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Implementing a Flipped-Learning Pattern Based on the Problem-Solving Teaching Approach to Strengthen students' Problem-Solving Styles in Learning English



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ABSTRACT

In today's world where students' virtual literacy has increased and when all kinds of e-books and educational videos are used and welcomed, flipped learning can easily enter our educational system, accelerate the preparation of students' professions with reinforce their reasoning power, judgment, and decision-making. Therefore, the present study has implemented a flipped learning pattern based on the problem-solving teaching approach to strengthen students' problem-solving styles in learning English. This research is a quasi-experimental study with pre- and post-test in two control and experimental groups. Participants were 320 people available by random replacement. To collect data, the Cassidy and Long problem-solving questionnaire was administered to the two groups as a pre-test. Then, the teaching method was traditional in the control group, and under a flipped teaching pattern based on the problem-solving teaching approach in the experimental group. To evaluate the amount of learning, the post-test scores of the two groups were compared. To measure the normality of the study population, a repeated measurement test and parametric t-test of a sample were performed. The results indicate the use of this method is more significant in the experimental group than in the other group. But no significant superiority was observed in the effect of the method in the two groups. Learning in this way is one of the basic needs of today's all levels of education. Given the benefits of reinforcing in-depth thinking, analytical thinking, critical thinking, creativity, confidence in decision-making, and problem-solving, this teaching method can be used as a complementary method alongside traditional teachings.

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1. Introduction

Learning the international language itself is a reason to expand communication because living in a multilingual world, where communication with other countries, especially the First World countries, is currently the most necessary way to acquire new and up-to-date sciences ([Jalali, 2021](#)). It fades the boundaries that have separated the people of different countries as geographical borders. According to the findings, there are several reasons for learning English that have tangible benefits, including the importance of using English in accessing firsthand content from the internet, up-to-date entertainment and games, expanding the communication environment, interaction and exchange, interacting with international users, daily life, technology, international communications, international trade, and earning dollars. It helps people find job opportunities, have a comfortable trip, get acquainted with different countries' cultures, do easy research, access up-to-date scientific and economic materials from firsthand sources, progress in education, and participates in international seminars as well ([Putra, 2020](#)).

Considering that human beings have found the spirit of searching from the exact beginning of their lives and are always looking for answers to various questions and their surroundings to know more about themselves and this spirit is strengthened in them as they grow intellectual age, too

([Mehrmohammadi, 2014](#)), many of the problems, from scientific issues to social, cultural, political, and economic subjects, that they will face in their daily and real life are full of simple and complex situational problems having to solve one by one ([Sabari Khosroshahi, 2010](#)). They are essentially a problem-solving situation resulting from rapid changes in science and technology, which cast a shadow on all aspects of human life and affect it ([Hamidi & Sarfarazi, 2010](#)).

In addition, the complex and changing nature of today's societies and their needs and requirements always expose us to new, complex, and unresolved situations, the solution of which will play an essential role in our success ([Soleymani, Aliabadi, Zaraii Zavaraki, & Delavar, 2021](#)). Therefore, facing people to these kinds of issues is undeniable in life, work, and research, and there should be ready to solve the problem in them ([Farhadian, 2009](#)). According to this, individuals can cope with changing life conditions and new situations that they constantly face by creating the ability to solve problems ([Seif, 2021](#)).

Now there is a discussion about the issue. It occurs when an obstacle undermines our current well-being, and problem-solving skills find solutions that remove barriers in the way and get the person to their goal. In other words, solving the problem finds a suitable way to achieve a goal currently impossible to reach ([Zare & Forouzandeh, 2013](#)). Therefore, educational systems to prepare the next

generation by solving the unforeseen events and problems of the future must create a change in educational methods of the educational process ([Soleymani, Mosavi, & Parirokh, 2012](#)). Curricula should focus on ways in which learners, instead of storing information, develop thinking, searching, problem-solving skills, and creativity through intellectual discipline ([Shabani, 2020](#)).

Hence, teaching with active and learner-centered learning approaches effective in learners' improving problem-solving skills, creativity, and initiative seems essential ([Adibnia, Mohajer, & Sheikhpour, 2013](#)). It makes it possible for them to use the mental capabilities of the mind, creativity, and potential environmental possibilities, in general, to benefit and develop their healthy personality in society ([Ahmadi, 2009](#)). Solving problems by the learner gives him a sense of competence, independence, and self-confidence. This method is one of the collaborative methods in teaching, having many applications. Although some have considered this teaching method more compatible with the individual model, experience shows that this method as a group is more effective than its single role model ([Parsons, Stephen Lewis, & Deborah, 2017](#)).

