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The Impact of Implementing Computer Games and Motor Activity on Early EFL Vocabulary Achievement

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***Abstract*—Study aims to investigate the effect of implementing computer and motor activity games on early *EFL* vocabulary achievement and using it at the sentence level. To do so three intact groups were chosen. Then the game group learned English vocabulary through motor activity, computer group was taught by using two software *Jumpstart English* and *Baby Einstein,* and children in control group was taught through traditional methods. In the last session an oral achievement test (reliability= 0.87) was run and the results revealed that at the both levels (vocabulary retention and sentence level) children who learned through motor activity game performed significantly better on the achievement test than those who learned through other methods.**

***Index Terms*—game, language game, vocabulary learning, computer game, motor activity**

I. Introduction

Game provides communication, sharing and relaxing fields that play an important role in human education process (Binark, 2009, as cited in Soylu ç çek, 2011). Studies on the using games had shown that teaching a lesson in a game context attracts students and increases their enthusiasm to the lesson (Cornillie, 2012, Demirbilek, 2010).

Teaching through games develops into a new method during this decade. Followers of teaching through game concentrate their studies on teaching in the course of computer game or motor activity or language game. CALL programs have been found to be effective in many language learning studies. Through playing digital games, even the shy students participate in language learning (Aghlara& Hadidi Tamjid, 2011). The other method of teaching through game is motor activity game. Because children learn better through discovery and experimentation and being motivated to learn in a playful and relaxed context.

On the other hand, teaching children is different from adaults. They are energetic with little patience to stay in the class. Therefore, it is obligatory to find a proper technique for this group of learners.

Computer and motor activity games have their followers. However, it is not clear which one is more beneficial. Followers of each method just mentioned the benefits of their preferred method and less attention was paid to disadvantages of its process. Therefore, it is important to search for more details about these different methods and comparing them with each other to find which one is more beneficial.

It should be mentioned that Iran as a non-English speaking country needs method that helps students to acquire language in more convenient way. The educational context in Iran is mostly grammar translation method and new methods are used just in small size institutions. Therefore, the result of such research can help teacher to be more effective and helpful in the classroom.

II. Literature Review

A. Theoretical Foundation

1. Computer Assisted Language Learning (CALL)

Using technology in our daily life not only affects our life but also brings new methods in education. Instead of using chalks and boards, teachers employ computer applications to present lessons. In digital education, instead of going to school students can stay at home and learn by using software. "Micro computers used as word processors complement the audio facilities, enabling the interactive teaching of all four language skills reading, listening, speaking and writing" (Crystal, 1987, p.377).

Gorjian (2012) stated that use of technology in teaching languages has been increasing over the past decade and has great effects on language learning. The ability to present information in different formats is one of its importances, which uses graphics, sound, text, and video. (Cummins, 2008, as cited in Gorjian, 2012).

Computer assisted language learning (CALL) is made of various parts like computer games, video games, and learning software. Iacob (2009) put that using means like CD-ROM, DVD's or Web-based resources, English as a second language in classes changed to a more dynamic, and focusing class that offers new ways of learning.

Educational software is the other teaching materials, which increases students' inspiration to do activities. It is vital to prepare settings with multimedia to motivate a student to learn (Yürütücü, 2002, as cited in Ayvaci & Deveciog˘lua, 2010). They must provide the students with knowledge and practice.

2. Game in Education

When we were born, we can play with others or ourselves without any teaching. We made games, assigned rules to them, learnt from them, lived with them, played our wishes, and acted like a desired man, therefore playing is a feature of human nature and can be claimed that the history of playing goes back to a primitive society (Demirbilek, Ylmaz, & Tamer, 2010).

"Games are made of various categories such as 'role play' games, 'physical' games, 'sorting', 'ordering', or 'arranging puzzles', 'labeling' games, competitive and cooperative ones" (Griva, & et. al., 2010, p.3701). These categories can be used as a game-based learning environment. In this environment, game is explained to the students, and then teacher and students play it. Students learn the desired point even without special attention.

Kebritchi (2008, as cited in Donmus, 2010, p.1499) states the positive effects of game as a motivation and a different learning environment, increasing attention, and remembering concept longer.

