Learning Style Preferences Of Project-Based Learners – A Kaleidoscopic View

*a. S.N.S.Gandhimathi and *b. Dr. V. Anitha Devi

*a *Assistant Professor, VIT University, Vellore.*
gandhimathi.sns@vit.ac.in (+91 9487486912)

*b. *Associate Professor, VIT University, Vellore.*

Abstract

Learners learn in different ways and respond differently to educational stimuli according to multiple intelligences or sensitivities. The study aimed at investigating the pattern of language learners' learning style preferences and its possible relationship with gender, discipline and self-rated English proficiency level. The respondents were 270 undergraduate students of VIT University, Vellore. Among the different modes of learning, like Project-Based Learning (PBL), Research-Based Learning (RBL) and Class-Based Learning (CBL), the respondents of this study were under Project-Based Learning (PBL) mode. They completed an online questionnaire through which data were collected on their learning style preferences. The results show the respondents' favor and disfavor of learning styles, depending on the background variables. The findings show that learners prefer group learning to perform their projects. The implications presented for the teachers may be useful to implement PBL in the ESL classroom.

Key words: Learning styles or Learning preferences; Project- Based learning; Research- Based Learning; Class-Based Learning

Introduction

Human beings are gifted to learn under almost any style, no matter what their preference is. But it is essential for a teacher to find out how a learner responds to the various learning environment to help the learners in the process of learning. Learning styles is described as "cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to learning environment" (Keefe, 1979).

For the past two decades, there has been constant effort to understand the

learning styles of various learners. There is a common belief that such a focus aids the students who become more successful learners and helps the teachers to implement learner-centered philosophy (Nunan, 1988, 1996 a, b). Students, who are aware of learning – how – to learn, will make use of the learning opportunities both inside and outside the classroom. A student learns more effectively when the teacher presents the concept in a way that suits the learners' preferred method of acquiring the concept (Montgomery, 1995). According to the input, the learning style of a student varies, but he or she may have a predominant learning style, which should be identified by the teacher. So that learning takes place without making any conscious effort.

Background

The research was conducted with 274 undergraduate students, who were all ESL learners and their mode of learning was Project-Based Learning (PBL).The study aimed at investigating the pattern of project based learners' learning style preferences and its possible relationship with gender, discipline and self-rated English proficiency level. Sometimes teachers have problem scaffolding students' activities, sometimes giving them, too much liberty or too little modeling and feedback. So it is essential for the teacher to know their learning styles prior to introducing Project-Based Learning activities. PBL activities have a variety of constructive benefits to students including attitude towards problem-solving capabilities, self esteem and self-directed learning. "Learners are different and learn in different ways. They have different attitudes, opportunities and preferences and learn in a unique way. In a sense, each learner is an island, and each learner interprets a particular classroom even in a slightly different way" (Nunan, 1996). Finding the learning styles will help the teachers to cater to the needs of the learners. The project is a main example of experiential learning. It integrates language knowledge and language skills, in a natural way. If the learners preferred learning style is Visual, the teacher can help students learn technical skills and computer programs to help them visualize and construct ideas prior to PBL activities. "The master-apprentice relationship is used as an analogy for the teaching-learning situation…like masters, teachers should scaffold instruction by breaking down tasks; use modeling, prompting, and coaching to teach strategies for thinking and problem solving; and gradually release responsibility to the learner" (Blumenfeld et al., 1991).

Projects allow learners with different levels of competence to co-operate on an equal basis in the completion of the tasks. This goes some way to solving the problems of mixed-ability classes. In Project-Based Learning the teachers use array of methods with little use of textbooks or test and they allow students to work on their own and exercise, a great deal of choice (Stephanie Bell, 2010). The main endeavor of the teacher is to develop learners' Project-Based Learning skills and integrate curricular content with these skills.

PBL is highly advantageous for the students. It enables them to relate what they know from their own lives to a concrete problem worked through in the target language. It also encourages, even demand the learners to take a greater responsibility for their own learning than is often the case with more conventional materials. As

such, they are in line with current thinking on 'learner independence' (Alan Maley, 2010).

In PBL, the project is the central teaching strategy; students encounter and learn the central concepts of the discipline through the project. It engrosses the students in complex tasks, based on real life challenges or problems that involve students in design, problem-solving, decision making, or investigative activities; gives students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999).

Literature Review

Material for the review was explored from the databases like Elsevier, Eric, Sociological Abstracts, PSYC INFO, EBSCO Host and Medline.Though many thinkers have been doing research on learning styles for years, the American psychologist, Witkin (1962), was the pioneer of the concept of field-dependency and field-independency. Since then, many scholars came out with different style dimensions. But Ehrman and Oxford (1990) discussed 9 major style dimensions appropriate to L2 acquisition. Among these, *perceptual (sensory or physiological)* preferences consist of *visual, auditory, kinesthetic and tactile dimensions* are closely related to the learning environment. Visual learners rely on their sight to gather information. They categorize knowledge in terms of spatial interrelationships among ideas and accumulate it graphically (Nilson, 2003).

Learners who prefer auditory style learn through listening to lectures. They learn well when they are able to hear themselves express ideas (Nilson, 2003). Tactile and kinesthetic styles may seem to be same but there is a subtle difference between them. While Kinesthetic deals with the movement of the whole physique, tactile deals with touching and using the objects. For example, tactile learners like to do projects, experiments etc., But kinesthetic learners like to involve in classroom experiences such as role – play and group discussion. Learners, who prefer working in a group, learn from their peers. Their performance increase when they share their ideas. Individual learners dislike working in groups. They may not be able to collaborate with their peers. They achieve better if they do not mingle with others.

