in this regard, the following factors have been analyzed as influential factors: formal programs, cooperation agreements, research support The use of licensing, marketing activities, the quality of business outputs (licenses and patents), the existence of participation in research collaborations, the existence of growth centers, parks, etc.

The reason for choosing this model as the theoretical framework of the present study is the relative comprehensiveness of this model in the field of school entrepreneurship, the theory is in line with the national norms of the Islamic Republic of Iran and in accordance with social, cultural and political conditions. The shape of the pattern is given below.

**Figure1.** Theoretical framework of research based on the model of Rottermill et al. (2013)



## Methodology

Considering that the present study deals with designing and validating the model of effective skill training (case study of scientific-applied centers of Mazandaran province), the research method is retrospective in terms of the time of occurrence of the phenomenon; According to the result, decision-oriented; Purposeful, practical; In terms of performance logic, deductive and inductive; According to the time of research, cross-sectional; Depending on the type of data, qualitative; Depending on the research environment, library; In terms of data collection method or the nature and method of research, it was descriptive and in terms of the degree of focus on the phenomenon was expansive.

The statistical population in the qualitative part of the research includes experts in effective skills training that based on the method of informed sampling of targeted snowball type, 30 experts (10 women and 20 men) were selected as the sample size. In the quantitative part, all the official instructors of applied science centers of Mazandaran province consist of 3000 people (2720 with master's degree (1100 women and 1620 men) and 280 with doctoral degree (100 women and 180 men) which are based on stratified random sampling method and according to the determination table. Morgan sample size formula 608 people (291 females and 317 males) were selected as the sample size.

In order to ensure the validity of the instrument in the qualitative part of the research and in order to ensure the accuracy of the findings from the researcher's point of view, the valuable opinions of professors familiar with this field and university experts who were experts in this field were used. Participants were also simultaneously assisted in analyzing and interpreting the data. In the present study, the reliability of the retest and the intra-subject agreement method were used to calculate the reliability of the interviews conducted. The following table shows the validity and reliability obtained from the tool:

**Table2.** Validity and validity obtained for the dimensions and components of the research questionnaire

Dimensions	Cronbach's alpha	CVR	Components	Cronbach's alpha	CVR
Career goals	0/87	0/79	Entrepreneurship	0/86	0/87
			Attitudes of the local community	0/88	0/85
			Attitudes of the national community	0/87	0/86
the coach	0/88	0/82	Professional features	0/89	0/84
			Scientific features	0/87	0/89
			Communication skills	0/88	0/85
			teaching method	0/88	0/85
			Applied research	0/88	0/85
Environment	0/87	0/80	Educational resources and equipment	0/85	0/87
			Local environment	0/86	0/81
			National environment	0/90	0/86
			Transnational environment	0/89	0/84
			Opportunity recognition	0/89	0/83
Student	0/91	0/76	Educational environment	0/90	0/84
			Attitude	0/90	0/90
			Education	0/92	0/89
			Previous knowledge and skills	0/85	0/87
			Individual competencies	0/85	0/87
Content	0/90	0/80	Needs assessment	0/89	0/89
			Technology	0/92	0/91
			Enrichment of resources	0/91	0/90
			Educational strategy	0/90	0/90
Management	0/89	0/80	Organizational Culture	0/87	0/88
			Funds	0/90	0/86
			Policy	0/86	0/81
			Welfare facilities and services	0/89	0/83
			Managerial support	0/86	0/81
Regulations	0/89	0/83			

The data analysis method was theoretical coding derived from the foundation data theorizing method. Theoretical coding is the process by which data is parsed, conceptualized, and freshly put together, and is the main process by which theory is formulated based on data. In this method, there are three main elements of "concepts", "categories" and theorems. In this method, theories are formed based on "raw data" (Delavar and Koushki, 2013).

Data analysis is the main focus of data theory. In each study as a whole, data collection, data adjustment, and data analysis are interrelated. To analyze the data obtained from the interview as well as the theoretical foundations, three types of coding have been used, which are: -Open coding, -Central coding, -Selective coding

## Findings

In order to use parametric tests before performing the test, we need to make sure that the population is normal. For this purpose, Kolmogorov-Smirnov test was used, the results of which are presented in the table below.