B. Related Studies

1. The History of Game Language

Teaching through practical game is not limited to early ages. Different ages with different level of proficiency are subject of studies. The problem with game is the number of studies in this field. Technology brings attention to itself and scholars too, work on it. In other word, motor activity games are disregarded not only in our educational system but also in our daily life, where children instead of playing face to face, play with each other by internet.

Moon (2005) searched for teacher's beliefs in using play and it's role in literacy learning children from different language backgrounds and found that each teacher has a unique understanding of play in learning, which may be affect classroom activities. Besides, Liu and Chu (2010) investigated the effect of game in learning. They worked on how ubiquitous games influenced English learning achievement and motivation and as a result stating that using ubiquitous games in English learning lead to a better learning results and motivation than using traditional method.

Using language game in teaching vocabulary has some disagreements. For instance, Gale (2011) in a study revealed while serious games improve learning, it does so at a lower rate than other instructional techniques.

Among different studies about applying language game at the classroom, some scholars focused on the attitudes of instructors about using game. Muhammet Demirbilek and et al (2010) introduced four categories that present the standpoints of foreign language teachers: "current situation", "usage", "game features" and "efficacy to lesson" respectively. Then, they showed the usage, and the usage depends on the game features and current situation.

2. The History of CALL

Is there any difference between constructing and playing an educational game on student motivation and deep learning strategy use? Vos, Meijden, & Denessen (2011) design a study in this area and found that there was a significant difference between intrinsic motivation and strategy use. Students were less motivated during the game play than during their regular school lessons" (p.135).

Paraskeva, Mysirlaki, & Papagianni (2010) examined whether online games were engaging for learners. They found that adults spend more time on playing digital games to identify with games' characters.

"As educational games had to negotiate the intriguing conundrum of being interesting enough to engage students, without being addictive and thus detrimental to academic performance" (p.504), Paraskeva et al. suggested that "this could be achieved by integrating elements that limit play sessions and oblige players to actively engage in an external educational task before continuing play, ideally in collaboration with other players" (P. 504). Moreover, this study could not clearly defined the relationship between game use and self-esteem.

Using web-based application is one branch of teaching through computer. Sahin and Ozdemir (2012) worked on it to support children's learning process. Researchers at the end of this study wrote, "for a better pedagogy of kids, educational computer games, visual multiple choices and matching tests are ideal to support children's learning process" (p. 2047).

Graphical design is the other part of teaching through computer games that in a study Soylu ç çek (2011) worked on it and stated that "proper and interesting designs for the target audience, fascinating game design, guidelines being encouraging according to the age group helped the message that was wanted to given to the kids to be effectively understood" (p.645).

As it was mentioned, teaching children regarding computer assisted has different field. In a study Ayvaci and Deveciolu (2010) worked on the contrast concepts of pre-school children that were taught into two groups (computer and traditional). They believed that students in pre-school age needed to develop their motor skill so computers were helped them. It means that they needed both methods not just one of them.

III. Research Questions

1. Does using activity game have any significant effect on vocabulary retention and vocabulary learning at the sentence level of elementary EFL learners?

2. Does using computer game have any significant effect on vocabulary retention and vocabulary learning at the sentence level of elementary EFL learners?

3. Is there any significant difference between the vocabulary retention and vocabulary learning at the sentence level of the group using motor activity game in classroom and the group applying computer game?

IV. Methodology

A. Participants

1. students

Sokhan institute as the only English institute for children in Ahwaz, Iran is selected as a place of study. At the time of search, 36 children (4 to 6 years old) were enrolled. Four students who know some English vocabularies were removed from study. To have three groups with same number of participants, two other students randomly removed. In each group five girls and five boys who knows only Persian as their first and mother language, participated in study.

Teachers

Each group had an experienced teacher (teaching English to 3-7 years children for almost two years). Computer group's teacher works with computer software and had experience of teaching at different levels. Therefore, she was chosen to teach computer group.

