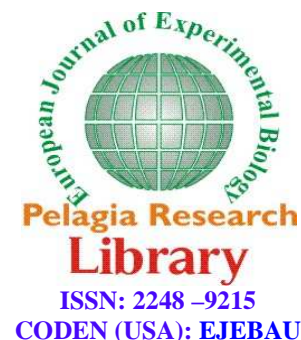




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European Journal of Experimental Biology, 2012, 2 (5):1625-1631



## Visual information and contextual interference affects the Volleyball Underhand serve learning: Exploring Specificity of Practice Hypothesis

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### ABSTRACT

*this research aimed to study the effect of visual Information and contextual interference on learning of underhand Volleyball serve and Exploring Specificity of Practice Hypothesis. Participants in this study were 80 healthy right handed female students that randomly divided into eight groups. The subjects practiced for five days, 30 attempt every day in random, serial, constant and specific in both vision and no vision conditions and finally participated in the transfer test. Results showed the performance dominant in visual condition. Results also showed that specific practice (According to specificity of practice hypothesis, People tends to practice in the conditions that the receiving sensory information and contextual characteristics are similar to the testing conditions) and random practice (motor programs recruitment in the new conditions) groups has better performance than other practice groups. Overall, results of current study revealed that despite the constant practice group has better performance compared to other groups in the acquisition phase, but random and specific practice groups was better that serialand constant groups in the transfer phase. Therefore the results of this study supported the theory of contextual interference and specificity of practice hypothesis.*

**Key words:** Specificity of practice, random and serial practice, proprioceptive information.

### INTRODUCTION

In the education and skills learning fields the coaches emphasized on simplicity of practice contextual characteristics, duration of selected task and further using of permanent practice sessions in contrast of the variable practice. While the motor learning researchers in numerous laboratory studies have supported the changing practices that lead to a better performance in the transfer and retention phases [1].

A research in the field of the practice manipulation provides useful information for physical education coaches, although few researches have been done in order to examine the benefits of practice combination [2-3]. Motor skill learning under the effects of complex association of the specificity of practice (specific learning), is related to the practice variability and structure of training program. According to learning specificity theory, there are similarities between contextual characteristics and received sensory information in practice and transfer phases[4-6]. The variability of practice derived from Schmidt schema predictions that variable Practice is more useful than the constant practice and leads to task positive transfer to the new conditions (competition).

Recent laboratory studies have compared the two sensory situations in the specificity studies, First case: a control of person common movement in the presence of visual sensory information, because this information has a better spatial accuracy of the information, and In the second case: the visual information removed during practice so the person use the other sensory sources such as proprioception, hearing and Etc, and deletion of this information in real terms led to poor performance. Based on Proteau suggestions in about the specificity of sensory sources, many researches were conducted. Mackrout and Proteau (2007) showed that when the learning will improve that the sensory information of the transfer phase is same with the sensory information of the acquisition phase (supporting the specificity of practice hypothesis) [7]. Abdoli and colleagues (2009) results to evaluate the specificity of practice hypothesis in underhand volleyball serve showed that learning for Sensory information available during practice is specific and with increasing training time, learning the motor skills to become more dependent on these sources of information and this result is approve for application of specificity of practice hypothesis in volleyball under hand serve[1]. But the results of research in the field of motor skills such as Squat, manually targeting, making the sign for large and small goals did not support the specificity of practice hypothesis [6-12]. Most researches shown visual information dominancy than proprioceptive information in various tasks practice (Targeting, mobility, weight lifting, knee reconstruction condition). People that practiced the motor task with full vision in the acquisition phase, in relation to the persons that practiced without visual conditions, had less accuracy in the transfer test (removal of visual information by blindfold) [13]. Adams Read (2007) argued that, similarity between training requirements and test conditions cannot lead to better implement the desired task, this inconsistency can be attributed to the type of task tested in the Reed study and this result is inconsistent with the principle of specificity of practice hypothesis. According to the conducted researches and obtained results in motor skills learning and manipulating the different training contexts can be create the useful combined training for improving complex, underhand, gross and fine motor tasks Among the training contexts can be referring to arrangement of training tasks and sensory conditions can be found in the practice. So the current study with regard to issues underlying the contextual interference and specificity of learning hypothesis in following the method to declare the optimal training situation for better performing of underhand volleyball serve in real condition same a competition. The researchers of this study with using of different training programs (random, serial, constant, specific) and various sensory conditions (vision and no vision) that are a two factors in creating the variety of training, Further experiments to investigate the combination of different training to improve a underhand volleyball serve learning based on specificity of practice hypothesis. So the question arise that which type of training arrangements (random or serial) compared with specific and constant practices in which sensory Conditions (vision and no vision) can help to better enforcement of underhand volleyball serve in real terms? And random practices in visual conditions are superior to the condition without vision in the transfer test of under hand volley ball serve?

