The Effectiveness of Flipped Learning in a Testing University Classroom: Students' Perceptions, the Role of Personality Traits, and Successful Intelligence

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Abstract: Flipped learning is a rather recent practice where the teacher provides the learners with the content of the teaching and videos of his or her teaching prior to the class meeting. Students are required to study and be prepared, and the class time is devoted to activities which involve higher-order thinking skills. This study aimed at assessing the perception of students of the flipped classroom and the effectiveness of flipped learning in a university testing and assessment class with bachelor's students of English Language Teaching. The first half of the semester was taught through the flipped strategy and a half was taught through traditional lecturing. Results indicated that students had a positive view towards flipped learning, and flipped learning led to a better performance of the students on the section of the exam which involved higher-order thinking skills such as application, analysis, and synthesis. Results further showed that successful intelligence was a better predictor of academic performance of the learners on the exams than the Big Five (NEO) personality traits, and creative intelligence was the component of successful intelligence significantly associated with students' performance. It can be concluded that flipped teaching is worth the time and energy spent by the teacher and the learners on preparation for the classroom and it can motivate and engage learners.

Keywords: Flipped Learning, Personality Traits, Successful Intelligence.

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Introduction

Learning is the ultimate aim of any instructional activity; therefore, over the years, educational experts and many teachers have been searching for effective methods of teaching which can guarantee effective learning on the part of learners. One rather recent innovation which promises more effective learning and deeper understanding of the materials by the learners is flipped learning or inverted learning (Kim, 2017) . The inception of flipped learning goes back to 2007 when Bergmann and Sams recorded their PowerPoint files for teaching chemistry at Woodland Park High School and then uploaded them to the network so that students could make up missed lessons; though, today, they believe, "the flipped classroom can address the needs of students …whether you teach math, science, social studies, language arts, physical education, ELL, a foreign language, or humanities" (Bergmann & Sams, 2012, p. 2). Muzyka and Luker (2016) believe that the flipped classroom is a high-tech variation of an ancient Socratic method which aims to engage students actively in answering instructors' questions which help them to see the connections between ideas. They also use King's (1993) terms and describe the flipped teaching as 'guiding on the side' compared to traditional approaches where the teacher is 'the sage on the stage'.

Flipped learning is a type of blended learning (Reidsema, Kavanagh, Hadgraft, & Smith, 2017), that is, it incorporates using technology in the traditional classroom with the hope of removing some of the limitations and defects of the traditional methods of teaching and learning, and changes the class environment from instructor-centered to student-centered (Kim, Roh, & Ihm, 2018) and allows teachers to personalize their students' education (Bergmann & Sams, 2012). In flipped learning, the order of activities is reversed. While in traditional classrooms, learners come to the class, are presented with the material most often through passive teaching methods such as lecturing, which is a very common teaching method at the university level, and are expected to go home and review and practice what they have learned in the classroom to consolidate it, in flipped classroom, using the technology, the teacher prepares podcasts, PowerPoint files or using screencasting technology films his teaching and gives the video to the learners prior to their coming to class. The teacher may even select ready-made videos from websites or networks. The students are expected to watch the videos, listen to the podcasts or study the PowerPoint files or other materials the teacher has provided them with. So, the presentation stage of teaching is

transferred to outside of the class which may be home, library or any other place, and the time in the classroom is assigned to practice and activities for stabilization of learning (Bergmann & Sams, 2012; Hung, 2014). It is worth mentioning that although in recent years, with the widespread availability of technology to teachers, it is generally viewed as a component of flipped learning, as Bergmann and Sams (2012) maintain, flipped learning is not limited to using technology to provide the material to the learners, and the class can be flipped even if students are asked to read a book chapter before coming to class (Muffett, 2014).

In the flipped classroom, learners can learn anywhere, anytime and at their own pace. They can watch the videos as many times as they like, and they can pause, rewind, or replay at will (Hsieh, Wu, & Marek, 2017). This way, flexibility and active learning are added to the classroom. Moreover, class time can be used for problem-solving, discussion, personalization of instruction and other activities which deepen learning because as Reidsema et al. (2017) maintain, decades of solid research indicate that active learning is a more effective method for developing conceptual knowledge and understanding. Learners' independence and their active engagement in learning are two key features of the flipped classroom; however, a highly motivated teacher who is willing to spend a lot of time on preparing the materials for the learners is a basic requirement for the flipped classroom to succeed (Kim, 2017) . Students are also required to be self-motivated and take responsibility for their learning (Muffett, 2014).

