The impact of variability on performance practice and identify errors in the task of coordination - association of children

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Abstract

The aim of this study was to investigate the effect of variability of exercise on the performance and identification of errors in the task of coordination – association. The sample study,was right-handed male students aged 9 to 12 years old from the city of Baharestan the population of 24 samples were selected by random cluster sampling and randomly divided into two groups: fixed and variable practice. The acquisition stage included 100 training efforts (10 blocks of 10 attempts), as well as feedback on three consecutive days with the coordination - association and retention test including 5 attempts without providing feedback within 24 hours later. Research tools were Performance measurement and error identification software, with the reliability of 88/0. Kolmogorov-Smirnov test for normality of the data evaluation and analysis of variance with repeated measures for the data analyseswere used. The results showed that there is a significant difference between fixed and variable training in performance and learning deviation from the target (two-dimensional error), thus the constant training group in the acquisition stage was better than variable training groupbut in the retention phase, variable practice group, had better performance and accuracy of their detection of errors was high. Therefore it can be concluded that the change from fixed to variable practice will enhance the accuracy of error identification in the implementation of the task of coordination - association in stage of the retention in relation to the acquisition stage.

Key words: variability of practice, motor function, the acquisition, the retention, task of coordination – association

Introduction

The task of physical education teachers in schools and various sports coaches is to optimize the learning process skills in the limited hours of physical education lessons and also in training sessions to optimized level (George, 1998). One of the effective ways to achieve this goal and optimizing the performance of students which teachers as well can take advantage of it, is to organize training sessions in a reasonable manner. Motor learning specialists in a wide rangehave examined ways of planning exercises, and extended it to real meetings and consider it in to levels of background interference and variability of practice(Schmidt and Anshel, 2004).background interference refers to a position in which the existing interference is placed between several tasks. The training efforts under conditions of high background noise (i.e., when the number of assignments to be an exercise in random order) typically leads to a less efficient performance than the training that is done under conditions of low background interference (when several assignments are practiced in a blocked order).on the other hand, the variability refers to variety of moves and diversity of background features which students experience withintraining skills (Magyl, 2002). Variability of practice can be considered as a continuum that started from the fixed practice and ends up to variable practice. Inafixed practice only one type of parameters are used while in a variable practice various parameters are used. According to the evidence-based research fixed practice cause to improve performance while the variable practice cause to develop the scheme .choice of the kind of parameter is facilitated by doing variable practice for movement patterns and also helps the individual to have better adaptation in the new situations. According to the theory of generalized movement program every skill is composed of a fixed (GMP) and variable (parameter) (Mgyl, 2002).variable practice causes the flexibility or adaptability of the movement production and so makes individuals to use what have learned in variable practice which did not performed already in the similar movements (Katalanv and Klynz, 1984). Tasks that require spatial-temporal coordination and forecasting is an exercise to improve performance. Research evidence shows that doing variable training affects the parameter component, and not the GMP section (Lai and Shay, 1998, Vaytakr and Xia 2000, Wolfe and Wright 2000). According to Schmidt theory, variable practice in comparison with the fixed one provides a much better retention and transfer in other words one of the factors that justifies the independence of the constant and variable component of the motor program is the variability of the practice. Most research on the variability of practice has confirmed the hypothesis and supported the scheme theory of Schmidt For example, Shvyyflt (2001), Nakamura (2002), Hetman (2005), Davis (2005) and Darius Khajavi (2001) demonstrated in their investigation priority of the variable practice group over other groups, their research as well confirms the scheme of Schmidt. Also Abdoli, Behruz. et al (2010) make a research on the impact of different types of exercise on the acquisition and retention of generalized motor program of shooting skills in ten track reach to the conclusion that in the acquisition stage constant training groups demonstrated better performance, but in the retention stage