## MATERIALS AND METHODS

This study was the quasi-experimental and field & applied research projects, including a pre test, training phase and the transfer test. Statistical Society of this study was Tehran Shahid Beheshti University female students who had no history of volley ball participation. 100 participants voluntarily participated in the preparation stage that finally 80 subjects were selected(Right-handed, no history of illness and organic problems).

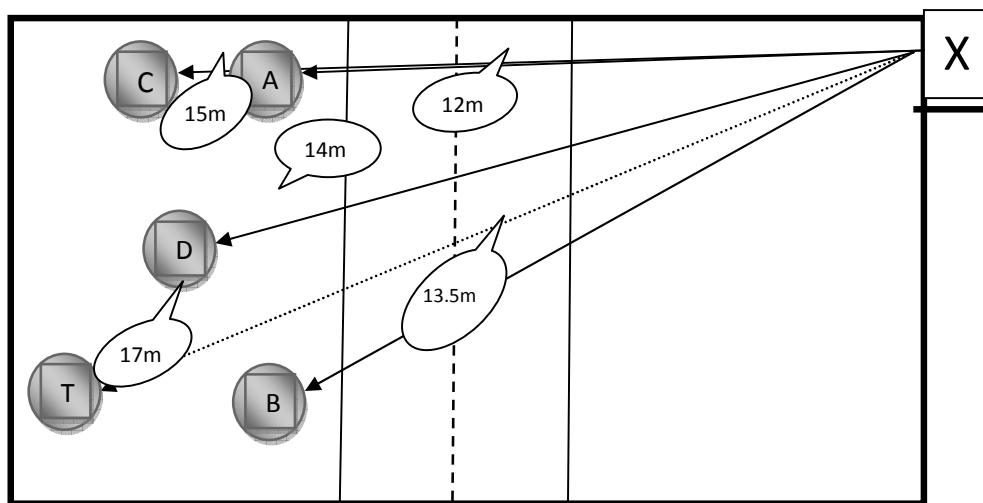
### Measurement tools

Research tools used in volley ball serve test in accordance with Travlos (2010) task. In this test, participants stand in the serve area(X Region) behind the serve line and hit the ball toward the goals outlined in the volley ball court (other side of the tour). Each target was a circle of radius90 cm and this circle divided into the smaller circle of30,50, 70and90 cm respectively that each of them from big to small, scored5, 4, 3 and 2, respectively [14]. Each impact to the scored circle recorded and mentioned scores were record in the score sheet and finally, the mean scores were calculated. If the ball not impact into the volley ball ground, but was outside the desired goal, points1andotherwisethe 0 score were recorded.

### Procedure

Participants attending the preparation and obtain the necessary education for underhand volley ball serve then subjects randomly divided into eight groups of 10 persons. Subjects with regard to the four practice groups (random, serial, constant and specific) and two sensory conditions(vision and no vision) in eight experimental groups (random with vision, random without vision, constant with vision, constant without vision, blocked with vision, blocked without vision, specific with vision, specific without vision) were replaced. After the preparation stage all of the subjects ready to step in pre-test consisted of 15 attempts from the area marked and behind the Volley ball serve line

