The Effectiveness of Motor Skills Training on Improve the Ability to Assembly Work in University of Applied Science Students

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Abstract

Purpose: The present study was carried out by the goal of effectiveness of proposed pattern, motor skills training on improving assembly ability of students of Applied Science University. **Methodology**: the present Study was a semi-experiment study with pre-test/post-test design with control group. The research population was all students of Applied Science University (subset of motor skill industry) of Tehran in 2017. Using non-random sampling method at hand 60 students were chosen that 30 of them were in experiment group with higher scores in workshop courses and 30 of them were in control group randomly replaced with higher scores. The experiment group was trained by pord and pegboard assembly with proposed pattern for 9 sessions and control group was waited in the list. Data gathering was performed by pord and pegboard test. Analysis of obtained data from questionnaire by SPSS-23 software was performed in two parts of descriptive and deduction (covariance analysis). **Findings**: The results indicated that motor skills training pattern can increase the agility of dominant, non-dominant and both hands and also experiment group assembly in relation to control group ($p<0/05$). **Conclusion**: Performing proposed pattern of motor skills training can improve the assembly skill among students.

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1. Introduction

Skill training is one of the effective elements in realization of sustainable development. Skill training plans can play their role so well in training people when the operations of designing, implementation, assessment and modification are realistic, based on modern technology and science, persistent participation of its participants, compatible with needs, explicit and implicit problems of manufacturing departments and performed by professional experts, advanced trainings and technical trainers according to scientific findings (Khaledi, 2008).

Baqerifar and Salehi (2014) conducted a research called "skill learning challenges and raising entrepreneur workers in technical and professional high schools: phenomenological study". There are 10 challenges in skill learning and raising entrepreneur workers in technical and professional high schools: "out of date workshop equipment and textbooks", " insufficient financial resources", "out of date training methods for skill learners" , "non-employing gifted and talented student", "insufficient time for skill learning", "lack of required communication among learnt skills with workforce needs", "negative attitude of parents to technical and professional high schools", "difficulty in continuing education", insufficient support of media from skill learning" that each has serious problems in dynamic skill learning at technical and professional high schools and training entrepreneurship works. Navidadahm and Shafizadeh (2016) performed a research called "examination of the most important challenges and skill training strategies in Iran". The results have indicated three significant skill training challenges: lack of model for developing higher education, unclear level of skill training in higher education system of the country and lack of necessary skills among students of skill learning centers. As there are currently 1100 Applied Science Universities with 5000 masters, the quota of Applied Science University in higher education is considered effective and important. The aim of this university is training students that are provided related skills to their major in addition to theoretical skills (Saeedi, 2014).

Skill trainings for boosting third generation universities are considered one of the contemporary needs of community and world, therefore Applied Science University should organize education in its framework qualitatively as soon as possible as a university involved in skill training field. According to this, getting the most desirable skill training level can be one the most important aspects of this university. Detecting orientation to get desired goals requires strategic planning. Strategies should be formulated by analysis of internal environment of general university (strong points and weak points) and analysis of external environment of all country (opportunities and threats) along with missionary and long term goals (Eshqi Araqi and Qanipor, 2017).

Applied science trainings follow goals like raising awareness level and technical skill of practitioner villagers, increasing their production and income, creating suitable job opportunities and decreasing unemployment in villages are designed and implemented. There are more than 1000 Applied Science Universities in our country that are considered a good potential for improving qualitative skills (Jamshidi and Zin Abadi, 2012). Applied science educational system creates and develops new concepts, restructures and modifies educational system through interacting with theory and practice by related scientific studies; in other words, educational modifications are performed by research mechanism and in fact research based feature has enabled this system to rectify itself consistently; and harmonize itself with contemporary changes and technology (Khalaqi, 2009).

One of the various problems facing educational system of applied science in Iran is lack of ability in finding new strategies suitable with contemporary changes for meeting customers' needs for modifying the system. Other problems include lack of a theoretical foundation for technical trainings of Applied Science Universities and relying upon that for scientific examination of problems and discovering strategies for modifying and qualitative development of system, lack of related and valid research centers in technical training fields and lack of communication of this system with universities or scientific and research centers.