Theoretically, flipped learning is supported by active learning which involves "students in doing things and thinking about the things they are doing" (Bonnell & Eison, 1991, as cited in Hung, 2014, p. 2). One advantage of flipped classroom is that it helps learners' thinking process through providing the opportunity for lower level of thinking such as knowledge, comprehension before the class, to use Bloom's (1984) taxonomy and provides the opportunity to develop higher-order thinking such as application and analysis under the guidance of the teacher in the classroom where the teacher can monitor learners' practice and support them in their development (Hung, 2014; Muffett, 2014).

Although flipped learning is applicable to all levels, and many studies in the world (Hung, 2014) were conducted in university classrooms, in Iran, flipped learning studies have mainly focused on the school level. Studies on flipped learning indicated that the better use of classroom time, active participation in the class discussions, opportunities to raise questions and better preparation for exams, time for critical thinking, emphasis on practical use of

knowledge, and increased interaction between the instructor and the students were the benefits of flipped classroom liked most by the learners (Kim, 2017; Pierce & Fox, 2012; Strohmyer, 2016). Studies have reported that the success of the flipped classroom depends on individual student attributes such as learning style and personality (Kim, 2017; Kim et al., 2018). Research has also shown an association between the academic achievement of learners and their personality characteristics (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; Komarraju, Karau, Schmeck, & Avdic, 2011; Novikova & Vorobyeva, 2017; Zuffianò et al., 2012).

Among the various personality dichotomies, as Barrick and Mount (1991) maintain, generally, researchers agree five robust factors known as Big Five or NEO personality traits can serve as a meaningful taxonomy for classifying personality attributes. The Big Five factors are often referred to as the acronym OCEAN: Openness to Experience, Conscientiousness, Extroversion, Agreeableness, and Neuroticism (Jensen, 2007).

Openness (O) is a dimension of personality that differentiates creative and imaginative individuals from more down-to-earth and conventional people. People with low scores on the subscale of openness are prone to have more constricted and familiar interests. They are often conservative and resistant to change. Conscientiousness (C) refers to how individuals control their impulses. Conscientious individuals tend to avoid disruption, are usually goal-oriented, and often are referred to as intelligent and reliable. On a negative side, high conscientious individuals may be workaholics and perfectionists. Extroversion (E) often refers to extroverts who are individuals and are quite sociable, enjoy being with people and are often enthusiastic and action-oriented individuals. Just the opposite, are introverts, the individuals who tend to keep more to themselves, are low key, and less dependent upon socializing. Agreeableness (A) refers to individuals who are often considerate, friendly, and willing to compromise. Neuroticism (N) is also referred to as emotional stability. Individuals receiving high scores on the scale of neuroticism tend to be experiencing negative feelings such as anger, anxiety, and depression. Such individuals tend to view conventional situations as threatening and trivial frustrations as terribly difficult (Costa, McCrae, & Kay, 1995; Jensen, 2007).

Caprara et al. (2011) and Poropat (2009) found consciousness and openness were strongly associated with academic achievement. Zuffianò et al. (2012), however, reported a significant impact of openness on academic achievement and a negative association between academic achievement and extroversion. They explained that the reason for their latter

finding may be the tendency of the introverts to spend more time studying, while the extroverts may prefer to spend more time socializing with others. Novikova and Vorobyeva (2017), in a study of the association between personality traits and academic success in various disciplines, reported a significant positive relationship between consciousness and extroversion with academic achievement in foreign and second languages, while the relationship with neuroticism was negative. Komarraju et al. (2011) also found a positive relationship between openness, agreeableness, and conscientiousness with academic achievement as measured by GPA.

Sternberg's Triarchic Abilities (STA) or successful intelligence is also another important factor in education attribute which has been reported to correlate with academic achievement (Ekinci, 2014; Negahban, Farzad, & Sarami, 2013; Sternberg, 2002, 2015, 2018; Sternberg, Torff, & Grigorenko, 1998).