(Region X) is given in Figure were impacted the target T. Same conditions were considered for all participants (With the benefit of perfect vision and without KR). Then each group in the acquisition phase, consisting of five consecutive sessions and in each session, 10 blocks of three attempts with five seconds break between each block were done. Random and serial groups conducted three targets A, B, C with a random and serial arrangement of their practice. Constant group only in D and specific group only in the parameter T began to turn a under hand volley ball serve. Participants performed a total of 150 attempts in the acquisition phase. The team that practice in full vision was able to see own performance and result, but that was practicing in the without visual condition, priory saw the target and then the blind fold was fasten for them and after handling service the blindfold was removed and by the examiner the subjects were aware of the impact of the landing site. 24 hours after the last training session the subjects participated in transfer test that was similar to pre-test conditions. With the difference that people were performed 30 volley ball under hand serve with a vision and without vision (blind fold) conditions. In order to eliminate the effect of transposition with vision and without vision (blindfolded)in the test the counter balance method were used.



### Statistical Analysis

In order to compare pre-test scores the one-way analysis of variance (ANOVA), analysis of variance with repeated measures and the Bonferroni test was used to determine between groups differences. Finally, two way analyses in the transfer phase in significant level of ( $P \leq 0.05$ ) was used. The X and Y coordinate relative to the impact extracted from the record sheets were obtained, and finally the average of radial error was calculated by the formula contained in SPSS 16 software.

### RESULTS

Analysis of pre-test scores showed no statistically significant differences between groups, which indicate no significant difference in the variance of the groups. One-way analysis of variance showed that there wasn't Significant difference between experimental groups had vision and no vision in obtained scores ( $P=0.54$  and  $F_{1,78}=0.37$ ). Also there wasn't Significant difference between experimental random, serial, constant and specific groups in the average radial error ( $P=0.99$  and  $F_{3,76}=0.02$ ).

Data analysis in the acquisition phase revealed that the main effect of group (visual conditions) in the acquisition phase of training days (five sessions), was significant ( $f_{1,72}=162.92$  and  $P=0.001$ ). Also, the main effect of training type on the acquisition phase (five sessions), was also significant ( $f_{3,72}=8.57$  and  $P=0.001$ ). Moreover, there are a significant interaction between type of practice and type of group in the acquisition phase ( $f_{3,72}=2.78$  and  $P=0.04$ ) ( $P \leq 0.05$ ). These results showed clear differences between the groups during training days at random, serial, specific and constant with vision and without vision.