**Table3.** Results of Kolmogorov-Smirnov test

The significance level	Degrees of freedom	K-S	Number
0/316	199	0/918	608

As can be seen, the result obtained from Kolmogorov-Smirnov test shows that (K-S) obtained is not significant and this indicates that the distribution is normal. Therefore, it is possible to use parametric tests to analyze the data of this study. Descriptive statistical methods (mean, skew and elongation) were used to summarize the material.

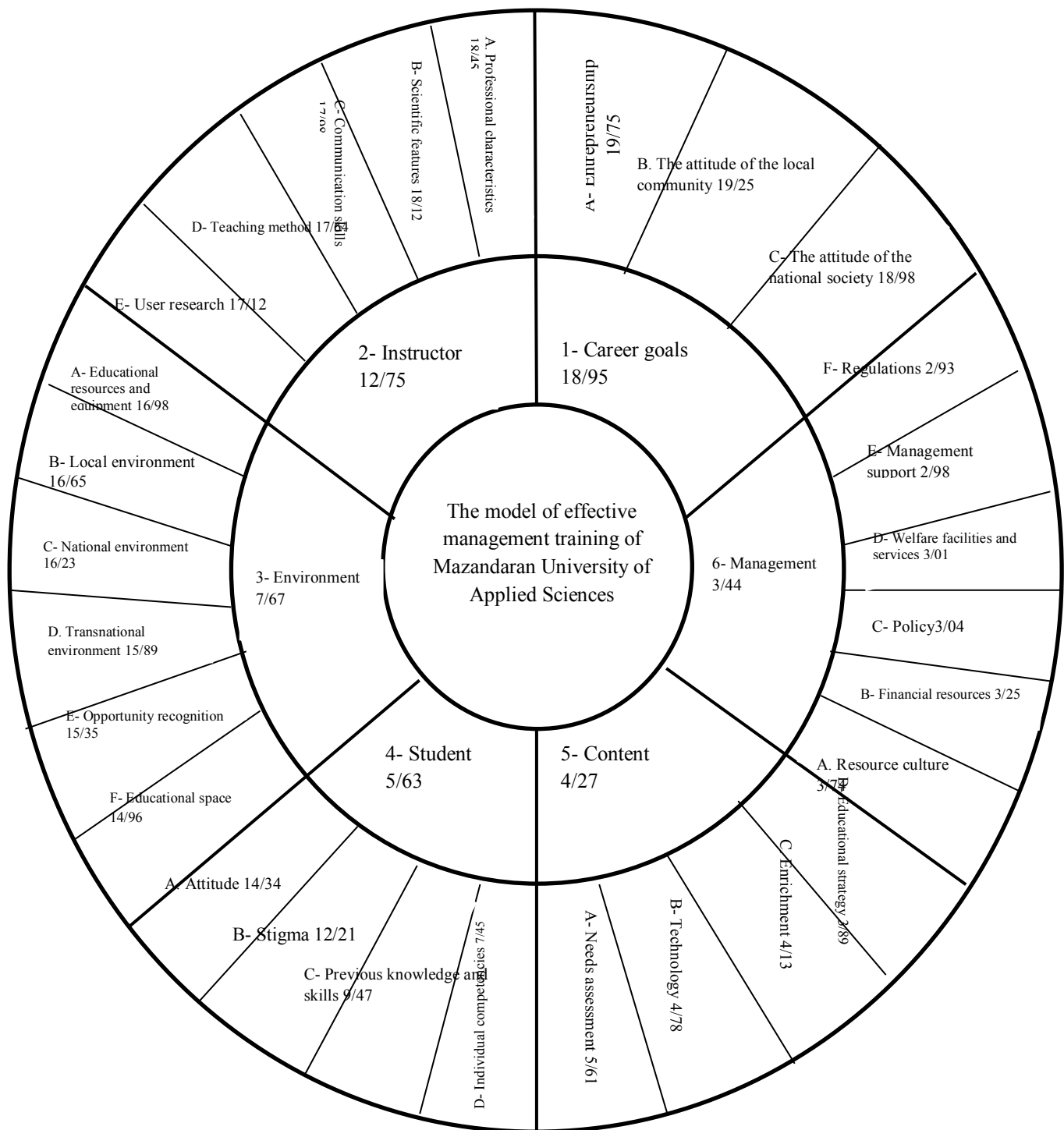
To design and validate the research model, 30 experts were interviewed based on a semi-structured interview with 4 questions. A qualitative model was designed using grounded theory approach and MAXQDA software. At this stage, with the help of coding done by the researcher and interviewed with experts, 6 dimensions, 27 components and 238 indicators for the mentioned research have been finalized.