Reid (1987) was the one who initiated measuring perceptual learning style preferences in second language. She made a study between native English speakers and L2 learners. Her samples represented 98 countries. The results showed that L2 learners strongly preferred kinesthetic and tactile learning styles and there was no preference for group learning. The study also revealed that males preferred visual and tactile learning more, when compared to females.

Heyland (1993) investigated the learning style preferences of 440 Japanese students representing eight universities. The result was similar to Reid's (1987) finding that students preferred kinesthetic and tactile learning styles. But when it comes to gender, women preferred tactile modality.

Isemonger and Sheppard (2003) explored the learning style preferences of 710 EFL students at a South Korean University. The result confirmed Reid's observation.

Like ESL students, EFL students also showed strong preference for kinesthetic learning style but instead of group learning, they disfavored individual learning style. The findings revealed that there were no prominent differences in learning style preferences with reference to age and their programme.

Manfred Man-fat Wu (2010) made a study in Hong Kong institute of Vocational Education, with 200 students who belonged to first year diploma courses. He reported that auditory, kinesthetic and group preferences are the most desired styles among the participants

L.C.Wong and David Nunan (2011) investigated the learning style preferences of effective and ineffective language learners among 110 undergraduate University students in Hong Kong. The results showed that the dominant style of the more effective language learners was communicative. On the other hand, the dominant style of the less effective language learners was authority-oriented.

And more recently Farid Naserieh and Mohammed Reza Anani Sarab (2013) explored the learning style preferences among 138 Iranian graduate students. The results indicated that they favored kinesthetic learning and disfavored group learning.

The review on Project-Based learning shows that PBL was experimented with other courses like mathematics also. For instance, some researchers made a study on Project- Based learners' academic achievement in mathematics.

Barron et al. (1998) made a research on Project-Based intervention on the sixth graders. The result exposed that the scores of the students on the Standard Geometry test stepped up by approximately 10% points.

Gallagher et al. (1992), faculty of the Illinois Mathematics and Science Academy and the Chicago Academy of Science collaborated and examined the effect of a high-school version of the problem-based learning model on students' academic achievement and problem solving skills. 78 students were involved in the study. The results showed that there was a significant increase in the scores between the pretest and posttest.

Boaler (1997) reports a longitudinal study of mathematics instruction conducted in two British secondary schools. One of the schools (referred as "traditional") adopted a more teacher-directed, didactic format for instruction. Mathematics was taught using whole class instruction, textbooks, tracking, and the frequent use of tests. At the second school (referred as "project-based"), students worked on open ended projects and in heterogeneous groups. Teachers taught using a variety of methods and allowed students to work on their own and to exercise a great deal of choice in doing their mathematics lessons. Boaler observed approximately 90 one-hour lessons in each school. 300 students were involved for the experiment. Most of the students in the traditional school reported that they found (the) work boring and tedious. They opined that mathematics was a rule-bound subject and they can succeed only if they remember and use rules. In contrast, students at the project-based school regarded mathematics as a dynamic, flexible subject that involved exploration and thought.

Shepherd (1998) reports that problem-based learning can have a positive effect on students' acquisition of critical thinking skills. Shepherd (1998) made a 70-day project in which students work on defining and making solutions for a problem

related to an apparent housing shortage in six countries. Though the number of students took part in the project was quite small (20 students in the experimental group and 15 in a control group), Shepherd noticed a significant raise on the part of the experimental group, as compared to the control students, on a test of critical thinking skills.

Helle, L., Tynjälä, P., & Olkinuora, E. (2006) analysed 22 research articles and found that PBL can endow the student with a real and holistic experience, aiding self-directed deep-level learning.

Bell, S. (2010) reveals in his research that PBL nurtures social learning as learners practice and become competent with the twenty-first-century skills of communication, negotiation, and collaboration.

However, only a few researchers explored the learning style preferences of project-based learners.

Aim of the study and Research Questions

Investigating students' learning style preferences and their relationship with background variable such as age, gender and discipline will help a language teacher in enhancing the learning skills of the students. Dunn (1990) suggests that learners who are informed about their learning style preferences and who have been exposed to learning strategies that are compatible with their preferred learning style perform better.

"When learners take on a self-directed learning project, they gain more than new skills or knowledge. They may also develop motivation, independence, discipline, and confidence" (Abdullah, 2001).

The present study, as such, aimed at exploring the pattern of undergraduate learners' perceptual learning style preferences and its relationship with the background variables. Based on the aim of the study the following research questions were formulated.

1. What is the pattern of learning style preferences between Engineering students and Arts &Science students who have chosen project based learning?
2. What are the effects of the project-based learners' gender, discipline, and self-rated English proficiency level on their learning style preferences?

Methodology

The study was quite descriptive. The respondents were 270 undergraduate students at VIT University, Vellore, India. The subjects were from various technical programmes (Electrical and Electronics Engineering, Electronics and Communication Engineering, Information Technology, Mechanical Engineering, Biotechnology, Biomedical Engineering, Production and Industrial Engineering, Electronics and Instrumentation Engineering, and, Computer Science and Engineering) as well as Social Sciences (Bachelor of Computer Applications, B.Sc Multimedia and Animation, Bachelor of Business Administration, and Bachelor of Commerce). The students rated their own English Proficiency Level.