The teacher of game group was not an English teacher. Because of her interest in teaching English to children, she learned it herself, and devoted all her times to teaching English. She has an intuition in teaching children and believes in game like classes. Control group's teacher trusts in books and does not deal with supplementary tools in teaching.

Settings

2. Computer setting

The experiment was conducted at the computer laboratory located at Sokhan institutions.

Every two participants used one system for this study and all of children had one headphone for themselves. There was a central system that teachers used and guided children. All of computers were located on the rectangular table and children could see each other. There was not any picture on the wall and no window in the class. There was only a big whiteboard behind teacher's system. In this group, parents did not have access to the class and at the end the teacher informed them about what happened in the class.

3. Game setting

The game classroom was made of child-size furniture, books, and chairs. Many colorful pictures (like children's painting, vocabularies' pictures, and some children's handicrafts) were installed on the wall. There was a big whiteboard on the wall and a central system in the class that was used for songs and sounds. Teacher had a small table to put needed objects on it. All of class's time, she stood. Above her table, there was a small television set and a video. A window was in the class with a pink curtain. The window was opened during the class and parents observed what happened in the class and when children did not pay attention to their teacher, teacher pulled across to cover window. Of course, when teacher used curtain parents could hear the class and done the same as the teacher at home.

4. Control setting

Control class is small with two big windows that pink curtains covered them and parents were not allowed to observe teacher instruction. Between two windows, there was a bookcase full of institution files and children were not allowed to use them. There was a big whiteboard and teacher's table. Children had children-size chairs.

B. Materials

1. My First English Adventure' book

This package consists of pupil's book, activity books, picture cards, stickers, and audio CDs. The pupil's book consists of six lessons and each lesson has four main words.

2. "Jumpstart English" and "Baby Einstein"

1) *Jumpstart English:* Through fun activities and songs, Jumpstart Phonics Read & Rhyme encourages children to master each new word and sound as they progress through engaging activities. It is consisted of eight CDs: alphabet, reading adventure, geometry, numbers, time, and my magic playground. (Ebrahimi & Zamanian, 2013, p.155)

2) *Baby Einstein:* "Its focus is to create high quality, innovative products that bring the arts and humanities to babies in a way that is fun and appropriate to their age. The philosophy of this company is to engage babies and make discovery." (Baby Einstein's website, as cited in Ebrahimi & Zamanian, 2013, p. 155)

To have the same content for teaching some parts of each of these programs were used.

3. Achievement Test

It was an oral test, which was made of twenty items. Children answered questions one by one. Test was based on covering content in class, therefore it has content validity and two experts approved it. To have a reliable test, test retest is used with the same condition of study (number of students and consider their gender) and its reliability was 0.876.

C. Data Collection

1. Treatments

The classes were held for sixteen sessions, three days a week, and an hour each section.

1) Group One (Using Game): the class was held on Saturdays, Mondays, and Wednesdays from 17 to 18 o'clock. Teacher used *My First English Adventure* book, songs, and plays. She utilized different games: role-play, play in yard, handicraft, pantomime, painting, and singing song. Teacher used appliances like crayons, painting colors, pictures, gum, scissors, colorful papers, mp3 systems, whiteboard, picture cards, stickers, and voice CDs.

Each section was begun by a song in *Hello*. Then teacher reviewed what she taught in previous session by picture cards. At the second part of the class time, she taught new lesson and in teaching, students were allowed to express their ideas and changed their seat in the class. Teacher listened to them and answered their questions. Then they had snack time. At the end, class's time was devoted to review new lesson.

2) Group Two (Computer Group): this group's class was held on Saturdays, Mondays, and Wednesdays from 18 to 19 o'clock. This group worked with computers. Each pair of the children used one system and each student had one headphone. They sat around a rectangular table and saw each other. Teacher ran the program and they worked with it. They hear song, and played games like matching. At first part of class, teacher ran program to review. At this level students' name were written on the board. When they answered right, teacher drew a flower in front of their name. At the end of that program, teacher gave sticker to the best students.

At the second part, it was teacher who made decision about the best program because most of vocabularies were covered in both programs and the teacher used one of them for teaching part and the other for reviewing. Before second part of the class, the teacher gave explanation to the children about what they were faced. In this class, there was not any difference between types of words. Computer programs covered all vocabularies. Children were allowed to use computer program at home.