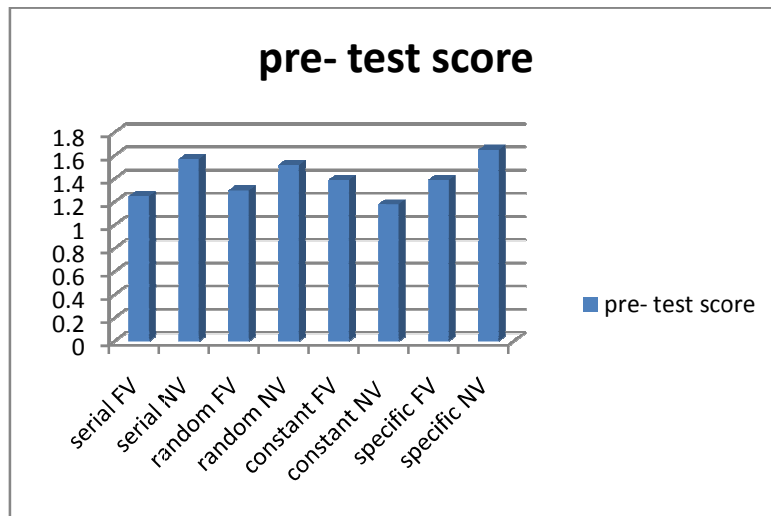


Fig1. Pre test scores

Also the average scores of performance training groups indicate a progress in the acquisition process (in training sessions). The Bonferroni test results between groups and training days showed that the constant and specific groups had better performance in days1 to 5 rather than the random group, moreover, the serial group in the fourth and fifth days was better than the random group. the Muchley spherical test results showed that the H0 hypothesis was rejected that is about the consistency of covariance error matrix of the dependent converted normal variable with an identity matrix, as well as we cannot be accept variance matrix spherical-covariance of dependent variable ( $P \leq 0.05$ ). Statistical analysis of the transfer data showed that the main effect of group (vision and no vision), in the transfer was significant ( $f_{1, 72} = 26.06$  and  $P = 0.001$ ) ( $P \leq 0.05$ ) that is visual information during training (the acquisition) affected the learning and testing conditions. The main effect of practice type (random, serial, random and constant) in the transfer was significant ( $f_{3, 72} = 9.62$  and  $P = 0.001$ ) ( $P \leq 0.05$ ), this indicates the effectiveness of various training programs on subjects performance in the transfer. Interaction effect of group and type of training was not significant ( $f_{3, 72} = 0.19$  and  $P = 0.090$ ) ( $P \leq 0.05$ )

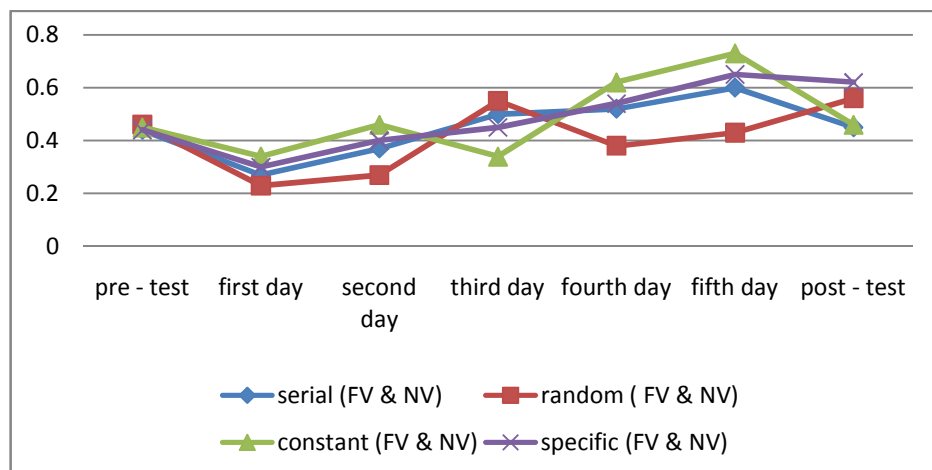


Fig2. The pre-test, training and transfer test performance of different training groups

## DISCUSSION

The purpose of this study was to investigate the effect of visual information and contextual interference on learning of underhand Volleyball serve and exploring Specificity of Practice Hypothesis. One-way ANOVA results to verify

pre-test scores of training groups showed no significant differences between training groups that this represents a random selection of individuals in experimental groups and homogeneity of groups. Study results indicated improvement in performance of participants in the acquisition phase of underhand volleyball serve. Results showed that in the practice days constant, specific, random and serial groups with vision had better function rather than their counterparts who had no vision[15-17].

Statistical analysis showed that the in acquisition process, constant and serial group performance was better than the random group. This result is consistent with predictions of variability of practice theory (better performance of constant group in training sessions). Also research results are consistent with findings of variable and specific learning research that compare the specific, constant and random (variable) groups during the acquisition process [14]. Results of this study are inconsistent with Kou four and colleagues (2003) in three skills of volleyball, Jones (2006) on in three skills of volley ball, Zetou and colleagues (2007) in volley ball skills, Lotfi (2004) in basket ball skills and Hatami (2009) in volley ball skills with generalized motor programs and the various parameters[18-22]. Because in mentioned researches in the acquisition phase, the contextual interference effect on prominence of serial attempts category rather than other attempts did not seen. On the other hand the results of this study are consistent with the idea of Sherwood (1996) and Sohrabi (2004) based on creation of contextual interference effect with parametric change of similar movement program[23-24].

Transfer test results showed that groups trained with visual in acquisition phase; their performance in the transfer test was not weaker than their peers without visual and was performed underhand volleyball serve with higher accuracy(less RE).