**Table4.** Descriptive indicators of research factors

Acts	average	Skewness	kurtosis
Entrepreneurship	0/49	-1/274	1/809
Attitudes of the local community	5/45	-0/020	2/039
Attitudes of the national community	5/35	-0/512	1/180
Professional features	5/34	-1/278	1/370
Scientific features	5/33	-1/474	1/575
Communication skills	5/18	-1/904	1/179
teaching method	5/12	-0/427	2/820
Applied research	5/93	-1/142	2/435
Educational resources and equipment	4/78	-1/651	2/51
Local environment	5/49	-1/244	2/183
National environment	5/35	-1/174	1/490
Transnational environment	5/34	-1/714	2/54
Opportunity recognition	5/32	-1/150	2/29
Educational environment	5/25	-1/512	1/089
Attitude	5/12	-1/35	1/770
Motivation	5/1	-1/150	2/019
Previous knowledge and skills	5/86	-2/050	3/039
Individual competencies	4/91	-0/512	-2/089
Needs assessment	5/52	-2/305	2/370
Technology	4/85	-0/512	-2/089
Enrichment of resources	4/92	-1/35	1/770
Educational strategy	5/12	-1/35	1/770

Organizational Culture	5/25	-1/512	1/089
Funds	5/10	-1/474	1/878
Policy	5/24	-0/474	2/575
Welfare facilities and services	5/21	-2/205	2/541
Managerial support	5/17	-1/304	1/254
Regulations	5/19	-2/210	2/215
Career goals	5/35	-0/904	1/179
the coach	4/04	-0/457	3/020
Environment	5/40	-0/142	31/35
Student	5/57	-1/42	1/652
Content	5/69	-1/325	1/142
Management	5/14	-1/562	1/714

According to the above table, among the dimensions of the effective skills training model, the content dimension (5.69) has the highest average and the instructor dimension (4.04) has the lowest average. Among the components of the model, the highest mean is related to the component of applied research (5.93) and the lowest average is related to the component of educational resources and equipment (4.78). The following figure shows the results of interview content analysis using open, pivotal and selective coding. Data analysis began with the extraction of concepts and categories (open coding) and irrelevant and duplicate concepts and categories were removed.



**Figure2.** The validated model of effective skill training in Mazandaran University of Applied Sciences in the present study

In order to confirm the data description and generalize the research results to the community from which the sample was extracted, the confirmatory factor analysis test was used. The results of this test are given for each dimension and its constituent components in Table 5, respectively:



**Table 5.** Standard and significance coefficients of identified dimensions and components

	Acts	Standard coefficient	meaningful	Condition
Career goals	Entrepreneurship	0.86	7.86	Confirmation
	Attitudes of the local community	0.73	7.78	Confirmation
	Attitudes of the national community	0.71	7.89	Confirmation
the coach	Professional features	0.79	8.01	Confirmation
	Scientific features	0.92	7.55	Confirmation
	Communication skills	0.79	8.02	Confirmation
	teaching method	0.81	8.36	Confirmation
	Applied research	0.84	8.25	Confirmation
Environment	Educational resources and equipment	0.79	7.89	Confirmation
	Local environment	0.80	7.29	Confirmation
	National environment	0.81	7.68	Confirmation
	Transnational environment	0.74	8.17	Confirmation
	Opportunity recognition	0.79	7.89	Confirmation
	Educational environment	0.79	8.19	Confirmation
Student	Attitude	0.75	7.84	Confirmation
	Motivation	0.72	7.98	Confirmation
	Previous knowledge and skills	0.77	8.23	Confirmation
	Individual competencies	0.71	8.12	Confirmation
Content	Needs assessment	0.80	7.86	Confirmation
	Technology	0.83	7.93	Confirmation
	Enrichment of resources	0.82	7.84	Confirmation
	Educational strategy	0.81	7.83	Confirmation
Management	Organizational Culture	0.80	7.80	Confirmation
	Funds	0.83	8.10	Confirmation
	Policy	0.79	7.21	Confirmation
	Welfare facilities and services	0.82	8.71	Confirmation
	Managerial support	0.81	8.11	Confirmation
	Regulations	0.79	7.93	Confirmation