Table1 Reliability Statistics (N=274)

Cronbach's Alpha	No.of Items
.782	30

Respondents

The respondents were 274 undergraduate students in VIT University, Vellore, India. Since the university follows Fully Flexible Credit System (FFCS)*, there was no necessity for random sampling to select the respondents. In the technical discipline, the respondents were from various branches like Electrical and Electronics Engineering, Electronics and Communication Engineering, Civil Engineering, Mechanical Engineering, Production and Industrial Engineering, Computer Science and Engineering, Biomedical Engineering, Biotechnology, Electronics and Instrumentation Engineering, and Information Technology. In the Arts & Science discipline, the respondents were from branches like Bachelor of Commerce, Bachelor of Computer Science, Bachelor of Computer Application, Bachelor of Science(Multimedia and Animation). The respondents were also asked to rate their English proficiency level as they perceived it.

Table 1 shows the reliability statistics of the data. The alpha coefficient for the thirty items is .782 suggesting that the items have relatively high internal consistency (see Table 1). Table 2 shows the respondents' distribution based on the background variables in the study. In terms of gender, there are 198 male respondents and 76 female respondents, when it comes to discipline there are 147 technical learners and 127 learners are from social sciences and in the self-rated proficiency test Level 1 has been chosen by 53 students, Level 2 has been chosen by 32 students, Level 3, has been chosen by 91 students, Level 4 has been chosen by 52 students and Level 5 has been chosen by 46 students. Thus the research design for this study was descriptive. Learners' preferred learning styles were measured using PLSPQ which was developed by Reid. It has 30 randomly ordered statements, each five for six learning styles : Visual, Auditory, Kinesthetic, Tactile, Individual and Group. The questionnaire is based on a five-point Likert scale, ranging from 1 (strongly disagree), 2 (disagree), 3 (unsure), 4 (agree) and 5 (strongly agree).

Table 2 Gender, discipline and self-rated proficiency level of respondents

Gender	No.of respondents	% to total
Male	198	72.3
Female	76	27.7
Total	274	100.0
Discipline	No.of respondents	% to total
Technical	147	53.6
Social sciences	127	46.4
Total	274	100.0

Self-rated Proficiency Level	No.of respondents	% to total
Level 1	53	19.3
Level 2	32	11.7
Level 3	91	33.2
Level 4	52	19.0
Level 5	46	16.8
Total	274	100.0

Instrument
The data collection instrument was done through online survey using Reid's PLSPQ measure, which is widely used in the ESL/EFL field. The first part of the survey included the following information:
Name(optional)
Gender
Discipline to which the student belongs
Self-rating of language proficiency on a five-point scale starting from level 1 to level 5

The second part of the survey had a thirty-item questionnaire adapted from Reid surveys are very useful for collecting data from the respondents. One of the main benefits of conducting the survey online was that the software could analyze and categorize the data as the respondents completed the survey. Pedagogically, it also proved useful for the learners, who got immediate feedback on their learning styles.

The questionnaire consists of 30 statements for different learning styles, such as, *Visual, Auditory, Kinesthetic, Tactile, Individual and Group.* Five-point Likert scale, ranging from 1 (Strongly disagree) to 5 (strongly agree) is used. Since the respondents were project-based learners, some statements were rephrased to make it appropriate for their learning environment. In item 5, "In class, I learn best when I work with others" the phrase "in class", is not relevant for them. Their mode of learning is research- based and they do not depend on classroom activities alone so the statement was rephrased to I am productive, when I work with others. Similarly, in item7, the phrase "in class" is removed. In item 8, "the statement when I do things in class" was rephrased to when I do projects I learn better". In item 14, "I learn more when I make something for a class project " was rephrased to " Doing project increases my creativity". In item 20, I learn better in class when I listen to someone." The phrase "someone" was rephrased to "my teacher or my peers". In item, 26 the phrase "in class" is removed. In item 27, " In class, I work better ….." the phrase "In class" was removed. In item 29, " I learn more ….."was rephrased to " I learn more from internet sources than by listening to lectures".

Various authors studied the learning style preferences of various learners. When the values are compared, it is clear that Cronbach's Alpha value for the visual subscale did not even reach .60 (see Table 3) but the other five constructs of auditory, kinesthetic, tactile, individual and group learning mostly generated consistent data. In other words, though the visual constructs on the PLSPQ might not be reliable, the

other five constructs (auditory, kinesthetic, tactile, individual and group) were explicitly supported. To check whether the data fit with proposed models, the researchers also rearranged the questionnaire items according to the subscales produced by Wintergesrst et al.(2001). So the current study and other studies on learning styles using PLSPQ should interpret the results obtained from the visual subscale with caution.

Table 3 Comparison of the Cronbach's alpha values for the PLSPQ in different studies

Study	N	Style Preference					
		Visual	Auditory	Kinaesthetic	Tactile	Individual	Group
Itzen -1995	126	0.54	0.56	0.63	0.72	0.80	0.87
Yamashita -1995	582	0.51	0.48	0.68	0.72	0.81	0.82
Liversidge -1996	237	0.36	0.35	0.75	0.67	0.75	0.80
Wintergerst et al. -2001	100	0.37	0.39	0.69	0.59	0.75	0.87
Isemonger and Sheppard -2007	691	0.37	0.39	0.76	0.67	0.84	0.83
Naserieh -2013	138	0.50	0.59	0.64	0.69	0.82	0.79
Current Study	274	0.36	0.65	0.72	0.58	0.66	0.60
Note.Adapted from Isemonger and Sheppard(2007).							

Results and Discussions:

In order to know the respondents' strong preferences, the mean scores are compared. Since all constructs (visual, auditory, kinesthetic, tactile, individual and group) fell into the major category, it is clear that Project-Based learners are competent to do their project in any learning environment. But within the categories the mean score of group learning (M = 19.53) is relatively high. This proves they show accountability when they collaborate with others and they are amazingly resourceful when time is of the essence. The learners are highly motivated in group learning and they never let their peers down (Stephanie Bell, 2010). But students' individual (M = 15.94) learning style preference is comparatively low. In other words, they do not gain anything in the individual activities.