the variable practice group performance was better than the constant practice group.Abdoli, Behruz. et al (2011) make a research on the effect of exercise on the acquisition, retention and transfer of the task of predicting the timing of adjustment and reach to the conclusion that although variable practice within the acquisition stage will lead to poor performance In the retention test of variable practice group proves better performance than constant practice group. Lotfi, M., et al (2013) in a study to examine the impact of variable and constant training on performance, retention and transfer of skills of throwing darts to mentally retarded children reach to the conclusion that the variable practice group in the retention test proved better performance than constant training group. The results taken from some of other studies did not confirmed this hypothesis, there was no significant difference between variable practice group with other groups as well, the scheme theory of Schmidt have not been supported in these studies. For example Krykoplon (1994), BijanRjayyan (2007) and Omid Mohammedan (1998)in the retention testfound no significant difference between the variable practice group with other groups, and the scheme could not be verified. Most assignments used in the variability practice studies were field assignments such as Shvynflt (2002), Dvvys (2005), Darius Khajoo (2000), B. Rjayyan (2007) and OmidMohamadian (2010).so the researcher wants to use of the experimental assignment related to the field. Skills used in this study was a laboratory task.so in the review of literature there are cases that have used experimental assignments such as Mc Kraken and Astlmach (1997), piebald (1983), Shea and Kohl (1991), which have been used were the skills of hands movement on an obstacle to disconnect electrical power,the skills of power generation in children and the creation of 150 Newton force is used. Wax Yao et al (2012) in a study entitled impact of the variable practice on the efficiency and timing evaluated the effect of the variability of practice in the three groups. All three groups had improvements in their performance and variable training group has clearly had a better performance from the other two groups. Ronald and Marcus (2013) in a study did research on the impact of various forms of practice, constant and variable,onthe speed throw over the arm in their pre-school children, the results showed that both groups had improvement in performance and an increase in workload (training)is an important factor for th**e** type of training (constant practice) toimprove performance in children. the aim of this study was to compare the efficacy of switching from fixed to variable practice (practice variability), on performance and identification of errors in the acquisition phase in order to determine in what circumstances is identification of errors in retention than acquisition phase by the change from fixed to variable training conditions and what stage has got the most impact from the variable practice in increasing the accuracy of error identification.

Methodology

Participants

The population were boys aged 9 to 12 years old and top right (right-handed) city of Baharestan which 24 samples were selected by random cluster sampling who did not have the desired experience

of coordination-association.so the clusters selected from schools of Baharestancity,several class from every school, at the end, regarding the volume of the sample, specific students were selected.

Research tools

Research tools includes software of measuring the accuracy of the performance with the reported reliability 88/0.Methods of using software was in this way that the subjects took the mouse of devices, and as much as possible maintained coordination with the mouse in the square box to the directions left, right, up and down movement, So that the yellow ball that was thrown at the screen in an arched path in the monitor must strike with a black marker. The mentioned assignment in this study was designed as a computer program, in which a person encountered with a variety of shootings which were released at different angles and time intervals so the participants should try to hit the ball, thrown in a long way, at the time of landingby the cursor.in this task the subject by moving the mouse tried to hit the ball in its direction so that the number of errors in the learning task indicated the amount of task learning.in this study the deviation error rate from the target measured as a two dimensional error.

Methods

First of all the subjects take part in a pre-test in a way that the participants were provided with guidance on the work tools and got familiar with the manner of their usage. Then the subjects were divided into two variable and constant groups.in the acquisition phase including a three-day practice, the subjects practiced during the consecutive three days.in the first day every subject did performed 40 attempts (in 4-block area just 10 attempts), between attempted block 1 minute restand between every attempt 5 seconds rest was given to subjects, And on the second day as the first day of training, fixed and variable training was conducted for both groups, it also took 2-hour training session per day and on the third day each subject performed two blocks of 10 attempts that lasted 1 hour. In addition, each subject after each training block (10 attempts) received augmented feedback (the number of hits that were correct).in the first and second day after a 2 block area (twice a day) and on the third day after the last attempt was made evaluation was made. 24 hours after the last attempt the retention test was performed which the retention test including 5 attempts, between each attempt there was 3 seconds rest and all of the subjects were taken a retention test.

Statistical analyses method

Statistical analysis of this study was descriptive and inferential levels.Descriptive method includes calculating the mean and standard deviation, etc Inferential statistics was used to assess the impact of variability on performance and identification of errors, soKolmogorov-Smirnov test was used in order to assess the normality of the data and the analysis of variance with repeated measures was used to confirm or reject the null hypothesis.