## Discussion

In identifying the dimensions, components, criteria, indicators and indicators of effective staff training, 30 experts were interviewed and the interviews were analyzed using MAXQDA software, which is professional software for analyzing data collected by qualitative and hybrid methods. . After open, selective and axial coding, the components were determined. The results of factor analysis show that among the available indicators (items), 27 components and 6 main dimensions were identified. The results of this study with Zeeraw (2019), Zavar et al. (2019), Davoodi, Gholami, Daneshfard, (2020), Khorasani, Shams Morkani and Mokhtari (1396), Taheri (2015) and Chaghari et al. (2017) Is aligned.

In the qualitative part for the model of effective skill training system for scientific-applied centers of Mazandaran province includes 6 dimensions and 28 components and 252 indicators. Which were approved by users in the quantitative part. In other words, the result of the quantitative part with the qualitative part Is. Therefore, based on the obtained coefficients, it can be said that all indicators have an important and significant role in measuring the dimensions and components of the model of effective skills training system for scientific-applied centers in Mazandaran province. Together, they have provided an underlying factor in the model of an effective skills training system. Regarding this finding, we can say that the findings obtained with the findings of researchers Bround (2020), Zeeraw (2019), Chaghari et al. (2017), Davoodi, Gholami, Daneshfard, (2020), Zavar et al. (1398), Hosseinpour., Sayad Niqab (2019), Ezzati, Yuzbashi, Shateri (1396), Taghipour et al. (2017) are consistent. Also, the dimension of career goals with the percentage of variance (18.95) has the highest priority. Then the instructor has the percentage of

variance (12.75), the environment dimension (7.67), the student dimension (5.63), the content dimension (4.27), and finally the management dimension (3.44). They have the lowest priority.

To pay attention to career goals in effective skills training, to consider the attitude of the local community and to pay attention to issues such as creating a positive attitude among local employers regarding the skill performance of the center, creating a local community attitude towards the skill performance of the center, creating a positive attitude of local customers. Regarding the skill performance of the center it is important to create a positive attitude of local organizations regarding the skill performance of the center.

On the other hand, in addition to the local environment, an organization should also have a place for itself in the national environment. Therefore, in examining the job objectives section, one should not neglect the attitude of the national community. One of the most important things that can be considered in the national community attitude section Doing things like: creating a positive attitude among national employers about the skill performance of the center, creating a positive attitude of the national community about the skill performance of the center, creating a positive attitude of national customers about the skill performance of the center, creating a positive attitude of national organizations about the skill performance of the center Be. Every instructor who intends to provide training to learners must have a series of characteristics and basic abilities to be able to use their maximum power and effort in providing training.