Table 4 Descriptive statistics of learning style preferences (N=274)

Items	Minimum	Maximum	Mean	Std. Deviation	Type
Visual	9	25	18.11	2.715	Major
Tactile	8	25	18.56	3.352	Major
Auditory	7	25	18.64	3.297	Major
Group	9	25	19.53	3.092	Major
Kinaesthetic	7	25	18.76	3.641	Major
Individual	5	25	15.94	3.914	Major
Note. 11.49 Or less =Negligible; 11.5 to 13.49 =Minor; 13.5 and above =Major.					

Table 5 **Bonferroni post hoc test for differences in learning style preferences.**

Source	Difference	p- value	Difference	p- value
Visual (V)	G > V	.00**	V >I	.00**
Auditory (A)	G > A	.05*	A >I	.00**
Kinaesthetic (K)	G > K	.00**	K >I	.00**
Tactile (T)	G > T	.00**	T >I	.00**
Individual (I)	G > I			.00**
Group (G)				
(*p < .05.) (**p <.01.)				

Moreover, Bonferroni post hoc test also revealed that the participants' notably preferred group learning style to individual, visual, auditory, kinesthetic and tactile (see Table: 5). They show the least preference for individual learning style. It means that they feel difficult to do the projects individually. As we know all of the projects are interdisciplinary and they need to consult or discuss with students of other disciplines. They like to interact with teachers and students of other disciplines also. The finding is however dissimilar to studies that found Isemonger and Sheppard (2003), Reid (1987), Rossi-Le (1989), Stebbins (1995), and Wintergerst and DeCapua (1998, 2001).

Learning styles and background variables

Gender

Table 6 **Independent samples t tests for learning style preferences for Gender differences (N= 274).**

Items	Male(N=198)		Female (N=76)		Mean Difference	95% Confidence Interval of the Difference		p-value		
	Mean	Std. Deviation	Mean	Std. Deviation		Lower	Upper		Male CV	Female CV
Visual	17.88	2.765	18.68	2.504	-.800	-1.488	-.113	.023*	0.154642	0.134047
Tactile	18.10	3.449	19.78	2.755	-1.680	-2.550	-.811	.000*	0.190552	0.139282
Auditory	18.32	3.320	19.47	3.105	-1.150	-1.995	-.306	.008*	0.181223	0.159476
Group	19.01	3.094	20.88	2.663	-1.871	-2.615	-1.128	.000*	0.162756	0.127538
Kinesthetic	18.45	3.526	19.54	3.838	-1.085	-2.087	-.082	.034*	0.191111	0.196418
Individual	15.77	3.895	16.39	3.953	-.627	-1.678	.424	.240	0.246988	0.241184
Overall	107.54	11.723	114.75	10.353	-7.215	-10.080	-4.349	.000*	0.109011	0.090222

Out of the total respondents 72.3% were male and 27.7% were female. The

independent samples t-test shows the relationship between Gender and learning style preferences (see Table 6). Among all these learning styles, both male and female learners have more preference for group learning (Mean scores =19.01 and 20.88) and less preference for individual learning (Mean scores =15.77 and 16.39). Since the learners are Project-Based learners, they get mutual support from their team members and each member contributes their ideas to achieve a common goal. But at times, some learners may feel secure in a team, because they are less confident to do a project individually. Those learners must be identified by the teachers and proper training should be given to bring out their creativity and individuality. Consecutively after their completion of the task as a team the teacher can provide an activity that will help these learners to realize that they are capable of doing the task individually. Teachers should encourage and motivate the learners to do the projects individually without the support of their peers as well as know how to take part in teams.

But there is a significant difference between male and female in choosing all the learning styles (Visual p = 0.023< 0 .05, Tactile p = 0.000< 0 .05 , Auditory p = 0.008< 0 .05, Group p = 0.000< 0 .05 and Kinesthetic p = 0.034< 0 .05) except individual learning style (Individual p = 0.240> 0 .05). This is dissimilar to the studies that reported no gender-related differences in this regard (e.g., Hyland, 1993; Reid, 1987; Rossi-Le, 1989). The Co-efficient of Variations (CV) in Visual, Tactile, Auditory, Group and individual (except Kinesthetic and Overall) are higher for male learners than the female learners. It reveals that female learners are stable and less variable compared to their counterparts. Male learners are not able to balance among all the learning styles. According to Adam et al. (1999) males use a more intricate strategy than females. Barral and Debu (2004) in their study on body, brain and cognition of male and female found that while men were faster than women at aiming at a target, the women were more perfect in their performance. The Co-efficient of variations in this study prove that female learners have some balance in their preferences.

Programmes

Table 7 Independent samples t tests for learning style preferences for Discipline (N= 274)

Items	Social Science(N=127)		Engineering(N=147)		Mean Difference	95% Confidence Interval of the Difference		P - value		
	Mean	Std. Deviation	Mean	Std. Deviation		Lower	Upper		Social Sciences CV	Engineering CV
Visual	18.29	2.511	17.95	2.878	-.346	-.987	.295	.289	0.137288	0.160334
Tactile	18.29	3.259	18.80	3.424	.505	-.291	1.300	.213	0.178185	0.182128
Auditory	19.06	3.215	18.29	3.335	-.769	-1.550	.011	.053	0.168678	0.182340
Group	19.70	3.257	19.38	2.945	-.320	-1.063	.424	.398	0.165329	0.151961
Kinaesthetic	18.63	3.636	18.86	3.654	.234	-.635	1.103	.596	0.195169	0.193743
Individual	16.20	3.963	15.71	3.871	-.490	-1.426	.445	.303	0.244629	0.246404
Overall	110.17	12.335	108.99	11.319	-1.187	-4.020	1.646	.410	0.111963	0.103854

