How does Doodling Effects on Students Learning as an Artistic Method?

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Abstract

The main purpose of this study was to assess the effects of doodling on learning performance of high school male students in Tehran. The design of this research was a pre-test–post-test with a control group. A group of 175 junior high school 12 -13 year old students was chosen for this study. After being taught a section of Natural Science course, the students were asked to answer questions related to the lessons. After that, their grades were used as the pre-test scores. The post-test was carried out after the devised treatment. During ten sessions of the same course and teacher, the students were given a blank sheet and were asked for doodling if they liked to/felt for. After each session, a couple of relevant written questions were asked to evaluate how well students learned the lessons. The experiment and control group both consisted of 27 randomly selected students; participants in experiment group were doodlers and those in control group didn't doodle. To evaluate the doodling effect, covariance analysis is performed. Comparison of the grades showed that the experiment group outperformed the control group significantly ($P<0.01$).

Keywords: Doodling, learning, educational performance, male adolescent, student

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Introduction

When we talk about education not only transferring the knowledge, but also how well this is accomplished using various techniques is meant (Winters, 2011). Varieties of techniques from different fields of art (e.g., drawing, music, theater, etc.) can improve learning (Eisner, 1998). The educational implications of art have been investigated by different researchers (Burkitt, Barrett & Davis, 2005, Cox, 2005, Anning, 1999, Warren, 2003, Eisner, 1998). Doodling, unconscious scribbles, or one of the most common habits among students, is one of the practical methods in the field of art. Recently, there have been a few studies suggesting that doodling can improve academic retention (Andrade, 2010; Brown, 2011; Chan, 2012).

Doodling usually happens through unconscious drawing of patterns and shapes when people are bored with something. It may be observed as students' common practice on their books or marginal notes. Some teachers considered it as a matter of losing attention and concentration. "The term 'doodle' was first used in 1930 by the meaning which we know today, i.e., absentmindedly drawing nonsense symbols, designs, figures, and patterns, but in a more comprehensive definition it can be said that doodling is an unconscious designing while no attention is paid by the person" (Gonzalez, 2010).

"Doodling usually occurs whilst a person is day dreaming or is experiencing mental wandering. It hardly ever happens when one is fully concentrated" (Singer, 1966). Researchers observed that effective learning requires involvement of both brain hemispheres (Kerry, 2005). Studies show that there is a strong positive correlation between the dominance of the right side of the brain and educational failure or behavioral disorders in schools (Warren, 2003; Stellern, Gutierrez & Patterson, 1986). To involve both brain hemispheres, the brain should be trained. That includes several activities to strengthen mental skills like concentration, attention, and problem solving. In this regard, variety of activities might be accentuated. It is noted that drawing and music are the most important comprehensive activities that involve both hemispheres (Caine& Caine, 1990). So we may observe doodling as an innovative activity that could affect both right and left brain hemispheres.

Also studies show that Doodling decreases the level of autonomous arousal, accompanied by day dreaming and tiredness, and keeps the person conscious by increasing concentration (London, Schubert& Washburn, 1972).Day dreaming is associated with generally high arousal level seen in boring situations through increased activity in default cortical networks (Mason, Norton, VanHorn, Wegner, Grafton & McRae, 2007; Smallwood, Fishman & Schooler, 2007).

The role of doodling in preventing day dreaming and mental wandering has been studied in different research works. (Andrade, 2010; Aellig, Cassady, Francis &Toops, 2009; Chan, 2012).

Since this study is the first one in the field of doodling in Iran, and that there has been no

similar research, we find it proper to introduce this method(doodling) by reviewing a number of similar investigations before we get into our way.

In one study, doodling is asked while a video task is given. It is demonstrated that there is not a significant correlation between doodling measures and the number of correct video content items (Aellig, et al, 2009). In another study, doodling is requested while an auditory task is given. The results show that doodlers are unexpectedly more successful in remembering than the non-doodlers (Andrade, 2010) .Recently Chan (2012) has shown that doodling negatively affects performance on a visual recall task. This may show that doodling can only be helpful if it has no common cognitive resource with the main activity. Doodling generally increases concentration (especially in the case of boring and complicated subjects) (Andrade, 2010). That is an ability to keep and remember information. It activates the mental eye using a part of visual cortex, resulting in the ability to make mental images, to solve problems in an innovative way, and to activate the unconscious part of the mind through keep the conscious part activated. It integrates the three senses of visual, audience, and kinetic, all of which lead to a better learning process (Brown, 2011).