Currently, despite development and variety of these trainings, any related or independent and valid research center hasn't established in Iran for doing research about technical trainings of applied science. In addition, there aren't any training field and course about applied science trainings in universities of Iran so by which the study, research and translation of definitions are carried out for students and masters of universities (Barzagaran, 2006).

Along with this, Qavami et al (2012) in a study titled "Observing animation model" fixed pictures and mix model have meaningful effect on motor and balance skill learning. According to the results, observing animation is a suitable patterning method for learning bipod balance skill. They also have suggested that, fixed pictures can be used as complement for animation. Ashtari (2016) examined the effect of spontaneous feedback, summary, range and performance of motor skill learning among students, the results indicated that presenting feedback on a range because of active participation of learner in learning process and increasing motivation of learner for more useful learning are among other kinds of feedback. Simbar et al (2017) conducted a research titled "Improving motor skills of teenagers based on skill based training". The results indicated that skill based trainings place the student in real working conditions and are effective in improving their motor skills. Schloffel et al (2017) conducted a research titling" teacher's skill based training in the form of mixed learning". Results indicated that using combined training skills is effective in training skill based trainers. Martini et al (2015) conducted a research titled "perception of psychology students of skill based learning by university homework". The results indicated that among students, as the homework are based on practical aspect and skill, in fact they have pragmatic usage in life, and as the practice is more real, the students will appreciate it better. Therefore, according to the significance of subject of skill trainings in general university and the role of these trainings in the future of the country, and regarding few studies about how to teach skills to learners, this study tries to answer this question that if the motor skill training affect improving assembly ability of students in Applied Science University?

2. Methodology

The present paper has practical goal and descriptive research data gathering method. Also in this research, the grounded theory was used as presenting pattern. The most important data gathering methods in this research, in addition to library studies, theoretical foundations and research literature of subject matter, were detected by interviewing with masters and experts in skill training and graduates if related majors to assembly industry along with effective factors on motor skills training (assembly). On the basis of that, a pattern for improving motor skills trainings was designed and affirmed by experts.
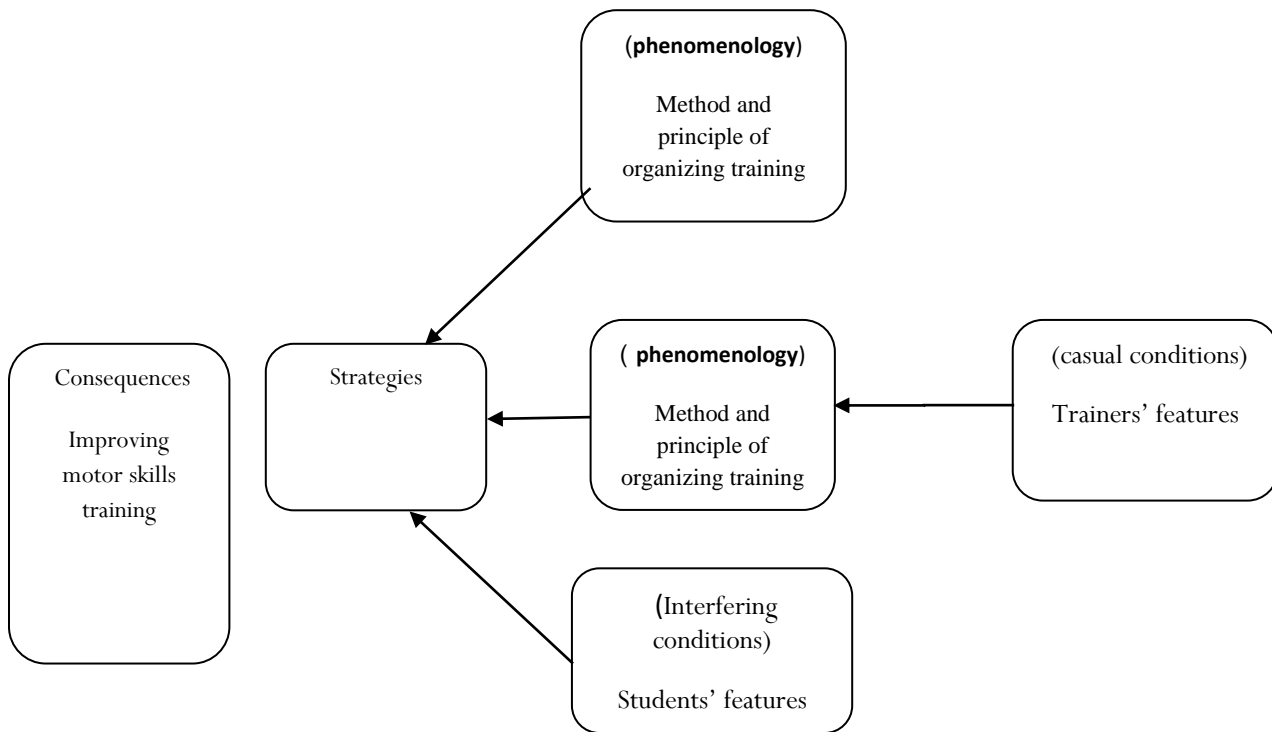
Figure1. Pattern of Improvement in Motor Skills Training