In terms of programmes, out of the total respondents 53.6% were from engineering programmes and 46.4% were from social sciences. Learners in social sciences and engineering programmes (see Table 7), have high preference for Group learning (M=19.70 and 19.38) and less preference for individual learning style (M=16.20 and 15.71). To be more precise, learners who belong to engineering programmes and social sciences favour group learning and disfavor individual learning. It was same with male and female learners, they too have more preference for group learning and less preference for individual learning. From the result it is clear that though they listen to teacher's explanations and suggestions for their language learning, the p - values (Visual p = 0.289>0 .05, Tactile p = 0.213> 0 .05, Group p = 0.398> 0 .05 and Kinesthetic p = 0.596>0 .05 Individual p = 0.303> 0 .05) except Auditory learning style show that they are not totally dependent on the teachers. There is no significant difference between the programmes and learning style preferences. The result is consistent with that of Isemonger and Sheppard (2003), which reported no relationship between learning style and discipline. And the result is different from that of Joy and Kolb (2009, p.83) revealing that "the discipline seems to have a slightly larger effect on determining a learner's liking for abstraction or concreteness than culture does".

The Co-efficient of Variations in Visual, Tactile, Auditory, individual (except Group and Kinesthetic) are higher for learners who belong to Engineering programmes than learners who belong to Social Science programmes. The result reveals that learners who belong to Engineering programmes are not stable in their choice of learning style preferences but learners from social sciences, have some balance in their preference for each learning style. But Overall value (0.103854) of Engineering programmes is lesser compared to Social Sciences (0.1119630). It is explicit that though learners of Engineering programmes are not able to give importance to each learning styles, they excel in their overall performance due to their analytical skills and more application oriented courses. In VIT University, learners from Engineering programmes get placed in various companies even before they complete their degrees. It is not with social science learners because they need to complete their postgraduation to get a job. They give importance to each learning style but they are not stable in their overall performance.

Proficiency

Table 8 ANOVA test for learning style preferences for Proficiency level (N= 274).

Item	Proficiency level	N	Mean	Std. Deviation	Minimum	Maximum	P - value
Visual	Level 1	53	18.30	2.722	12	24	0.77
	level 2	32	17.56	2.382	11	22	
	level 3	91	18.07	2.843	9	25	
	level 4	52	18.15	2.711	13	24	
	level 5	46	18.28	2.730	11	23	

	Total	274	18.11	2.715	9	25	
Tactile	level 1	53	18.40	3.242	9	24	0.52
	level 2	32	17.66	3.516	9	22	
	level 3	91	18.78	3.248	10	25	
	level 4	52	18.83	3.240	11	25	
	level 5	46	18.65	3.701	8	25	
	Total	274	18.56	3.352	8	25	
Auditory	level 1	53	19.55	3.489	7	25	0.16
	level 2	32	17.91	3.383	8	25	
	level 3	91	18.69	2.739	12	25	
	level 4	52	18.40	3.764	9	25	
	level 5	46	18.28	3.371	10	25	
	Total	274	18.64	3.297	7	25	
Group	level 1	53	19.08	3.589	9	25	0.75
	level 2	32	19.59	2.850	12	25	
	level 3	91	19.75	2.843	10	25	
	level 4	52	19.71	3.095	12	25	
	level 5	46	19.37	3.179	11	25	
	Total	274	19.53	3.092	9	25	
Kinaesthetic	level 1	53	18.36	4.015	8	24	0.37
	level 2	32	18.22	4.070	7	23	
	level 3	91	18.60	3.402	7	25	
	level 4	52	19.00	3.242	12	25	
	level 5	46	19.61	3.750	10	25	
	Total	274	18.76	3.641	7	25	
Individual	level 1	53	16.81	3.762	10	24	0.23
	level 2	32	15.16	4.386	9	25	
	level 3	91	15.54	3.857	5	24	
	level 4	52	16.38	3.652	7	23	
	level 5	46	15.78	4.071	7	24	
	Total	274	15.94	3.914	5	25	
Overall	level 1	53	110.49	13.799	80	140	0.48
	level 2	32	106.09	11.326	86	136	
	level 3	91	109.43	10.734	81	134	
	level 4	52	110.48	11.485	81	136	
	level 5	46	109.98	12.029	77	128	
	Total	274	109.54	11.793	77	140	

Out of the total respondents19.3% students have chosen Level I, 11.7% students have chosen Level II, 33.2% students have chosen level III, 19.0% students have chosen level 4 and 16.8% students have chosen level V. Analysis of Variance (ANOVA) was implemented to find out the possible differences among perceptual learning style preferences and the five Self-rated proficiency groups. The result of the analysis (see Table 8) show there is no significant difference P>.05 between the self-rated proficiency level and learning style preferences. This is similar to most of the studies (e.g Isemonger and Sheppard, 2003; Reid, 1987).

Limitations

The greatest flaw of the study is in finding out the preferences of the population from the sample chosen. The 274 respondents may not be the representative of all the undergraduate learners. It is similar to other survey researches where validity of the research is questionable (Nunan and Bailey, 2009). The results are, therefore, restricted to the sample in the study and may not be helpful to students of other educational levels. In terms of the background variables the proficiency level is self-rated, which has to be taken into consideration when evaluating the study. The issue here is whether their rating accurately reflects reality. As Mochizuki (1999) emphasized that self-report of the respondents may not be a reliable data, since the respondents always try to pose themselves that they are the best and perfect.