So previous studies show that except for the situations in which resources needed for the main activity and those for doodling are the same, doodling is indeed helpful (Andrade, 2012; Chan, 2012). This may be because mental wandering acquires more resources than doodling. (Aellig et al, 2009; Smallwood, O'Connor, Sudbery & Obonsawin, 2007)

In fact, day dreaming and mental wandering are considered as barriers in the way of educational development especially for adolescents (Smallwood et al, 2007B). Basically, one of the important factors in educational performance is the functionality of working memory (Gathercole & Alloway, 2008; Gathercole, Alloway, Kirkwood, Elliott, Holmes & Hilton, 2008; Gathercole, Lamont & Alloway, 2006). Since working memory depends on concentration (Susan, Gathercole, Tracy & Alloway, 2004) it can be said that improving concentration indeed affects the learning process positively (Holmes, Gathercole, Place, Dunning, Hilton & Elliott, 2010).

Since teenage and adolescence years are the era for which growth in mental experience and learning flexibility happen (Jacob, 2002; Charles & Luoh, 2003; Dubas, Semon, Graber & Petersen, 1991; Graber, Lewinsohn, Seely, Brooks & Gunn 1997; Stattin & David, 1990), students (both male and female) in these ages are experiencing physical and mental changes. They are subject to day dreaming and mental wandering more than the others. This may lead to educational failure. Therefore, it is important to study ways to decrease day dreaming and mental wandering; help students to focus and have a better educational performance (Smallwood et al, 2007B). Therefore, on the basis of the frequency of doodling amongst students (Chan, 2012), here we are to study the effects of doodling on learning/education performance.

Furthermore, one of the successful methods which has gained a lot of attention in the past few years is VAK learning method (University of Pennsylvania, 2009). This method is based on the idea that the subject connects with the data being gathered through one or more ways namely; visual, audience, and kinetic. Since people normally lack enough knowledge about their abilities in knowing the best way of learning, invention and use of a method which covers the three ways while respecting the teaching process seems beneficial (University of Pennsylvania, 2009). In this regard, it may be said that doodling as a visual and kinetic task, concurrently with audio task (as used in this study) can improve learning and be a useful auxiliary device for teaching.

Method Participants

According to different changes in growth for both males and females (Jacob 2002; Charles & Luoh2003; Dubas et al. 1991) and the difference between educational performance of female students and male ones (Graber et al. 1997; Cavanagh, Reigle-Crimp & Crosnoe 2007; Sttatin & David 1990) the gender was controlled. Participants of this study were 54 males ranging from12 to 13 years of age with the mean age being 12.5, in a high school in Tehran. Experiment and control groups were respectively among doodlers and non-doodlers.

Material

Throughout the term, students completed a test after each unit. They completed ten tests, consisting five questions each. It is worth noting questions were not graded equally because the content of each lesson was different from others and each question had a different grade having a total score of nine.

1. Nine score tests made of five questions: to assess level of students learning from the taught lesson in each session, students sat tests having five questions lasting ten minutes and each was designed by the teacher. The maximum and minimum scores in these tests were nine and zero, respectively. The scores were used as the educational performance.

2. White sheets for doodling: students were provided with A4 size papers for doodling. Drawing tool, subject, and pattern were chosen by free will.

Procedure

After coordinating with the school dean and the science teacher in carrying out this research, it was decided to have ten session Science classes for the junior students in the same place and under the same circumstances. It is worth mentioning that the set up here matched the typical set up for these students as much as possible.

In pre-test, all 175 students sat a quiz according to the routine classroom schedule after one session of teaching Natural Science. Lessons typically contained general concepts on experimental sciences, including basic no-

tions on the biology of animals, plants, chemicals, human body, physics of fluids and electricity. Then the students were provided with a definition of doodling: doodling is an unconscious drawing which happens when situations get boring. In order to avoid any interruption in the flow of the class, no instruction was given and no limitation was set. All participants were assured that there was no obligation for doodling. The duration of teaching lessons was 40 minutes to have enough time to assess the impact of day dreaming and mental wandering on the students. Although the total time for each session was normally 90 minutes, in this study we set the time in a way that the first 40 minutes were devoted to teaching new lessons, ten minutes for the exam, and the resting 40 minutes were for other classroom activities, so except the ten minutes spent on the exam in each session, the rest of the class schedule matched the normal set up.

To assess the mere effect of doodling ten sessions provided for the students and they were asked to doodle when they felt the need or desired for that. There was a minimum amount of doodling that had to be presented in order for the student to be considered as a doodler. That meant if more than 50 percent of

Table I: The educational performance mean of the test and control groups

Variance	Maximum	Minimum	Std. Error	Std. Deviation	Mean	N	Groups	Statistical features Stage
6.66	8.00	0.00	0.49	2.58	5.87	27	Pretest	Test
0.56	8.83	5.56	0.14	0.75	7.58	27	Posttest	
6.62	9.00	0.00	0.49	2.57	5.38	27	Posttest	
1.62	8.25	2.75	0.24	1.27	6.32	27	Posttest	Control

To determine the difference between the test and control groups, keeping a constant level for the pre-test, covariance analysis is used the results of which are shown in table II.