3) Group Three (Control Group): control's class was held in Sundays, Tuesdays, and Thursdays on 18 to 19 o'clock. Teacher use the same book of game group. Class consisted of two parts: the first part referred to review prior lesson (teacher showed picture cards to children and asked questions in Persian, they repeat it in English several times), and at the second part teacher explained new expression first in Persian then in English. Control class was not equipped with voice systems, so teacher sang song by heart.

2. Posttest

This study included one posttest (see Appendix A). Before using the test, it was piloted with another group and its reliability was acceptable and two experts confirmed its validity. After sixteen sessions, children in three groups took part in the post-test. The test was oral and the students one by one answered teacher's questions.

V. Results

A pilot study was conducted before gathering data in the same institution and with the same number of children. The aim was to evaluate the consistency of the post test. The test was administered twice with two weeks intervals. For this purpose, test-retest was employed.

TABLE 5.1.
RESULT OF CORRELATION COEFFICIENT OF PILOT STUDY

		pilot	pilot2
pilot	Pearson Correlation	1	.876**
	N	10	10
pilot2	Pearson Correlation	.876**	1
	N	10	10

As it is obvious, the test is reliable (r = .876). About the validity of test, it should be mentioned that the test is based on content of materials that is covered in the classrooms. Two experts scrutinized the test and confirmed its validity. When the reliability and validity of the test were confirmed, it was used as post-test and the results are as follows.

Addressing the First questions

TABLE 5.2.
DESCRIPTIVE STATISTICS OF THE POST-TEST FOR ACTIVITY GAME AND TRADITIONAL GROUPS

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
game	10	9.2000	.29059	.91894
control	10	7.2000	.55377	1.75119
Valid N (listwise)	10			

As table 5.2 shows activity game has a greater mean than the control group. Therefore, an independent sample *t*-test was run. The results were displayed in table 5.3.

TABLE 5.3
INDEPENDENT SAMPLES T-TEST OF THE POST-TEST FOR TWO GROUPS (ACTIVITY AND CONTROL)

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Group	Equal variances assumed	4.571	.046	3.198	18	.005	2.00000
	Equal variances not assumed			3.198	13.607	.007	2.00000

Based on the table 5.3 the amount of sig. is .005, which is significant. In other words, there is significant difference between the two groups. In the other words, there was significant difference between control and game group in the knowledge of vocabularies.

Table 5.4 displays the descriptive statistics of the post-test for control and activity groups at sentence level.

TABLE 5.4.
DESCRIPTIVE STATISTICS OF THE POST-TEST FOR CONTROL AND ACTIVITY GROUPS AT SENTENCE LEVEL

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
game	10	9.7000	.21344	.67495
control	10	7.4000	.45216	1.42984
Valid N (listwise)	10			

As table 5.4 shows, activity game group has a greater mean than the control group. So, an independent sample *t*-test was run. The results are displayed in table 5.5.

TABLE 5.5.
INDEPENDENT SAMPLE T-TEST OF THE POST-TEST FOR TWO GROUPS (ACTIVITY AND CONTROL) AT SENTENCE LEVEL

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
group	Equal variances assumed	3.797	.067	4.600	18	.000	2.30000
	Equal variances not assumed			4.600	12.821	.001	2.30000

Based on table 5.5 the amount of *t* is 4.60, which is significant at the probability level of .000. so we can concluded that, there is significant difference between the two groups.

Addressing the second question

Table 5.6 displays the descriptive statistics of post-test scores between control and computer game group.

TABLE 5.6.
DESCRIPTIVE STATISTICS OF POST-TEST SCORES FOR THE CONTROL GROUP AND COMPUTER GAME GROUP

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
computer	10	8.6000	.37118	1.17379
control	10	7.2000	.55377	1.75119
Valid N (listwise)	10			

As table 5.6 shows, computer game group has greater mean than the control group. In order to see if the difference is statistically significant or not, an independent sample *t*-test was run. The results are displayed in table 5.7.