Successful intelligence or the triarchic model of intelligence or WICS, which stands for Wisdom, Intelligence and Creativity Synthesized (Sternberg, 2015) was developed by Sternberg (1997) who believed intelligence is not only the speed of mental processing and intelligent people are not only those who study well and are high achievers in school exams (Brown, 2014; Negahban et al., 2013). Believing that conventional intelligence is not enough to solve world problems (Sternberg, 2018), Sternberg (2015) said in any life activity, people need to think creatively to generate new ideas, to think analytically, to judge their ideas and those of others, and to think practically to implement their ideas and to convince others of the value of their ideas. They further need the wisdom to ensure that there is a balance between their intrapersonal (their own), interpersonal (other people's) and extrapersonal (institutional) interests. As Sternberg (2002) maintains, "Successful intelligence is the ability to succeed in life, given one's own goals, within one's environmental contexts. Thus, successful intelligence is a basis for school achievement but also life achievement" (p. 385). According to this theory, intelligent people in addition to memory work (recalling, recognizing, matching, verifying and repeating) can do analytical work (analyze, evaluate, explain, compare and contrast, and judge), creative works (create, invent, explore, imagine, suppose and synthesize), and practical work (put into practice, use and apply their knowledge and implement their plans). Vimple and Sawhney (2017) studied the relationship between successful intelligence and academic achievements of adolescents, and Mysore and Vijayalaxmi (2018) reviewed some studies on this relationship and reported significant correlations between successful intelligence and its components and academic achievement.

Sternberg (2002) believed that although there are major differences between the theory of successful intelligence and Bloom's Taxonomy, it can be said that teaching for memory is related to teaching for knowledge and comprehension, teaching for analytical thinking is related to teaching for analysis and evaluation, teaching for creative thinking is related to teaching for synthesis, and teaching for practical thinking is related to teaching for application. Therefore, bearing in mind that flipped classroom intends to foster the higher-order thinking abilities of application, analysis, synthesis, and evaluation through classwork and let the learners develop knowledge and comprehension through prior-to-class work, successful intelligence seems to play a role in the flipped classroom and this seems to be a research-worthy topic.

Since research evidence shows the impact of the flipped classroom on teaching effectiveness, and noticing the paucity of research on flipped learning in Iranian ELT context, and lack of such research in university contexts in Iran, this study aimed to find the answers to these research questions:

1. What are the perceptions of ELT students of the assessment flipped classroom?

2. Is there any difference between learning assessment concepts and skills when ELT students are taught through the flipped and non-flipped classroom?

3. Is there any difference between learning of lower-level and higher-level skills when ELT students are taught through the flipped and non-flipped classroom?

4. Can personality type and successful intelligence predict the learning of students in a flipped classroom?

Methods

Participants

This intact group study was carried out in a Bachelor's Testing and Assessment of Language Skills classroom at Farhangian University of Mashhad, Shahid Beheshti Campus. The class for this two-credit course (one theoretical credit, and one practical credit) was held three hours a week. Half of the semester was taught through flipped learning strategies and the other half through non-flipped lecturing techniques. The class included 30 male students whose ages ranged from 22 to 24 years.

Procedure

Students were informed of the objectives of the study at the beginning of the semester and their consent was obtained for participation in the study. Two students were not willing to fill