Results

Table 1: Test theeffectofdeviations from thetargetgroupin theacquisition

Index	SSw	MSw	df	F	sig
Blockeffect	41090/95	3239/601	1/29	4/59	0/032
The interaction ofblocksin the group	1008/34	779/465	1/29	1/105	0/32
Error	20079/67	705/45	28/46	-	-

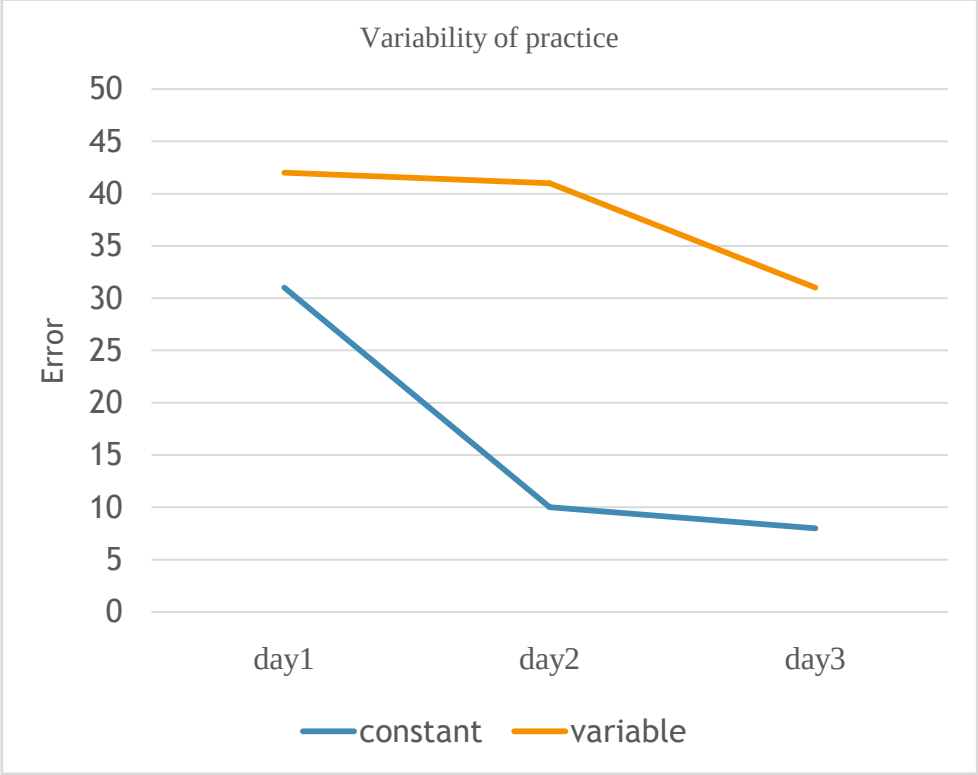
Results in Table 1 in relation to the analysis of data by using Green House test on the two-dimensional error in the acquisition shows that there is significant difference in the performance of the subjects in the two variable and constant practice groups(P = 0/032).

Table 2: Impacttestbetweena groupofdeviation from thetargetacquisition phase

Index	SSb	SSb	df	F	sig
Blockeffect	51836/63	51836/63	1	61/9	0/001
The interaction ofblocksin the group	8060/26	8060/26	1	9/62	0/005
Error	18423/11	837/414	22	-	-

It can be specified that, by taking into account the results of the work between groups (table2), there is a significant differenceIn the case of the two-dimensional error in the two variable and fixed groups, therefore there is a significance between performance of subjects in different groups(constant practice and variable practice) in which constant training group had better performance in the acquisition phase than variable training group but in the retention phase variable training group acquired better result.