This findings are consistent research results of Proteau and colleagues (1992, 1998 and 2007), Bootsma al. (1990), Cox and coworkers (1988) but was inconsistent with Fleishman and Rich (1963) and Rubin and colleagues (2005) on the targeting practices. Fleishman and Rich believed that visual afferent information was very important in practice sessions and gradually replaced by proprioception data. May be possible reason forth is contradiction between Fleishman and Rich (1963) and Rubin and colleagues (2005) related to the performing experiments on the unrealistic situations (lab environment) that this result is consistent with findings of Travlos (2010). Better performance of random group than the constant and serial groups in transfer test is justified in accordance with forget, extension and variability theories. The results are consistent with the findings Grandora(2003), Fialho and colleagues (2006), Bortoli and colleagues (2010) and Travlos(2010). However, present research results are inconsistent with Bortoli and colleagues (1992), Lee and McGill (1983, 1985) and Jones (2005). Because they believe that in transfer the serial and random programs has better performance and in them findings did not get differences between blocked and random groups in the transfer test. Also superior performances of random group showed that change the parameter with the same motor programina underhand volleyball serve are created sufficient interference to confirm the interaction of contextual interference on transfer conditions [25-28]. These findings are consistent with Sohrabi(2004), Sherwood (1996), Mc Gilland Anderson(1996) study results.

Statistical analysis of the radial errors of participant's impacts showed that the specific and random groups with vision have more accurately in performance compared to other groups. This result suggests that visual information especially central vision, in the handling of serves to the target have a crucial role and this finding supports the specificity of practice hypothesis (9). While the research findings revealed that there isn't significant interaction between type of training and different sensory conditions (vision and no vision). In other words, did not find significant differences between the practices (random, serial, constant and specific) vision and no vision conditions in the transfer test. Better performance of specific groups in the transfer test can be justified in accordance with the practice specificity hypothesis that practicing one parameter especially when is same to the goal parameter, willlead to more accurate performance. The results of the research are inconsistent with Bennett and siker (1995) and Rubin (2004) results they showed that better performance in the transfer phase did not require a similar training condition with the test conditions [12]. Perhaps one of the reasons for the contradictory nature of the task is implementation complexity and context and the experimental conditions (laboratory and field, retention level of individuals and individual characteristics). The results of this study to evaluate the effect of different practice conditions on under hand volley ball serve learning after a period of training showed that, the subjects performance in transfer test was improved compared to the pre-test. In general, people in transfer test performed the underhand volleyball serve with higher accuracy[29-37]. Based on the results of this study can be said that practice in accordance with specific guidelines of specificity of practice hypothesis (similarity between practice and test conditions) and contextual

interference hypothesis(training program reconstruction in the new situation),will be lead to performance improvement in the transfer phase.

Based on past research (Brady, 1998 and 2004; Williams and coworkers, 2005; Barreiros et al. 2007) and present findings, one of the suggestions in the field of contextual interferences and specific of practice hypothesis can be doing this research on people with different age groups and skill levels and different personality traits[38-42]. Also with changing the amount of interference and field assignments and the research laboratory create a useful and applicable study design. A few applied research are exist that conducted in the field of practice until improve the competition conditions so in order to better implementation of various skills in physical education classes, the researchers with doing more researches in this area can provide useful guidelines and tips for sports coaches and teachers in different disciplines.