out personality and intelligence scales and performance data on exams were only used in the study. For the first half of the session, students were given the PowerPoint files and the screencast videos of teaching the materials on alternatives in assessment, assessing listening, speaking and reading based on Brown and Abeywickrama (2010) one week prior to the class meeting and were asked to read the materials and watch the videos and be ready for a quiz at the beginning of the class. Since quizzes prior to classroom activities are an important motivational strategy to encourage learners to watch the videos or read other materials (Kaviani, Liaghatdar, Zamani, & Abediny, 2018), each session a short quiz which included true/false, multiple-choice and short-answer items was given to students and they were corrected through self-assessment and peer-assessment and the scores were registered by the instructor researcher. The students knew that these scores formed part of their final grades, so they were motivated to attend the class being well-prepared and the scores on the quizzes also confirmed their readiness. Then the first part of the session (one instructional hour) was devoted to question and answer and discussion about the content of the related chapter and video. In the second part (two instructional hours), students were grouped and asked to review the school textbooks and sample school exam papers and decide about the type of listening, speaking, etc. activities or items in the textbook or exam papers which were the focus of the session. Then each group reported its findings to the whole class and the whole class discussed whether they agreed or disagreed with the decision of the group about the type of activity and their reasoning for their decision. In the next session, in the first part, each group was given one of the textbooks taught in language institutes and students were asked to do the same task of analyzing the activities in the textbook based on what they had studied. Finally, in the second part of the session, they were asked to develop and write different test items based on what they had studied and learned. The instructor was the facilitator and in cases where there were disagreements among the group members or between different groups about the type of item or activity and the reasoning for the decision, he guided the students and provided them with hints and references to the content of the textbook or videos. At the end of this phase of the study, there was an exam which included essay type and short-answer questions which required lower-level thinking skills based on Bloom's taxonomy and some items which required analysis and production of test items (higher-order thinking skills).

In the second phase of the study, students were not required to do anything prior to coming to class. The chapters on assessing writing and grammar and vocabulary were

lectured to the students and they answered only different types of questions about their understanding of the concepts and features of different kinds of items in the chapter throughout the session. Following that, they were given an exam which was a parallel form of the first exam and included items which required lower-order thinking skills (knowledge and comprehension) and higher-order thinking skills.

Instruments

In addition to the mid-term and final exams, the students were also asked to complete a sixty-item NEO-personality questionnaire, a 36-item Successful Intelligence Inventory, and a Perception of Flipped Classroom Questionnaire. Since the participants were ELT seniors, the questionnaires were administered in the original English language. The NEO Five-Factor Inventory (NEO-FFI) includes 60 items on a five-point Likert scale which ranges from strongly disagree to strongly agree. Each domain is measured by twelve items and some items need to be reverse scored before calculating the score on the total scale and the five components. The reliabilities reported in the manual (Costa & McCrae, 1992) were adequate, with a mean of 0.78 across the five factors. In the present study, the Cronbach's reliability of the total scale was 0.78 and the coefficients of the components were 0.75 for neuroticism, 0.64 for extroversion, 0.68 for openness, 0.70 for agreeableness and 0.74 for conscientiousness.

The Successful Intelligence Inventory includes 36 Likert type items on a five-point scale which ranges from 1 (Weak) to 5 (Excellent). The scale is comprised of three sub-constructs of analytical intelligence (items 1 to 12), creative intelligence (items 13-24) and practical intelligence (items 25-36). Grigorenko and Sternberg (2002, cited in Negahban et al., 2013) reported a Cronbach's alpha reliability of 0.74 for the whole scale and 0.82, 0.68 and 0.71 for analytical, creative, and practical intelligence, respectively. Negahban et al. (2013) translated the scale into Persian and validated it and reported a Cronbach's alpha of 0.76 for the whole item, and of 0.74, 0.70, and 0.81 for the three sub-constructs, respectively. In this study, the Cronbach's alpha reliability of the total scale was 0.85, and the reliability coefficients for the analytical, creative, and practical intelligence were respectively 0.84, 0.68, and 0.74.

Results

After data collection, the data were fed into SPSS 20 for analysis. Prior to any analysis, the normality of the distributions of all data sets was confirmed.

To answer the first research question and assess the perception of students of the flipped classroom, the mean score of each item on the Perception Questionnaire (Hsieh et al., 2017) was calculated. Table 1 shows the results of the 14 Likert type items in the questionnaire.

Table 1. *Mean Scores of Students' Perceptions of the Flipped Classroom*

Item	Statement	Mean
1	A flipped classroom is a better way of learning.	4.11
2	I enjoyed the flipped classroom teaching approach more.	4.04
3	I think the flipped classroom is a more effective and efficient way to learn.	4.11
4	I feel more motivated in a flipped classroom.	3.89
5	I participated in and engaged myself more in learning in the flipped classroom.	4.11
6	I became a more active learner in the flipped classroom.	4.19
7	I thought the time and effort I spent in the flipped classroom was worthwhile.	3.93
8	I learned more and better in the flipped classroom.	4.07
9	I prefer the flipped classroom to a lecture-based classroom.	3.93
10	I think the flipped classroom learning guided me toward a better understanding of the course topics.	4.07
11	I experienced pleasure in the flipped classroom.	3.89
12	I devoted myself more to the instructional/class activities in the flipped classroom.	3.85
13	I spent more time and effort than usual on my flipped classroom learning activities.	4.04
14	Generally, I am happy and satisfied with this flipped learning experience.	4.30
	Overall mean score	4.03