Table II: Analysis of covariance between groups to assess the effects of doodling on learning

Observed Power	Partial Eta Squared	.Sig	F	Mean Square	Df	Type III Sum of Squares	Source of changes
0.98	0.25	0.000	17.71	14.69	1	14.69	Pre-test effects
1.00	0.87	0.000	367.62	304.79	1	304.79	The main effect of test
0.99	0.29	0.000	21.62	17.92	1	17.92	Variance
				0.829	51	42.28	Error
					54	2692.66	Total

the paper was filled with doodles.

After each session students were given a test including five questions made by the teacher himself based on the lessons taught each session. As mentioned before, quiz scores of the first session of the class i.e. before describing doodle for participants, was used as the pre-test and the average of ten quiz scores taken afterwards was the score for the post-test. All the students wrote their names on the doodle sheets. After the tenth session, 27 students were randomly chosen from those who had doodled and were assigned in the experiment group and 27 students randomly selected from those who had not doodled were specified to the control group.

Results

Aim of this study was to investigate the doodling effects on junior high-school students learning.

the effect of intervention based on meaningfulness of mean of pre-test and post-test was tested using covariance.

Descriptive data of the two groups are provided in table I. As you can see in means, educational

performance is increased in the test group (from 5.87 to 7.58).

Regarding the fact that pre-test effects staying constant, the effects of doodle are significant ($P<0.01$).Doodling has a significant effect on learning and the effect size (Eta Square) is 30 percent that means that 30 percent of the variance in adjusted mean for educational performance in the post-test is due to doodling.

Discussion

In this study the effect of doodling on learning amongst 12-13 year old male students was investigated, with the mean age being 12.5 years of age. The results showed that doodler students were more successful in educational performance than those who did not doodle; that is, doodlers outperformed non-doodlers in terms of educational performance. These findings were consistent with other researches in the literature (Andrade, 2010).

In Andrade's (2010) research, 40 participants aging 18 to 55 were randomly assigned to the experiment or doodling group. People in the 'doodling' condition were asked to shade printed shapes while listening to a telephone call. The doodlers performed better on the monitoring task and recalled about 30 percent more information on a memory test. As can be seen, she used an auditory task, structured doodle and recalling test. But In current study, the effect of free doodle on learning of lessons that included auditory and visual tasks was investigated. Although there were some differences in methods between current and Andrade (2010) researches, the results supported benefits of doodling as an artistic try in educational performance. It is also to be said that in case of interference of doodling on the process of learning/recalling, it seems that by creating a relaxing condition, doodling can improve unconscious drawing by means of activating kinetic, auditory, and visual activities which result in improvement of psychological extroversion function, decreases day dreaming and increases concentration as well.

In another study, Aellig et.al. (2009) studied correlation between free doodling and the ability to learn contents from an educational video for a group of 34 undergraduate students. They found no significant relationship. In Chan (2012), 14 undergraduate students were randomly assigned to either 'doodling' or 'non-doodling' conditions. In the doodling group, participants were asked to draw flowers at the same time as they were viewing the slideshow. He found that the mean number of recalled images by the doodlers was significantly lower than that of the non-doodlers.

In last two studies since the task for learning/recalling is a visual one, doodling has no or a negative effect on performance, but either the task is auditory (Andrade) or a mix of both visual and auditory (current study), doodling is an effective factor in learning. That might be because of the fact that doodlers' visual processing resources are divided into two visual tasks (Chan). However, auditory tasks do not require many executive resources and they even may help to prevent mind wandering and day dreaming without decreasing attention on the main task (Andrade, 2010). Since this study is the first one in the field of education in Iran, and that there has been no similar research or administrative method available, considering strengths and weaknesses of previous studies as well as taking theory of doodling into account, applying doodling method has been in a way to provide a suitable base for unconscious extroversion. In this regard, selecting a suitable subject as Science in order to apply auditory and visual resources, free doodling, and having a base for unconscious doodling can be noted. In the end, students of this research were at the age of both puberty and change of school level which by themselves result in a failure in educational practices (Smallwood et al, 2007B).

A noticeable point related to doodling in all researches is that doodling can result in concentration by reducing day dreaming. (Andrade, 2010; Aellig et.al. 2009; Chan, 2012)

Day dreaming causes brain to focus on analyzing personal emotions and thoughts instead of processing the data gathered (Smallwood & Schooler, 2006). In this study, because participants were not aware of how doodlers and non-doodlers were grouped through the sessions of the test, they were prone to day dreaming.