#### REFERENCES

- [1] Robin, C., Toussaint, L., Blandin, Y., &Proteau, L. (2005). Specificity of learning in a video-aiming task: Modifying the salience of dynamic visual cues. *Journal of Motor Behavior*, 37, 367–376.
- [2] Bortoli, L., Robazza, C., Durigon, V., &Carra, C. (1992) Effects of contextual inter- ference on learning technical sports skills. *Perceptual and Motor Skills*, 75, 555- 562.
- [3] Fialho, J. V. A, Brenda. R .N, and Ugrinowitsch, H. (2006). The Contextual Interference Effect in a Serve Skill Acquisition with Experienced Volleyball Players. *Journal OF Human Movement Studies*, 2006. 50: 65 – 78.
- [4] Abdoli, B., ShamsipourDehkordi, P., Shams, A. (2009). The effect of visual, proprioceptive and training sessions on the acquisition and transfer of volleyball underhandservice: the study of specificity to practice hypothesis. *Quarterly* 14(52). (persian)
- [5] Brady, F. (2004) Contextual interference: a meta-analytic study. *Perceptual and Motor Skills*, 99, 116-126.
- [6] Lotfi, Hossein Abad,GH.,Khalaji, H., Bahram A., Farokhi. A. (2004). Effects of contextual interference on basketball skills learning. Thesis, Faculty of Physical Education, Kharazmi University. (persian).
- [7] Jones.L.L, French K.E. (2006) The Effects of Contextual Interference on the Acquisition and Retention of three Volleyball Skills. *AAHPERD National Convention and Exposition*.
- [8] Bennett, S. J., &Davids, K. (1995). The manipulation of vision during the powerlift squat: Exploring the boundaries of the specificity of learning hypothesis. *Research Quarterly for Exercise and Sport*, 66, 210-218.
- [9] Cox, R.H. and J. Walkuski, 1988. Kinesthetic sensitivity and stages of motor learning. *Journal of Human Movement Studies*, 14: 1-10.
- [10]Mc Gill, Richard A. (2008). *Motor learning; concepts and applications*.Translated by VaezMousavi, M K. Shojaei, M. Bamdad Pub. (persian)
- [11]Pew, R.W., 1966. Acquisition of hierarchical control over the temporal organization of a skill. *Journal of Experimental Psychol.*, 71: 764-71.
- [12]Poter.J.M. &Magill.R.A. (2010).systematically increasing contextual interference is beneficial for learning sport skills. *Journal of Sports Sciences*, October 2010; 28(12): 1277–1285.
- [13]Proteau, L., Tremblay, L., &DeJaeger, D. (1998) Practice does not diminish the role of visual information in on-line control of a precision walking task: support for a specificity of practice hypothesis. *Journal of Motor Behavior*, 30, 143-150.
- [14]Travlos, A. (2010). Specificity and variability of practice and contextual interference in acquisition and transfer of an underhand volleyball serve. *Perceptual and Motor Skills*, 2010, 110, 1, 298-312.
- [15]Abdoli B, ModaberiSh and Shamsipour D. P. (2012). Comparison of the quality of life for healthy active and sedentary elderly and with osteoarthritis. *Annals of Biological research*, 33, 5: 2337-42.
- [16]Mostafai A. (2012). The Comparison between athlete women and non- athlete women regarding to mental health and happiness. *Annals of Biological research*, 33, 5: 2144-47.
- [17]Omidi M, Yousefi M, Ahmadi M, Farzanfard F. (2012). An investigation of the relationship between cardiorespiratory fitness and body fat with coronary risk factors in adolescent girls. *Annals of Biological research*, 3, 6: 2975-78.
- [18]Abdolshahi. M. (2006). The effect of contextual interference on learning of similar & different badminton similar and different skills. *Olympic Journal*, 4(1). (persian).
- [19]Blandin, Y., Toussaint, L., & Shea, C. (2008). Specificity of practice: Interaction between concurrent sensory information and terminal feedback. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 34, 994–1000.