Implications and Conclusion

The result of this study can present valuable inputs for improving the quality of teaching and learning experiences of Project-Based learners. The main implication for teaching is that the teachers should try out different approaches and various procedures in the classrooms. Perceptual learning styles and their correlates, revealed in this study are important elements to consider before implementing PBL because it is not a supplementary activity to support learning. It is the basis of curriculum (Stephanie Bell, 2010). Since the effects of PBL are numerous, the second language teachers should not compel the learners to do projects individually because if the learners perform the project in collaboration, they will have in-depth knowledge, research aptitude, critical thinking, accountability, responsibility, discipline, self motivation and they will acquire the ability to self monitor their own progress. When students collaborate with their peers for doing projects, they become interdependent and each student contributes to the achievement of the end product. Accountability to other students often has greater effect. Though there are many benefits in group learning, at times the learners may become more dependent on their peers. Since students have to meet the necessities of the profession which emphasizes on skills like solving real life problems (Heitman 1996) and capacity to do work independently, it is recommended that teachers should take utmost effort to help learners become confident and optimistic to do projects on their own at a later stage. In the same vein, teachers should help learners come out of their comfort zone of preferred learning styles (Oxford, 2001). Teachers can help learners to help themselves by promoting and nurturing learner autonomy; that is to say by making the learner to take charge of his or her learning.

References:

1. Abdullah, M. H. (2001). Self-Directed Learning. ERIC Digest.
2. Adam, J. J. (1999). Gender differences in choice reaction time: evidence for differential strategies. *Ergonomics*, *42*(2), 327-335.

3.   Arthurs, J. B. (2007). A juggling act in the classroom: Managing different learning styles. *Teaching and learning in nursing*, *2*(1), 2-7.

4.   Barral, J. and B. Debu. (2004). Aiming in adults: Sex and laterality effects. *Laterality: Assymmetries of Body, Brain and Cognition* 9(3): 299-312.

5.   Barron, B. J., Schwartz, D. L., Vye, N. J., Moore, A., Petrosino, A., Zech, L., & Bransford, J. D. (1998). Doing with understanding: Lessons from research on problem-and project-based learning. *Journal of the Learning Sciences*, *7*(3-4), 271-311.

6.   Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, *83*(2), 39-43.

7.   Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational psychologist*, *26*(3-4), 369-398.

8.   Boaler, J. (1997). Experiencing school mathematics; Teaching styles, sex, and settings. Buckingham, UK: Open University Press.

9.   Curry, L., 1990. A critique of the research on learning styles. Educational Leadership 48 (2), 50e56.

10. DeCapua, A., Wintergerst, A.C., (2005). Assessing and validating a learning styles instrument. System 33 (1), 1e16.

11. Dörnyei, Z. (2006). Individual differences in second language acquisition. *AILA review*, *19*(1), 42-68.

12. Do¨rnyei, Z., (2007). Research Methods in Applied Linguistics. Oxford University Press, Oxford.

13. Dunn, R.S., Dunn, K., (1972). Practical Approaches to Individualizing Instruction. Prentice Hall, Englewood Cliffs, NJ.

14. Dunn, R.S., Dunn, K., (1979). Learning styles/teaching styles: should they... can they... be matched? Educational Leadership 36, 238e244.

15. Dunn, R.S., Dunn, K., Price, G.E., (1978). Teaching Students through their Individual Learning Styles. Reston Publishing, Reston, VA.

16. Dybvig, T., (2004). Learning Styles. Retrieved May 16,2008, from.http;//www.teresadybvig.com/learnsty.htm

17. Ehrman, M., & Oxford, R. (1990). Adult language learning styles and strategies in an intensive training setting. *The modern language journal*, *74*(3), 311-327.

18. Ehrman, M.E., (1996). Understanding Second Language Difficulties. Sage Publications, Thousand Oaks, CA.

19. Griffiths, C., (2012). Learning styles: traversing the quagmire. In: Mercer, S., Ryan, S., Williams, M. (Eds.), Psychology for Language Learning:Insights from Research, Theory, and Practice. Palgrave MacMillan, Hampshire, pp. 151e168.

20. Heitman, G., (1996). Project-oriented study and projects-organized currilcula:A brief review of intentions and solutions. European Journal of Engineering Education, 21(2), pp. 121-131.

21. Helle, L., Tynjälä, P., & Olkinuora, E. (2006). Project-based learning in post-secondary education–theory, practice and rubber sling shots. *Higher Education*, *51*(2), 287-314.Hill, New York.