The definition of the problem-solving method states that "problem-solving is a process for discovering, sequencing, and arranging paths that lead to a goal or a solution" ([Safavi,](#)

[2014](#)). Therefore, in the problem-solving process, not only the answer is essential, but also the process of reaching it is necessary. In this method, learners try to solve the problem and reach the best way to solve it while using their previous knowledge ([Zarei and Marandi, 2011](#)). In this case, learning takes place by creating challenges on educational topics ([Prichard, Stratford, & Bizo, 2006](#)). If the education system can teach learners the ability to solve problems, it has achieved its goals. The more the decision-making power and selection of desirable solutions increase in learners, the easier it will be to meet their daily needs and the more successful they will be ([Adibnia, 2010](#)).

This teaching method includes brainstorming on related topics, filtering out irrelevant ideas, and discussing possible and beneficial responses and consequences of the actual world ([Preeti, Ashish, & Shriram, 2013](#)). In the meantime, the flipped learning model based on the problem-solving teaching approach is an effective method to present topics in education in a coherent, integrated, and focused manner and is based on the principles of adult learning theory. This teaching method strengthens the motivation to learn, deep thinking, analytical thinking, critical thinking, and creativity in performing activities, goal setting, and decision-making with confidence and trust. Most importantly, it stimulates acceptance of learners'

learning challenges and curiosity and creates a pragmatic learning program. Hence, this study seeks to investigate the performance of a flipped learning model based on the problem-solving teaching approach to strengthen students' English language learning problem-solving styles.

2. Review of the Literature

The history and antiquity of examining, theorizing, and implementing problem-based curricula in education were in the late 1950s and early 1960s being a part of the cognitive-behavioral motion for behavior modification. Desorilla and Goldfried, the founders of this method, have emphasized the need for training problem-solving skills on the arrange of training individual skills ([D'Zurilla & Nezu, 2010](#)). Psychological theorists have examined problem-solving skills from different perspectives. A problem-oriented curriculum design approach is more commonly known as problem-based learning ([Mahmoudi, 2012](#)). Planning to design and develop a problem-based curriculum was started as a new curriculum at McMaster University in 1966 by Howard Burroughs et al., and the first group of students of medical education registered in 1969 ([Mehrmohammadi & Mahmoodi, 2013](#)).

[Woods \(1996\)](#) first used the title of problem-based learning. After the 1970s, it gradually expanded to other universities in the world. Instructors have performed problem-based learning since the 1980s in professional majors such as engineering. At present,

instructors implement in various fields of basic sciences, engineering, social sciences, humanities, behavioral sciences, and agricultural sciences at different levels of education face-to-face, virtual or integrated ([Laines et al., 2011, quoted in Mahmoudi, 2012](#)). The basic assumptions of this model are a) change in learning and the role of the learner, b) change in the type of education and emphasis on vocational and theoretical education in combination, c) change in educational centers and their role, d) change in the role of knowledge ([Preeti, Ashish, & Shriram, 2013](#)).

Zare and Nahravanian ([2017](#)) found that the growth and development of levels of critical thinking as an effective capability and empowerment can promote students' academic achievement in self-direction and problem-solving, self-directed and problem-solving learning levels. Hosseinitabaghdehi and salehi ([2018](#)), in their research results, found a significant positive relationship between self-directed learning and students' self-efficacy. Another study showed a relationship between motivation for progress and problem-solving styles (creativity, trust, and orientation) ([Mahmoodinezhad, Masoudiyekta, Samsamipour, Zamaniyan, Mahmoodinezhad, & Kasani, 2020](#)).

The results of Parvaneh, Zoghi, and Asadi ([2020](#)) showed that the flipped teaching method has a significant effect on improving the autonomy of language learners and reducing their

anxiety. Another study found that people who have learned a second language with higher information processing power and faster learning ability can collect and summarize information about the subject matter more accurately and quickly than people who only know one language ([Haddadi, Zare, & Alizadehfard, 2020](#)).

Terasne and Setianingsih ([2020](#)) found in their research that problem-solving strategy had a positive effect on students' speaking skills.

Research data from Dmitrenko, Petrova, and Podzygun ([2020](#)) also show that regular use of problem-based tasks has a constructive impact on students' language competence formation. Phonetic, lexical, and grammatical skills have improved due to peer communication and self-control while solving problem tasks. The overall results of this study confirm the increase in students' speaking skills (monologue, dialogue, and polylogue skills). Abdollahi and Ahmadabadi ([2019](#)) showed that instructors should pay attention to factors such as having complete teacher mastery, motivating the students, teacher belief in the ability to do work, school and administration incentive policies, required resources and facilities, school incentives, family awareness, classroom dynamics, teacher belief in flipped learning effectiveness, teacher belief in student, up-to-date teacher information, breaking the traditional frameworks and rules, and cultural presuppositions about the role of the

teacher, interest in being guided by the teacher to create flipped learning.