TABLE 5.7.
INDEPENDENT SAMPLE T-TEST OF POST-TEST SCORES FOR THE CONTROL GROUP AND COMPUTER GAME GROUP

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
group	Equal variances assumed	1.881	.187	2.100	18	.050	1.40000
	Equal variances not assumed			2.100	15.729	.052	1.40000

As table 5.7 shown, *t* is 2.100, which is not significant at the probability level of .50. Therefore, there is no significant difference between the two groups.

Table 5.8 displays the descriptive analysis of treatment for control and computer group.

TABLE 5.8.
DESCRIPTIVE STATISTICS OF TREATMENT FOR THE CONTROL GROUP AND COMPUTER GROUP AT SENTENCE LEVEL

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
computer	10	8.3000	.36667	1.15950
control	10	7.4000	.45216	1.42984
Valid N	10			

As table 5.8 shows, computer game group has greater mean than the control group. In order to see if the difference is statistically significant or not, an independent sample *t*-test was run. The results are displayed in table 5.9.

TABLE 5.9.
INDEPENDENT SAMPLE T-TEST OF POST-TEST SCORES FOR THE CONTROL GROUP AND COMPUTER GAME GROUP AT SENTENCE LEVEL

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
group	Equal variances assumed	.135	.718	1.546	18	.140	.90000
	Equal variances not assumed			1.546	17.263	.140	.90000

Based on table 5.9, the amount of *t* is 1.54, which is not significant at the probability level of .140. So, there is no significant difference between the two groups.

Addressing the third question

Table 5.10 represents descriptive data of two experimental groups based on post-test result.

TABLE 5.10.
DESCRIPTIVE DATA OF TWO GROUPS BASED ON POST-TEST RESULT

type	N	Mean	Std. Deviation
game	10	9.2000	.91894
computer	10	8.6000	1.17379

According to table 5.10, there was a difference between the means. Therefore, independent sample *t*-test was run to determine whether the difference between mean scores were statistically significant. Table 5.11 shows the result of independent-samples t-test of two groups.

TABLE 5.11.
INDEPENDENT SAMPLE T-TEST OF POST-TEST SCORES FOR THE ACTIVITY GAME GROUP AND COMPUTER GAME GROUP

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference
group	Equal variances assumed	1 .000	.331	1.273	18	.219	.60000
	Equal variances not assumed			1.273	17.020	.220	.60000

The result of independent sample *t*-test shows that significant value (.219) is more than .05. In other words, this study found that there is no significant difference between two groups in using vocabulary and two methods have same effect on teaching vocabulary to children.

The last hypothesis refers to analysis of data of vocabularies employed into the sentences. The descriptive analysis of the collected data of the first part of achievement test (using vocabularies in sentences) is conveyed in table 5. 12.

TABLE 5. 12.
DESCRIPTIVE ANALYSIS OF USING VOCABULARIES IN SENTENCES

type	N	Mean	Std. Deviation
game	10	9.7000	.67495
computer	10	7.2000	1.81353

As it is seen in Table 5.12, there is difference between two means; so independent sample *t*- test is used to determine whether the differences between mean scores are statistically considerable. The outcome of independent sample *t*- test is brought into table 5.13.

TABLE 5.13.
THE OUTCOME OF INDEPENDENT SAMPLE T-TEST AT SENTENCE LEVEL

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
group	Equal variances assumed	19.478	.000	4.086	18	.001	2.50000
	Equal variances not assumed			4.086	11.446	.002	2.50000

Based on table 5.13, the amount of *t* is 4.086, which is significant at the probability level of .001. In other words, there is a significant difference between the two groups.

VI. DISCUSSIONS

This study found that utilizing game language has a positive effect on children's learning. The result is in line with other researches like Turgut and Irgin (2009) which showed efficiency of activity games on the young learners' language learning and in another research by Connolly, Stansfield, and Hainey (2011, as cited in Ebrahimi &Zamanian,

2014) found that game-based language learning has made progressively significant contributions in helping to promote enhanced learning experiences within education.