Although a specific hypothesis is that doodling aids concentration by reducing daydreaming (Andrade, 2010), in this study the teaching task would have also encouraged day dreaming because according to the researches in the field of educational failure (Smallwood et al, 2007B; Kerry, 2005; Holmes et al, 2010) the level of attention by the students starts to decrease after 15-20 minutes passed the class time (Matheson, 2008).

On the other hand, for educational development to happen, coordination between the data gathered from the environment and internal representations is necessary (Smallwood, et al, 2007B). But day dreaming and the gradual decrease in concentration prevent this coordination from happening (Smallwood et

al, 2007B) .Alternatively, here, doodling has been studied as one of the proposed methods to establish this coordination. In some studies using laboratory procedures and retrospective methods it has been concluded that with increasing age, people have less frequently unbidden task-unrelated images, thought intrusions, or day dreams (Giambra, 1993; Lindquist & Maclean, 2011). With regards to this negative relationship between mental wandering and age (Smallwood & Schooler, 2006; Christoff, Ream & Gabriele, 2004) beside considering reported studies on critical effects of mental wandering on educational failure (Giambra, 1993), research about ways of preventing mental wandering in educational systems especially among youngsters is important. Unlike previous researches performed on participants of more than 18 years of age, we considered younger groups (12-13 year old students).

Nowadays, in various researches it is revealed that artistic activities can lead to academic achievement (Eisner, 1998). Since an important factor in educational performance is effective function of working memory (Gathercole & Alloway, 2008; Gathercole et al, 2008; Gathercole et al, 2006) and one of the properties of working memory is its relation to concentration (Susan et al, 2004), perhaps it can be concluded that artistic activities (such as doodling in this study) can drastically improve learning by improving working memory and concentration.

In some psychological approaches, like art therapy, art media, the creative process, and the resulting artwork are used to explore people's feelings, reconcile emotional conflicts, and foster self-awareness (Rubin, 2005). Nowadays to overcome many educational problems and to help dropouts, art has been considered for special educational needs (SEN) as a form of therapy (Warren, 2003).In this study it was tried to apply doodling in a way by which there can be artistic plan in line with improving academic performance, and in fact, it was defined as a method of art therapy for students.

Alfred Adler, a founder of the school of individual psychology, sees doodling as a manifestation of a rational craving for symmetry and order. He speaks of doodling as a manifestation of the essentially rational urge with an adaptational meaning: a manifestation of `the struggle for survival and the struggle to organize, into graspable form, the chaos of life. ` (Slobtseva, 2006, 22) In psychoanalytical approaches, pictorial images and drawings are considered as expressions of the unconscious emotional aspects of a person (Diem-Wille, 2012). From the Freudian perspective, since doodles often include abstract elements, it is worthwhile to see how automatic paintings can be interpreted (Slobtseva, 2006). In the present study, we did not consider what students had drawn but it was worthwhile to detect it for each student for deeper information about inside world of people.

On the whole, it is to be said that stressors and internal excitements can occupy people's mind, and consequently prevents concentration, so seemingly, doodling as a drawing ac-

tivity in the field of art can release excitement and increase levels of concentration. Doodling focuses the brain, and prevents that from day dreaming which leads to a decrease in concentration. A simple activity like doodling needs a low level of resources in the brain and is also helpful to prevent day dreaming without affecting concentration.

Due to prevalence of doodling, specifically in lower ages, this study and its positive findings as the first application of doodling in educational settings can be a good reason to pay more attention to this prevalent and unconscious behavior. Considering findings of this study, it is to be said that by witnessing increasing rate of doodling mostly in lower ages among students, applying doodling in the process of education can be seen as a great educational help and as a drawing process in the field of art can control occurrence of day dreaming and increase concentration which leads to a better performance of students in their studies.

Not surprisingly, free doodling was investigated here. That is an intense emphasis on the aspect of doodling being unconscious is put. However, future studies can suggest a pattern or sample for doodling. Also regarding the fact that to this date all the results of other studies are in a modal form, it is better for the future studies to find a method to record the activities of the brain to assess the impacts more precisely. Since only male students are chosen, generalizing of the results is limited. Future studies may be carried out for female students as well. Here doodling is asked for by providing blank sheets for students. Although the students are free to doodle or not to doodle, it is not in accordance to doodling definition which is an unconscious activity. Therefore, it is interesting to see the effects of doodling on learning by observation. That is no instruction and/or training is given and only by observation the educational perfor-

mance of those students who make drawing while listening in the class is monitored.

Samples of students doodles.

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