- [20]GRANDA VERA. J. AND MONTIL- LA. M. M. (2003). Practice schedule and acquisition, retention and transfer of a throwing task in 6- yr- old children. *Perceptual and Motor Skills*.
- [21]Gyu. Young Hwang. (2003). An Examination Of The Impact Of Introducing Greater Contextual Interference During Practice On Learning To Golf Putt. Submitted to the Office of Graduate Studies Of Texas A & M University.
- [22]Robin, C., Toussaint, L., Blandin, Y., &Vinter, A. (2004). Sensory integration in the learning of aiming toward "self-defined" targets. *Research Quarterly for Exercise and Sport*, 75, 381-387.
- [23]Barreiros, J., Figueiredo, T., &Godinho, M. (2007). The contextual interference effects in applied settings. *European Physical Education Review*, 13, 195-208.
- [24]Proteau, L., Marteniuk, R. G., & Levesque, L. (1992) a sensorimotor basis for motor learning: Evidence indicating specificity of practice. *Quarterly Journal of Experimental Psychology: Section A*, 44, 557-575.
- [25]Battig, W. F. (1979) the flexibility of human memory. In L. S. Cermak& F. I. M. Craik (Eds.), *Levels of processing in human memory*. Hillsdale, NJ: Erlbaum. Pp. 23-44.
- [26]Bootsma, R. J., &vanWieringen, P. C. (1990). Timing an attacking forehand in table tennis. *Journal of Experimental Psychology: Human Perception and Performance*, 16, 21–29.
- [27]Fleishman, E. A., & Rich, S. (1963). Role of kinesthetic and spatial-visual abilities in perceptual-motor learning. *Journal of Experimental Psychology*, 66, 6-11.
- [28]Giuffrida, Clarc, (2002): Different Transfer Benefits of increased Practice for Constant, Blocked and Serial Practice Schedules. *Journal of Motor Behavior*, Vol34, No4, 353-365.
- [29]Hatami. F., Namazizadeh. M., Aslankhani. M A, (2009). The effect of contextual interference on acquisition, retention and transfer of volleyball skills with generalized motor programs and different parameters. Thesis. Faculty of Physical Education, ShahidBeheshti University. (persian).
- [30]Koufour, N., Michalopoulos.M, Kioumourtzoglou.E.(2003). Contextual interference effects on learning volleyball skills. *Inquiries in sport and physical Education*, 1(2):159 – 168.
- [31]Krigolson, O., Van Gyn, G., Tremblay, L., &Heath,M. (2006). Is there “feedback” during visual imagery? Evidence from a specificity of practice paradigm. *Canadian Journal of Experimental Psychology*, 60, 24–32.
- [32]Mackrous, I. Proteau , L . (2007). Specificity of Practice Results from difference in movement planning strategies. *Experimental Brain Research*.
- [33]Proteau, L. (1992). On the specificity of learning and the role of visual information for movement control. In L. Proteau& D. Elliott (Eds.), *Vision and motor control* (pp. 67-103). Amsterdam: North-Holland.
- [34]Proteau, L. (2005) Visual afferent information dominates other sources of afferent information during mixed practice of a manual aiming task. *Experimental Brain Research*, 161, 441-456.
- [35]Robin, N., Dominique, L., Toussaint, L., Blandin, Y., Guillot, A., & Le Her, M. (2007). Effects of motor imagery training on serve return accuracy in tennis: The role of imagery ability. *International Journal of Sport and Exercise Psychology*, 2, 177–188.
- [36]Schmidt, Richard A. Principles of motor learning and performance: basis to practice. Translated by Namazizadeh, VaezMousavi. Samt Pub, (2007). (persian).
- [37]Shea, J. B., &Zimny, S. T. (1983) Context effects in memory and learning movement information. In R. A. Magill (Ed.), *Memory and control of action*. Amsterdam: North- Holland. Pp. 345-366.
- [38]Shenfelt, Elizabet L. (2000) comparison of constant and variable practice conditions of free. Throw shouting perceptual and motor skills, Vol94. PLL13.
- [39]Sherwood, D.E. (1996).The benefits of random variable practice for spatial accuracy and error detection in a rapid aiming task. *Research Quarterly for Exercise and sport*, 57, 35-43.
- [40]Sohrabi. M. (2004). Randomized comparison of physical training and random and blocked mental imagery on generalized motor programs performance and learning and time parameter. Thesis, Kharazmi University (persian).
- [41]Toussaint, L. Blandin, Y. (2010).On the role of imagery modalities on motor learning.*Journal of Sports Sciences*, 28:5, 497-504.
- [42]Zetou.E,Michlopoulou M, Giazitzi K, Kioumourtzoglou E.(2007). Contextual interference effects in learning volleyball Skills, *Perceptual and Motor Skills*; 104(3pt1):995-1004.