Then, effectiveness test of method and principles of organizing motor skills training category, the training protocol is as following according to presented strategies. Preparation by presentation, presenting pre-requisites with guide book and diagram, easy form using modern technologies, time of classes for various practices, practice of different versions of a work and descriptive-external feedback of students using pre-test method, then the educational protocol was designed and the test/post-test prescription with control group and random assigning were performed. The research population was all students of Applied Science University (subset of motor skill industry) of Tehran in 2017. Using non-random sampling method at hand 60 students were chosen that 30 of them were in experiment group with higher scores in workshop courses and 30 of them were in control group randomly replaced with higher scores. The experiment group was trained by pord and pegboard assembly with proposed pattern for 9 sessions and control group was waited in the list. In this research, the assembly class of Applied Science University of Damavand for implementing pattern was considered. As one of the interfering factors of the pattern is the gifted students, in control group those students were chosen that had obtained higher scores in workshop courses during previous term. Another affective factor on pattern was experienced masters that for teaching experiment group the professional workshop masters with more than 10 years training experience were used. It should be noted that professional masters of Applied Science University had more than 10 years training experience. After the first week of training "Perio Pegboard assembly", at first the pre-test of Perio Pegboard assembly was taken from both groups and the results were recorded. Then after 8 weeks of performing pattern on students of control group, once again both groups took Perdio Pegboard assembly test. Research gathering data tool was the Perdio Pegboard placing test. The goal of this test was measuring agility of one hand, two hands and agility of fingers. Perdio Pegboard in 1940s was used for and agility test for personal selection. In addition to this usage, Perdio Pegboard placing test for neurological measurement, helping focusing on defects and brain impairments has been used. This board has two equal rows that there are 25 tiny holes in each row. Pins (Pegs) are located in right and left cups on the board.

Rings and washers have occupied two middle cups. In three preliminary micro tests, the subject puts pins the holes so many as possible in thirty seconds interval at first with dominant hand, then with non-dominant hand and finally with both hands.

For right hand test, the subject should place pins in the holes as possible as s/he can and starts this from the right above row. The left hand test uses left hand rows. Then two hands are used for filling rows from top to low. In the fourth micro-test, the subject uses both hands alternatively to make "assemblies" including pins, washers, ring and a washer. The subject should make more assemblies as many possible as s/he can in 1 minute. The tester will gather 5 scores separately from total of test method, one score for each category. 1- Right hand (30 seconds), 2- Left hand (30 seconds), 3- Both hands (30 seconds), 4- Assembly (60 seconds). The total of tests should be summed in order, unless the subject is left-handed, in that case, sets of 1 and 2 are interchanged. At first left hand and then right hand. For ensuring that Perdo placing test is compatible LA fight tool and ordinary test, it was experimented. In this paper following equipment and resources are needed: 1- Perdo placing test (Model A 32020), test board, pins, rings and washers. At least a thirty inch experiment table is required.