These factors can be related to his leadership and communication skills, ie factors such as; The ability of the instructor to involve the learners in order to have their power and knowledge during the teaching of the desired materials and also to commit them to learn the materials presented in the training course, because if the learners find out, their opinions will be taken into account during the teaching process. And they are not a mere learner, they will definitely have more commitment to learning, which will increase the effectiveness of the course, the instructor's ability to manage the classroom, and the power and authority to manage classroom affairs and attract Learners' participation in affairs, proper timing in presenting the curriculum in order to avoid wasting the time they have for education and making the most of all the time they have for education, and preventing fatigue among learners due to inability to use it properly. From time and need more time to present the course content, how the instructor deals and interacts with learners, which is a determining factor in the effectiveness of the course, because the instructor's behavior during the course is one of the most important factors that motivate the learner to learn. Increases Ray and having the right attitude when holding the course can be a key factor in the success of the course and finally the ability of the instructor to answer questions that show how much he has mastered the content of the course and learners learn that the instructor has the ability to present content. On the other hand, having an educational environment of local standards, having an educational environment of national standards, having an educational environment of transnational standards, attractiveness of educational environment in creating interest in students, existence of up-to-date technologies, existence of necessary workshops for students, existence Skills required simulators, existence and quick access to required resources (including libraries, virtual, smart, electronic, etc.), the existence of suitable spaces for skill internships of students are among the most important things that will be effective in this field.

The student dimension refers to all the factors and cases related to the person or persons who are the subject of the training and are the target of the training, which itself includes the four components of attitude, motivation, previous knowledge and skills and individual competencies. In explaining these results, it can be said that the student is one of the basic factors in any educational process. As a result, when providing education, all cases and factors related to the student should be considered. In the field of student attitude should be factors such as; The level of interest in the field of study, the level of commitment to the university and its support, a positive attitude towards the importance of the field of study in the future career, a positive attitude towards other university staff. Content dimension this dimension refers to all the information and content that is provided to the student during the training course and is used as part of the learning resources. In other words, it can be said that one of the most important and basic issues that should be considered in the discussion of education is the content that is provided to learners and learners and individuals are expected to learn based on it. In this regard, it can be said that the content itself corresponds to the four components of needs assessment, technology, resource

enrichment and educational strategy. This means that in compiling and designing any type of educational content, four important steps must be considered. The management of an organization refers to all matters and actions that are related to the management process of an organization and are influenced by it, which corresponds to the six components that are: organizational culture, financial resources, policy, facilities and welfare services, support It is managerial and by-laws. In the field of financial resources, such as: anticipating and allocating the required funds for skills training courses, timely payment of skills training costs, developing financial instructions for the professional growth of the center's staff, aggregating the center's training funds, attracting Qualitative staff in the center, communication between the staff legal evaluation system and the center's training courses, material incentives to staff efforts to learn and teach the center's skills training, can be mentioned.

According to the research findings, it is suggested that

Next career goals:

- Efforts to create new skills training markets in the region
- Introducing the skill trainings of the centers to different managers by holding training workshops
- Provide the necessary ground for training skilled labor required by the domestic market

Next coach:

Holding in-service courses for coaches to increase their technical and professional abilities

- Inviting outstanding professors to hold the necessary courses to increase the ability of instructors to master and use various new teaching methods
- Providing the necessary ground for continuous evaluations of trainers before training, during training and after training.

Environment dimension:

- Provide an educational environment based on local, national and transnational standards
- Spend more time on skills training than theoretical training at the center
- Standardization of training spaces in terms of color, light, sounds, cooling and...

Student dimension:

- Increasing the motivation of students in the centers for entrepreneurship and self-employment by granting special privileges
- Create a balance between students' skills and the needs of the community
- Efforts to apply what students have learned in their real work environment
- Provide the necessary ground to update their skills (students) according to the new skills of the community

Content dimension

- Students' participation in the local, national and transnational skills assessment process according to their needs
- Carrying out needs assessment to create a fit between the skill needs of academic disciplines in the centers
- Holding aptitude tests to create a balance between students' talents and acquired skills
- Provide appropriate educational content to achieve the skill goals of students in the centers using experienced professors

Management dimension

- Supporting senior managers to anticipate and allocate sufficient and required funding for skill training courses in the centers
- Managers' efforts to establish a connection between the staff legal evaluation system and the center's training courses
- Senior managers support the payment of facilities and material incentives to staff efforts to learn and teach the skills training of the employment center
- Supporting senior managers in timely payment of skills training costs to achieve the center's goals

Future researchers are encouraged to consider the use of effective training in organizations and to determine the distance between the current and desired status in order to assess the current situation. It is

also recommended to conduct research on the subject of pathology of effective education in the areas of supervision and higher based on the dimensions identified in the model.

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