22. Hofstede, G., (1986). Cultural differences in teaching and learning. International Journal of Intercultural Relations 10, 301e320.
23. Hofstede, G., Hofstede, G.J., Minkoy, M., (2010). Cultures and Organizations: Software of the Mind. Revised and Expanded, third ed. McGraw-
24. House, R.J., Hanges, P.J., Javidan, M., Dorfman, P.W., Gupta, V., (2004). Culture, Leadership, and Organizations: the GLOBE Study of 62 Societies.
25. Hyland, K., (1993). Culture and learning: a study of the learning style preferences of Japanese students. RELC Journal 24 (2), 69e91.
26. Isemonger, I., Sheppard, C., (2003). Learning styles. RELC Journal 34 (2), 195e222.
27. Isemonger, I., Sheppard, C., (2007). A Construct-related validity study on a Korean version of the perceptual learning styles preference questionnaire. Educational and Psychological Measurement 67 (2), 357e368.
28. Isemonger, I., Watanabe, K., (2007). The construct validity of scores on a Japanese version of the perceptual component of the style analysis survey. System 35 (2), 134e147.
29. Itzen, R., (1995). The Dimensionality of Learning Structures in the Reid Perceptual Learning Style Preference Questionnaire. Unpublished Doctoral dissertation, University of Illinois, Chicago.
30. Jones, B. F., Rasmussen, C. M., & Moffitt, M. C. (1997). Real-life problem solving.: Acollaborative approach to interdisciplinary learning. Washington, DC: American Psychological Association.
31. Joy, S., Kolb, D.A., (2009). Are there cultural differences in learning style? International Journal of Intercultural Relations 33, 69e85.
32. Keefe, J.W., (1979). Learning style: an overview. In: Keefe, J.W. (Ed.), Student Learning Styles: Diagnosing and Prescribing Programs. National Association of Secondary School Principals, Reston, VA, pp. 1e17.
33. Kinsella, K., (1995). Understanding and empowering diverse learners in ESL classrooms. In: Reid, J.M. (Ed.), Learning Styles in the ESL/EFL Classroom. Heinle & Heinle, Boston, pp. 170e194.
34. Kroonenberg, N., (1995). Meeting language learners' sensory-learning-style preferences. In: Reid, J.M. (Ed.), Learning Styles in the ESL/EFL Classroom. Heinle & Heinle, Boston, pp. 74e86.
35. Liversidge, G., (1996). Learning styles: an attempt at a quantitative assessment. Otsuma Women's University Bulletin 28, 93e114.
36. Maley, A. (2010). The reality of EIL and the myth of ELF. *EIL, ELF, global English: Teaching and learning issues*, 25-44.
37. Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer?. *Australasian Journal of Engineering Education*, *3*, 2-16.
38. Mochizuki, A., (1999). Language learning strategies used by Japanese university students. RELC Journal 30 (2), 101e113.
39. Mohamed, N., Al-Jaroodi, J., & Jawhar, I. (2009). Internet Information Retrieval for Enabling Student Projects. In *Information Technology: New Generations, 2009. ITNG'09. Sixth International Conference on* (pp. 987-992). IEEE.

40. Montgomery, S.M., (1995). Addressing diverse learning styles through the use of multimedia. In: Proceedings of the Frontiers in Education Conference, vol. 1. IEEE Computer Society, Washington, DC, USA.

41. Naraghi Zadeh, A., (2004). The culturally dependent diversification of learning behavior based on the learning-style model "Experiential Learning" and a case study of Iranian student teachers. Unpublished Doctoral dissertation, Cuvillier Verlag, Gottingen.

42. Naserieh, F., & Anani Sarab, M. R. (2013). Perceptual learning style preferences among Iranian graduate students. *System*, *41*(1), 122-133.

43. Nunan, D. (1996). *The self-directed teacher: Managing the learning process*. Cambridge University Press.

44. Nunan, D., & Bailey, K. M. (2009). *Exploring second language classroom research: A comprehensive guide*. Heinle Cengage Learning.

45. O'Brien, L., (1990). Learning Channel Preference Checklist (LCPC). Specific Diagnostic Services, Rockville, MD.

46. Oxford, R. L. (2003). Language learning styles and strategies: Concepts and relationships. *IRAL*, *41*(4), 271-278.

47. Oxford, R.L., (1993). Style Analysis Survey (SAS). University of Alabama, Tuscaloosa, AL.

48. Oxford, R.L., (2001). Language learning styles and strategies. In: Celce-Murcia, M. (Ed.), Teaching English as a Second or Foreign Language. Heinle & Heinle, Boston, pp. 359e366.

49. Oxford, R.L., Anderson, N.J., (1995). A crosscultural view of learning styles. Language Teaching 28, 201e215.

50. Peacock, M., (2001). Match or mismatch? Learning styles and teaching styles in EFL. International Journal of Applied Linguistics 11 (1), 1e20.

51. Polman, J. L. (2000). *Designing Project-Based Science: Connecting Learners through Guided Inquiry. Ways of Knowing in Science Series*. Teachers College Press, PO Box 20, Williston, VT 05495 (paperbound: ISBN-0-8077-3912-X, $23.95; hardbound: ISBN-0-8077-3913-8, $50).

52. Reid, J.M., (1984). Perceptual Learning Style Preference Questionnaire. University of Wyoming, Department of English, Laramie.

53. Reid, J.M., (1987). The learning style preferences of ESL students. TESOL Quarterly 21 (1), 87e111.

54. Reid, J.M., (1990). The dirty laundry of ESL survey research. TESOL Quarterly 24 (2), 232e338.

55. Reid, J.M., (1995). Preface. In: Reid, J.M. (Ed.), Learning Styles in the ESL/EFL Classroom. Heinle & Heinle, Boston, pp. viiiexvii.

56. Reid, J.M., (1998). Preface. In: Reid, J.M. (Ed.), Understanding Learning Styles in the Second Language Classroom. Prentice-Hall Regents, Upper Saddle River, NJ, pp. ixexiv.

57. Riazi, A., Mansoorian, M.A., (2008). Learning style preferences among Iranian male and female EFL students. Iranian EFL Journal 2, 88e100. Retrieved March 27, 20013, from. http://www.iranian-efl-journal.com/Iranian-EFL-Journal-second-edition.pdf.

58. Rossi-Le, L., (1989). Perceptual Learning Style Preferences and Their Relationship to Language Learning Strategies in Adult Students of English as a Second Language. Unpublished Doctoral dissertation, Drake University, Des Moines. Retrieved January 14, 2008, from http://escholarshare.drake.edu/bitstream/handle/2092/713/dd1989lrl.pdf?sequen ce¼1.

59. Rossi-Le, L., (1995). Learning styles and strategies in adult immigrant ESL students. In: Reid, J.M. (Ed.), Learning Styles in the ESL/EFL Classroom. Heinle & Heinle, Boston, pp. 118e125. Sage Publications, Thousand Oaks, CA.