Game language method helps students to employ vocabulary at sentence level. They used words at sentence level when they sang song, role-played, and even played at yard before and after the class. Their Parents reported that their child spoke in English with their dolls or taught them English vocabularies. It shows that they learned role-play at class and used it outside of the class.

The second question refers to if there was any difference between computer and control group. Based on table 5.9 and table 5.7, there was no difference between computer and control group in vocabulary learning and applying them in sentences. Therefore, "computer method was not more influential than traditional method of teaching words to children" (Ebrahimi & Zamanian, 2013, p.159).

The result is in line with Penna and Stara (2007) as they found "educational software and environments did not help students to learn more and better than in traditional training contexts" (p. 127).

As it was mentioned before, the main objectives of the study is to compare two experimental groups. The same as first question, there is not any significant difference between applying methods to help students to learn new vocabularies individually.

The results regards to last question confirms that computer programs cannot help children to use vocabularies in the correct form as a unified sentence. This result is in contrast with Berns, Gonzalez-Pardo, and Camacho (2013), Guillén-Nieto and Aleson-Carbonell (2012), Soylu çek (2011), Ayvaci and Deveciolu (2010), and Evreinova, Grigori Evreinov, and Raisamo (2008). All of these researchers arrived at the effectiveness of computer programs on the learning English but they just compared computer program with traditional method. The reason behind the difference between two groups at the sentence level and no significant difference at the level of individual words can be this point that children process (both comprehension and production) vocabularies better within the co-text.

VII. Conclusion

When conducting the study, a couple of the variables in the study were controlled. Gender was one of them; the number of boys and girls in each group were equal except the control group that included three boys and seven girls. This must be taken into account before any generalization can be made.

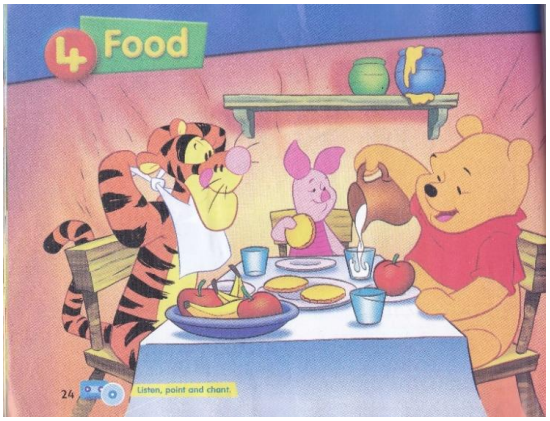
The first analysis conducted attempted to validate some of the ideas and suggestions of researchers such as Aghlara (2011), Gee (2007), Prensky (2005, 2006), and Squire (2004). The findings of those researches suggested that game (computer game or activity game) could be used as an effective instructional tool. The result of this study showed that although activity games significantly increased the participants test scores, it did not fare as well when compared to the increases found with the other instructional technique (computer game) at vocabulary level.

VIII. Limitations of Study

One important limitation of this project was the small sample. The other limitation of the study was related to the institution's environment. Sokhan institution is placed between two large apartments. Whenever students playing at yard, neighborhoods objected and students became silent or played at classroom. This situation made some changes in the game's rules and students became frustrated.

Appendix A. Post-test

This is an oral test:
e.g. student's name: Zahra
Teacher: hello
Zahra: hi
Teacher: what's your name?
Zahra: I' Zahra/ my name is Zahra
Teacher: Zahra, how are you?
Zahra: I'm fine
Teacher: Zahra, look at this picture:
A: how many apples do you see in the picture? Zahra: three apples



B: (teacher point to the picture and ask) is there any fruit on the table or not? Zahra: yes
B2: so what kind of fruit it is? Zahra: banana
C: what color is it? Zahra: it is yellow
D: what is in the pig's hand? Zahra: it is a biscuit.

Teacher: Ok, please do whatever I say to you: (she sing a song): jump, jump, jump with me, jump up and down/ turn, turn, turn, turn around, turn with me

Teacher: now do this: touch your head, touch your arms, and touch your legs

Teacher: Zahra, look at this: what is this? (Just name it)

Teacher: A house has …… . Zahra: bedroom, bathroom, living room

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