Figure 1: Line chartofboth groupsin5separateblocks oftrainingin theacquisition phase



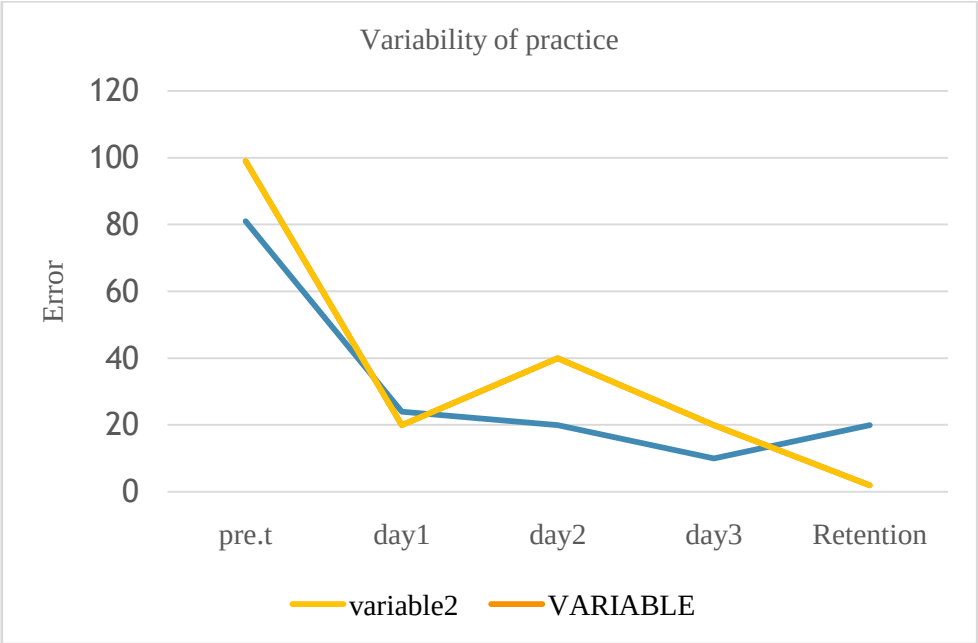
The retention phase

Table 3: Comparisonoffixed and variablepractice groupin theretentionof thetwo-dimensionalerror

The same informationmeans andvariances	Louvainteston thesamevariances		T testofequalmeans		
	F	**sig**	**t**	**df**	**sig**
Assumedto bethe samevariances	26/601	0/001	4/228	22	0/001
Giventhe lack ofequalvariances	-	-	4/228	11/64	0/001

Regarding to the table3 there is significance difference between the performances of the subjects in the retention phase, according to the chart 3 the performance of the variable training group in the retention phase had better performance than the constant training group.

Figure 2: Diagramcolumnfordeviations from thetargetlevel ofretentionforgroups



Conclusion

Based on the views of variability the variability practice in organizing the practice, causes poor performance, but learning is more stable and better. The results of studies that have been done inpract ice variability generally support the view of practice variability and variability suggests the validity ofthe theory ofpractice. Some of theseviewsare notsupportedand some otherresearchdo not providestrong research. In order toinvestigate further, the researcherssoughtto examinethe workonatask of coordination-association(by changing the parameters ofspeed andlaunch angle). The resultsshowed thatin theacquisition andretentionphase there is significant differencebetweenfixed andvariablepractice. Therefore theconstanttraininggroupin theacquisition andretentionin thevariablepractice groupshowed thebestperformance. Theresults oftheresearch is consistent with the research results ofShvyyflt(2001), Nakamura(2002), andDavisHetman(2005), DariusKhajavi(2001), Abdoli, B. et al. (2010, 2011)andLotfi, M., et al (2013) in relation totheimpact ofvariabilityon the performance oftheacquisitionandretentionpractice.in this respecttheresults ofthevariablepractice groupshowedthe best performanceintheretentiontest.the research results of Xia and et al(2001) was contrary to the results of this study. In this study,Xiaandcolleaguesexamined theeffects of variable and fixedexercisetrainingonabsolutetiming. One ofthe reasons causesinconsistent resultsbetweenthat study and thisone is the number of great attempts in the acquisition phase of Xiaet al.'s Study. Also, the taskismore complexthanwhatcan besaidin Xiaet al's study.