As Table 1 indicates, the mean scores of all items are above the midpoint of the scale (3) and the mean score of the total scale is 4.03. These results mean that students were satisfied with their experience of the flipped classroom. According to Hsieh et al. (2017), the items on the questionnaire measure four aspects of motivation, effectiveness, engagement, and overall satisfaction of the students. They did not provide the items which measure each construct, but since all items have means above the midpoint of the scale, the findings show that students believe that flipped classroom motivated them and was more effective and engaging for them.

To answer the second and third research questions on the effectiveness of flipped methodology in student's achievement, a series of paired samples t-tests were run. Table 2

displays the descriptive statistics of the two groups of flipped and non-flipped classrooms for the whole tests, and the parts which tested lower-order and higher-order thinking skills.

Table 2. *Descriptive Statistics of Flipped and Non-Flipped Groups*

	N	Mean	SD
Flipped-Total		18.07	6.82
Non-flipped-Total		15.18	5.47
Flipped-Lower order		6.60	1.93
Non-flipped-Lower order	29	8.32	2.84
Flipped-Higher order		11.67	4.84
Non-flipped-Higher order		7.04	3.65

Table 3 shows the results of the paired-samples t-tests. As the table indicates, there are statistically significant differences between flipped and non-flipped groups in total, lower-order, and higher-order thinking sections of the test.

Table 3. *Results of Paired Samples T-Tests for Flipped and Non-Flipped Groups*

	Paired differences		t	df	p
	Mean	**SD**			
Total	2.89	5.22	2.98	28	.00*
Lower-order	-1.75	2.59	-3.63	28	.00*
Higher-order	4.6	3.85	6.09	28	.00*

*$p < 0.05$

Inspections of Tables. 2 and 3 elucidate that the flipped learning groups outperformed the non-flipped group on the total test and on the higher-order thinking section, while the non-flipped group out-performed on the lower-order thinking section.

To answer question 4 on the predictive power of personality types and successful intelligence, first, the assumptions of multiple regression were checked and they were met only for the model including flipped total scores as the dependent variable and the NEO personality and successful intelligence as predictors. As Field (2009) maintains, in regression analysis, "you should have 10 cases of data for each predictor in the model" (p. 222). The number of participants in this study was 28 which can satisfy this requirement for the regression analysis. Table 4 shows the result.

Table 4. *Regression Test for the Predictive Power of NEO Personality and Successful Intelligence*

	Model Summary				ANOVA	
	R	**R Square**	**Adjusted R**	**Std E**	**F**	**p**
	.54	.29	.23	6.3	5.1	.01
	Coefficients					
	B	**Std. Error**	**Beta**	**t**	**p**	
NEO Personality	.03	.09	.06	.35	.72	
Successful Intelligence	.24	0.8	.52	3.05	.00*	

*p<0.05

As Table 4 shows, the model could explain 23% of the variance in the final flipped scores, but only successful intelligence was a significant predictor (p<0.05).

To further investigate which of the sub-constructs of successful intelligence is a better predictor of final flipped scores, another multiple regression test was run in which the three constructs of analytical, creative, and practical intelligence were the independent variables (Table 5).

Table 5 indicates that creative intelligence is the best predictor of the final flipped score.