Note: the subject should sit on the chair during test. A chronometer or a watch with second showing screen is required. For each test part, some scores are extracted. The micro test scores of placing pin (peg) include the number of pins inserted in the time interval for both hands. The score for the conditions of both hands include the total number of pair inserted pins. The assembly score is assigned to the number of inserted parts. La fight tool factory has produced an application for scoring Perdo Placing board usable for iOS and Android. This application is used in all test process steps by standardization of implementation using simple test collections with optional reading instructions, creating organizational software and following individual data and helps the tester. In this paper, the application was used for extracting test results. Data analysis was performed for questionnaire data by 23SPSS software in descriptive (average and standard deviation) and deductive including test presuppositions of covariance analysis (Lewin Test and MBOX) and finally covariance analysis was performed in meaningful level 0.05.

3. Findings

In this section, statistical description of data is presented, and then probable difference of groups in variable in different steps of measurement is examined.

Table1. Descriptive information of finger agility by measuring step of groups

Variable	Factors	Pre-test	Post-test	Post test
Dominant hand	Statistical index	Average	15.06	17.93
	Experimental	Standard deviation	1.90	2.52
	group	Average	14.60	14.73
	Control group	Standard deviation	1.95	2.91
Non-dominant hand	Statistical index	Average	14.13	16.80
	Experimental	Standard deviation	3.73	3.52
	Group	Average	13.73	13.06
	Control group	Standard deviation	3.99	3.01
Both hands	Statistical index	Average	13.80	14.73
	Experimental	Standard deviation	2.33	2.73
	Group	Average	13.80	13.20
	Control group	Standard deviation	1.85	2.33
Assembly	Statistical index	Average	42.20	47.73
	Experimental	Standard deviation	3.11	4.026
	Group	Average	41.80	45.00
	Control group	Standard deviation	3.77	4.74

As it can be seen, the average of experiment group in post-test step, relative to pre-test has been increased. According to the results in table (1), we can describe motor skill training pattern can increase

agility elements in dominant hand, non-dominant hand, both hands and also assembly category among students. In this section, we present and examine the obtained results from motor skills training pattern in pre-test and post-test step of both experiment and control group. On the basis of this, at first statistical presuppositions required for implementing covariance analysis were examined. At the end, deductive statistical method "covariance analysis" was used for analysis of research hypotheses. For examining this proposition, Lewin test was used that its results have been mentioned in table 2.

Table2. F Lewin test for examining variance homogeneity in control and experiment groups

Statistical index/scale	Df1	Df2	F	Sig
Dominant hand	1	29	2.55	.121
Non-dominant hand	1	29	.58	.451
Both hands	1	29	.274	.211
Assembly	1	29	.274	.605

As it can be observed, the proposition of equal variances for all variables is correct (p>0.05). The standard method for evaluating equality of covariance matrixes is M Box Test in which meaninglessness lower than 0.05 is considered unequal or heterogeneous index.

Table3. M box Test

Index	Covariance of dimensions of finger agility
18.589	M box
1.568	F
10	Df1
3748.207	Df2
.110	Sig

As it can be observed, the proposition for equal covariance matrixes is correct (p>0.05). Regarding total mentioned presuppositions, we can see that data of this research can access mono variable and multi variable covariance analysis and we can place the difference between two groups in dependent variables. In the following table, covariance analysis test of multi variable for testing research hypotheses has been presented.

Table4. Multi variable covariance analysis of scores of dimensions of finger agility in two groups

	Test	Value	F	Df hypothesis	Df error	Sig	Iota Coefficient
Statistical index The difference of two groups by controlling pre-test effect	The effect of Pillay Lambda Willox, hoteling effect, the greatest root	.53	6.11	4.00	21.00	.002	.53
		.46	6.11	4.00	21.00	.002	.53
		1.16	6.11	4.00	21.00	.002	.53
		1.16	6.11	4.00	21.00	.002	.53

The results of table 4 show that after removing the pre-test effect by multivariable covariance analysis, there was one meaningful effect for the pattern of motor skills training as "independent variable". This effect indicates that there was at least one meaningful difference in finger agility category between student trained with motor skills training pattern with control group students (Lambda Will ax=.46, p<0.05).