Subjectsinthestudymust, based on the time ofthetargetshownon thecomputer screen, press 2, 3and4on the keyboard, apparently,thistaskiseasier thanthe task of thisresearch. In fact,on theoretical groundsshould constant practice groupshouldperformed better than variablepractice groupbecausethe groupdoesnot need to restorethepatternof operationofthe memory. in this studythere wasa significantdifferencebetweenfixed andvariable practiceexercisesin theretentionon theerrordeviation from thetarget, and this iswas confirmed.Thereforethisresult is inconsistent with the research results ofMohammedan(2003) andRjayyan(2007). Mohammedan(2003) showed in a study that statistically there is no significantdifferencebetween thethree groups(one fixedgroupand twovariableGroups). Inanother studyRajayian(2007) examinedthe effect of variableand constantexercisein atrainingperiodofretention,transferandsecondaryassignmentsbadmintonservicebeadsthatthe results indicatedsignificant differencesbetweenfixed and variablepractice. Maryam mokhtariDynany(2007) In a similar studyentitledthe effect ofvariabilityon performance andretentiontask of manual coordination-associationin theacquisition phaseby measuring therelative phase reached to the conclusion thatthere is no significant difference in performance between the two variable and constant groups.the presented task in this research was similar to this study but with a difference that in the study surveyed by Maryam mokhtariDynany(2007)the subject performed a coordination task with two hands but in this study presented here the subject performed a more complicated work. There is no doubt that the nature task in this study which is a kind of laboratory task and also the computerized features of the task have lead the outcomes of this research to be inconsistent with the results of the above mentioned studies.Like the study done by Maryam mokhtariDynany(2009)similar task was used in which the subjects by using connected leverages to a device that had backward and forward movements, tried to target the ball but in the presented research the subject tried with a mouse in right hand to hit the ball. So, the results willbedifferent in two different tasks.Thetaskused in thestudybyMaryammokhtari was a coordinated task with two hands**,**but inthis studywe usedataskcoordinated by onehand. Among the firststudies doneabroadin the field ofperformance of the constant and variable training groups traininggroups overthetransfer test, is the research by Krykoplosthatconstanttraining programs, variable practice stereotypesandrandom variableson performance,retention and transferof academicMen was done in the skill ofbasketballshot. In this study,noexcellence inthepractice ofvariabletoconstantpracticefor bothretention and transfertestswere observed (Yan et al., 1998). Butthe results of thisresearch are constantwith theresults ofshahrzad's(1388). Shecalledin a studyentitledthe effect of variability ofthe training and age over retention and transferaccuracyof throwing above shoulder in children reachedto theconclusion that Variablepractice groupshowedbetterretention andperformancecompared toconstanttraining. Thisisalsoconsistentwiththe resultsfrom theage ofsubjects. Theresearchsubjects of the above mentioned studywereadults, but researchsubjects in Shahrzad's arebetween the ages of4, 5and6years, while

thisstudysubjectswerebetween the ages of9to 12 years. based on the report of Wand Rozam (1987) in the review of some of the studies more than half of them (on the adults and children) did not supported the hypothesis of variability**.** In particular,the conclusions ofthestudysubjects of whichwereadultshave beenextended tochildren. Thisvariabilityseems tobe aprofitableexercisefor adultsthanfor children,even if itis justified for learningin termsofvariability, the amount ofexercisefor children to reach optimal learningisthe subject ofinvestigation. But according tothe findings of thestudyit can be concludedthatfor children,the constant exerciseprovedusefulin theacquisition and learningshootingskillsalthoughthekind oftaskisverymuch related tolearning. Sowhateverage, usingexisting schemasandcourse ofdevelopment ofnew rules for theschemeislower. Therefore thepracticeismore important(Schmidt, Shapiro1982)(Anshel, and John, 2005). Thisstudy, in the research ofLee et al.(1985) raised and the amount ofexercisewere comparedin adults and children. However, although the schematheory, considers the effect ofthe variabilityinchildren'spracticeas non-formation ofscheme, the caseina lot of researchon childrenhas not beenachieved(Schmidt and Lee, 2005). Butsome research hasdemonstratedthat regarding the reasoning ofabsence ofscheme, constant training provemore useful in children. Overallresultsshowed thatalthough variablepractice groupin theacquisitionhadweakperformancecompared totheconstanttrainingit was thevariablepractice groupwhoshowedthe best performancein theretentiontest. Theproposalof this studyis that astudyon thesame subjectbe doneonfemale studentsanda comparison be madebetweenboysand girls.

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