60. Solomon, G. (2003). Project-based learning: A primer. *TECHNOLOGY AND LEARNING-DAYTON-*, *23*(6), 20-20.

61. Stebbins, C., (1995). Culture-specific perceptual-learning-style preferences of post secondary students of English as a second language. In:Reid, J.M. (Ed.), Learning Styles in the ESL/EFL Classroom. Heinle & Heinle, Boston, pp. 108e117.

62. Thomas, J. W. (2000). A review of research on project-based learning. Retrieved January 16, 2014, from. http://scholar.google.co.in/scholar?

63. Thomas, J. W., Mergendoller, J. R., and Michaelson, A. (1999). Project-based learning: Ahandbook for middle and high school teachers. Novato, CA: The Buck Institute for Education.

64. Tyacke, M., (1998). Learning style diversity and the reading class: curriculum design and assessment. In:

65. Wallen, N.E., Fraenkel, J.R., (2001). Educational Research: a Guide to the Process, second ed. Lawrence Erlbaum Associates, Mahwah, NJ.

66. Wintergerst, A.C., DeCapua, A., (1998). Exploring learning styles of Russian ESL students. Paper presented at the 32nd Annual TESOL Convention, Seattle, WA.

67. Wintergerst, A.C., DeCapua, A., (2001). Exploring the learning styles of Russian-speaking ESL students. The CATESOL Journal 13 (1), 23e46.

68. Wintergerst, A.C., DeCapua, A., Itzen, R.C., (2001). The construct validity of one learning styles instrument. System 29 (3), 385e403.

69. Wintergerst, A.C., DeCapua, A., Verna, M.A., (2002). An analysis of one learning styles instrument for language students. TESL Canada Journal/

70. Witkin, H. A. (1967). A COGNITIVE-STYLE APPROACH TO CROSS-CULTURAL RESEARCH1. *International Journal of Psychology*, *2*(4), 233-250.

71. Witkin, H. A., & Goodenough, D. R. (1981). *Cognitive styles, essence and origins: Field dependence and field independence* (No. 51). New York: International Universities Press.

72. Wong, L. L., & Nunan, D. (2011). The learning styles and strategies of effective language learners. *System*, *39*(2), 144-163.

Appendix
*Fully Flexible Credit System (FFCS)™ is offered by VIT University in its academic curriculum. Under this, students can register for courses according to their interests and academic abilities. FFCS allows students to decide their academic plan and permits them to alter it, if required, as they progress in time.

Questionnaire on learnering style preferences
Note:*Please tick out the appropriate boxes*

Name (optional):
Gender: Male   [ ]   Female   [ ]
Discipline: Engineering [ ]   Science   [ ]

How do you rate your proficiency in English?
a.   I can understand the vocabulary, expressions, and grammar in English but I cannot speak.   [ ]
b.   I can take part in short everyday conversations in English.   [ ]
c.   I know the communication strategies in English. I know the vocabulary and expressions to use in limited situations.   [ ]
d.   I can understand long conversations in English on new topics. I have a strong understanding of English vocabulary and expressions.   [ ]
e.   I can speak fluently in English in most conversations and discussions on a variety of topics.   [ ]

S.No.	Particulars	SDA	DA	N	A	SA
1	I like to listen to the lectures.					
2	I like to take part in the language games and activities.					
3	My language gets improved when I converse with my friends.					
4	I learn more when I study with a group of students.					
5	I am productive when I work with other students.					
6	I learn better when the teacher uses board or projector.					
7	When the teacher explains the concepts, I learn better than by reading the text book.					
8	When I do projects, I learn better.					
9	I remember what I have heard in class better than what I have read from the books.					
10	When I read the textbooks, I remember them better.					
11	I learn more when I practice.					
12	I like to learn vocabulary by reading them from the books or the board.					
13	I like to study English by myself.					
14	Doing project increases my creativity.					
15	I enjoy learning in class by doing experiments.					

16	I understand more clearly when I draw pictures, charts and diagrams than by just reading.					
17	I learn better in class when the teacher gives a lecture.					
18	When I work alone, I learn better.					
19	I learn better when I participate in role-playing.					
20	I learn better in class when I listen to my teacher/peers.					
21	I enjoy doing an assignment with two or three classmates					
22	When I practice what I have learned theoretically I remember better.					
23	I am comfortable to do the language activities with my classmates.					
24	I learn better by watching English channels in the TV.					
25	I enjoy doing projects.					
26	I learn better when I interact and take part in discussions.					
27	I learn better when I learn alone.					
28	I prefer working on projects by myself.					
29	I learn more from internet sources than by listening to lectures.					
30	I prefer to do the language activities by myself without the help of others.					

Note: **SDA**-Strongly Disagree; **DA**-Disagree   **N**-Neither; **A**-Agree; **SA**-Strongly Agree;

CV about the contributors

1.   Prof.Gandhimathi has 13 years of teaching experience. She has organized various workshops and conferences for English teachers. She has also presented her research papers in the international conferences. At present, she is pursuing her PhD in VIT University, Vellore.

2.   Dr. V.Anitha Devi, Associate Professor, SSL, VIT University,Vellore. She is an adept in training teachers to use technology in language classes. She has done her research in CALL from Anna University. Organizing and participating in International Conferences, guiding researchers and writing articles on Web 2.0, Educational Psychology, Culture, Literature and CALL for journals with impact factor are her recent fortes. She is an associate member and faculty coordinator of IEEE-PCS VIT Student's Chapter and member Editor of Journal of Technology for ELT.