Table5. One-way covariance analysis test in the context of multi variance covariance analysis

Statistical index of variables	Change resource	SS	Df	MS	F	Meaningful Level	Iota coefficient
Dominant hand	Group	46.69	1	46.69	7.80	.008	.245
	Error	143.65	28	5.98			
Non dominant hand	Group	57.16	1	57.16	7.26	.012	.207
	Error	218.91	28	9.12			
both hands	Group	23.55`	1	23.55`	7.49	.011	.213
	Error	87.01	28	3.62			

Assembly	Group	141.34	1	141.34	17.84	.000	.426
	Error	190.07	28	7.92			

The results of table 5 show that by removing the effect of pre-test variable, the research theory is confirmed by which there is a meaningful difference among variables of agility in dominant hand, non-dominant hand, both hands and also assembly category of students of experiment group related to control group. According to results of table 5, it is observed that obtained meaningful level for agility in dominant hand, non-dominant hand, both hands and also assembly category in comparison with meaningful level was obtained 0/013 from Benferroni modification (division of meaningful level 0.05 on 4 dependent variables) is smaller. Therefore, according to the obtained averages it can be said that by 95 percent ensuring of agility in dominant hand, non-dominant hand, both hands and also assembly category in experiment group has increased related to control group. It should be noted that the most effect level is related to assembly category.

4. Discussion

The present study was carried out by the goal of effectiveness of proposed pattern, motor skills training on improving assembly ability of students of Applied Science University. The results indicated that motor skills training pattern can increase the agility of dominant, non-dominant and both hands and also experiment group assembly in relation to control group. the results of the current research are compatible with findings of Baqeri and Salehi (2014), Navidadahm and Shafizadeh (2016), Simbar et al (2017), Schluffel et al (2017) and Martini et al (2015). Qaroon and Entezari (2012) conducted a study titled "Position of motor skills trainings in developing knowledge-based economy."

This research is review and its results have been presented in three layers of skill training and its position was introduced in developing knowledge economy: the first layer is the set of great competencies and its different definitions are required for success at workplace and they have been detected by skills in literature and country reports.

The second layer is technical skills common in all jobs included in one cluster or industrial section and the third layer is special, unique and technical skills of an industry that relative to other two layers is exposed to changes of demand and market fluctuations. The results of research by Irvani and Marjani (2015) also indicated that motor skills training can increase the skill level of students. According to results, individual are not provided with the same level of personalities and capabilities. They even differ in simple and normal behaviors, but the difference of their abilities in performing simple tasks are so slight and sometimes negligible. While their ability in complex and hard skills are so clear. So for choosing suitable people for specific jobs, their abilities should be measured and choose a job for each person than can do it or has the potential to do it. It means that we ensure that after taking an educational course, s/he can do his/her task desirably. In addition to cognitive abilities, other skills are effective in work behavior. As these factors are more objective, many papers are proposed about their relationship with work outputs. These skills either presented in relation to physical manipulation of objects in the environment or by appreciating their technical relations or power in using our senses. Generally speaking, these talents include sense and motor capabilities of a person and help us in performing motor activities and perceiving motivations. "Motor ability are related to manual works and technical activities and are evident in two forms: one of them is mechanical intelligence and the other is psycho-motor. Among sense abilities we can name multiple senses usually proposed in feelings and conceptual discussions" (baqeri and Salehi, 2016). In motor skill training, the error rate of the person decreases, the subject perceives the error well and recognizes suitable solutions. Although in this stage there are even errors, but motor functions become

monotone and the subject depending on conditional occasions can modify the motor pattern. Higher motor efficiency increases energy cost.

Development in function in this step is slower than previous one, so duration of this step is more than verbal-recognition step and depending on the task, it may last some weeks or months Owens (2016) in his research focused on the significance of delicate motor skills in developing learning and considering motor skills for supporting and helping learning and these skills can be effective in raising learners' learning. Motor learning is usually along with developing ability to do a skill or increase information about the skill. So, the subject of skill learning in this changeable world is very important and we try to fill the deep blanks between developed and developing countries; in order to fill this gap, we should raise our knowledge level to face with advanced and developed communities in the future. Among the limitations of this paper, is restriction in generalizing results to the desired community, though we can generalize the results to students of Applied Science University available as a community, however, we should be careful in generalizing the results in other societies. The limitation in random selecting and assigning of subjects in this research was another restriction. In this paper it wasn't possible to randomly choose the students or randomly assign them in groups, just possible to assign them in control and experiment groups.so it is recommended that this paper is carried out among students of other parts of the country.

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