Table 5. *Regression Test for the Predictive Power of Constructs of Successful Intelligence*

	Model Summary				ANOVA	
	R	**R Square**	**Adjusted R**	**Std E**	**F**	**p**
	.58	.34	.26	62	4.19	.01
	Coefficients					
	B	**Std. Error**	**Beta**	**t**	**p**	
Analytical	.26	.18	.26	1.42	.16	
Creative	.50	.20	.45	2.47	.02*	
Practical	-.00	.24	-.00	-.01	.98	

*p<0.05

Discussion

The results of the study showed that students were generally satisfied with the flipped learning experience and felt more motivated and engaged in the flipped classroom. This is in

line with the findings of Hsieh et al.'s (2017) study in which the mean scores of 3.81, 3.86, 3.90, and 4.00 were reported for motivation, effectiveness, engagement, and overall satisfaction, respectively, and the mean score of item 9 which states the preference of the students for the flipped classroom was 3.58, which is lower than what was found in this study. Having the opportunity to prepare before the class and giving the chance to consolidate their learning inside the class and see the practical use of the theoretical issues which are presented in the lesson might be one of the reasons for students' satisfaction.

Moreover, the results showed that although students outperformed on the part of the flipped learning exam which tested higher-order thinking skills of application, analysis, and synthesis, they had higher scores on the low-order skills of comprehension and knowledge of the non-flipped classroom. This confirms Hung's (2014) and Muffet's (2014) contention that flipped classroom provides the opportunity to develop higher-order thinking in the classroom. The reason for this finding might be the fact that students in the flipped classroom practiced a lot and analyzed and produced different test items. This might have enabled them to go through the three stages of skills development as proposed by Anderson (1987) and their declarative knowledge of the basic conceptual issues which was tested through lower-order items and might have changed into procedural knowledge. However, in case of the students in the non-flipped classroom, since they were not required to use the declarative knowledge for practical purposes, they might have had a better command of basic conceptual issues. The next finding of the study was that successful intelligence was a better predictor of flipped learning scores and personality could not predict the performance of the learners on the final test of the flipped classroom. This indicates that flipped learning might be beneficial for all learners with different personality characteristics. There was no study in the literature which focused on the role of personality traits in the achievement of learners in the flipped classroom, but the findings of this study are not consistent with findings of studies which have shown association between personality traits such as openness، extroversion, consciousness, neuroticism, and academic achievement (Caprara et al., 2011; Komarraju et al., 2011; Novikova & Vorobyeva, 2017; Poropat, 2009; Zuffianò et al., 2012). The finding that successful intelligence was a significant predictor of students' achievement in the flipped classroom is consistent with studies which maintain that successful intelligence correlates with the achievement of learners (Ekinci, 2014; Sternberg, 2002; Sternberg et al. 1998). However, although Mysore and Vijayalaxmi (2018) and Vimple and Sawhney (2017) reported significant correlations between academic achievement and all components of successful

intelligence, the results of this study showed that those with higher creative intelligence could perform better on the flipped classroom exam. This finding seems logical because, in the flipped classroom as well as in part of the exam, the flipped learners were required to produce items for assessing listening, speaking, and writing skills, a task which might have been facilitated by learners' higher creative intelligence.

Conclusion

The flipped classroom is a satisfactory experience for the learners which helps them have a deeper understanding of the concepts and materials which are taught to them and it provides them with the opportunity to think of the application of what they learn. Though preparing the content for the flipped classroom is time-consuming and might require energy from the teacher, the results seem to worth the time and energy invested by the teacher and the students, and at the university level it helps students to see the application of what they are taught in reality, and regarding the relationship between achievement of the students in the flipped classroom and the successful intelligence, flipped teaching and learning seems to be a strategy for what (Sternberg (2002)) calls 'teaching for successful intelligence'. The findings of this study imply that the time and energy spend by professors and instructors for preparing the flipped content is rewarding because it can improve the learning of the students. The time and efforts are also saved for future courses because the videos and PPT files prepared can be used for future courses, too. The findings also imply that flipped learning is appropriate for different learners regardless of their personality types.

However, there were certain limitations in this study which can be addressed in future studies. For example, although the results of this study confirm the effectiveness of flipped classroom and no role for personality traits, due to some limitations such as the small sample size and the intact group design, further studies are in order to explore the factors which might influence the effectiveness of flipped classroom with larger samples. Another limitation of the study was that it was an intact group design and the first half of the class was taught through flipped technique, and the second half was taught through lecturing. Therefore, future studies can be done using independent groups or counterbalanced designs to take into account the effect of the order of presenting the flipped technique and lecturing. Moreover, future research can focus on the effectiveness of flipped learning and lecturing through using immediate and delayed post-tests.

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