Other research results show that gender, lesson, and outcome variable types influenced learners' scores in this teaching method ([Sahebyar & Mesrabadi, 2021](#)). Nourinezhad, Hadipourfard, and Bavali ([2022](#)) found that flipped learning had a higher effect on improving self-confidence in students' English writing performance in the flipped learning group compared to the traditional education group. Sahebyar and Barghi's ([2021](#)) research indicates that flipped learning improves goal orientation in students' learning.

3. Method

This research is a quasi-experimental study with pre-test and post-test. Researchers have done it with a quantitative method, and it consists of two hypotheses:

Hypothesis 1- The implementation of a flipped learning model based on the problem-solving teaching approach has the effect of strengthening the problem-solving styles of students' constructive English language learning.

Hypothesis 2- The implementation of a flipped learning model based on the problem-solving teaching approach has the effect of strengthening the problem-solving styles of students' non-constructive English language learning.

3.1

articipants

The statistical population was all English language learners registered in the Aladdin Short-Term Specialized Training Center in Mashhad with 814 persons (530 learners in grammar, comprehension, and vocabulary and 284 persons in conversation skills). Among them, 250 learners were for grammar, comprehension, and vocabulary skills, and 120 persons for conversation chosen available by purposefully random replacement. Criteria for selecting language learners, in addition to being random, were voluntarily and based on their desire to participate in research, lack of English as their original language, and the time limitation from 1397 to 1399. After deleting questionnaires that did not answer the questions entirely or those that did not answer, the number of questionnaires analyzed was 220 participants in grammar, comprehension, and vocabulary and 100 participants in conversational skills. When using homogenization based on their scores, there were 320 learners divided into two groups, control and experimental.

In the next stage, to collect data, after identifying the community and the statistical sample by the researcher, the topics, schedule, and implementation of the project were determined. In each of the control and experimental groups for grammar, comprehension, and vocabulary skills with 220 participants in 12 groups (six control groups and six experimental groups) between 7 to 12 members for eight months and conversation skills with 100

participants, instructors teach in 6 groups (three control groups and three experimental groups) of 6 to 10 member. Scheduling of grammar, comprehension, and vocabulary skills were eight sessions of 3 hours in 3 weeks with three sessions per week (24 hours), five sessions of 4.5 hours in 3 weeks with two sessions per week (22.5 hours + 1.5 hours of testing), and four sessions 6 hours on two days in the morning and evening were intensive (sixteen sessions in total). To implement conversational skills, researchers performed in two independent codes according to the program thirty-nine sessions of 90 minutes (58.5 hours), two sessions per week, and twenty sessions of 180 minutes (60 hours), one session per week.

3.2

struments

To collect data and assess the impact of content and learners' progress on skills, instructors used the Cassidy and Long (1996) problem-solving questionnaire with 24 questions graded on a three-point scale (yes, no, and I do not know) and measures six factors. Constructive problem-solving styles are: Creative problem-solving style (questions 9, 10, 11, and 12) refers to planning and considering various solutions in a problem-solving situation, confidence in problem-solving style (questions 13, 14, 15, and 16) indicates learners' belief in their personal ability to solve problems, trend style (questions 21, 22, 23, and 24) is related to positive feedback on

problems and the desire to face them. These represent positive styles. Non-constructive problem-solving styles are: Failure to resolve the issue style (questions 1, 2, 3, and 4) shows a person's indifference in problem-solving situations, avoidance problem style (questions 5, 6, 7, and 8) reveals the effect of external and internal inhibitors on the problematic situation, finally, avoiding the problem-solving style (questions 17, 18, 19, and 20) indicates a tendency to ignore problems instead of solving them. These symbolize negative styles. The range of scores of each learner in the six respective styles is from zero to 8.

In validating scales, Mohammadi and Sahebi ([2001, quoted in Soleymani, Aliabadi, Zaraii Zavaraki, and Delavar, 2022](#)) obtained an average alpha of 0.60. The alpha coefficient in the study of Babapour Khairuddin, Rasoulzadeh Tabatabai, Ejei, and Fathi Ashtiani ([2003](#)) is equal to 0.77, and its validity coefficient is 0.87. Therefore, considering the average internal correlation of tests, this scale has the required reliability. Cassidy ([2009](#)), in his latest research, reported the validity of this questionnaire as follows: failure 0.80, avoidance 0.71, creativity 0.75, confidence 0.78, tendency 0.73, and avoidance 0.71. In this study, researchers considered problem-solving styles in two styles, constructive or positive and non-constructive or negative, and their validity coefficient was 0.91.

3.3

rocedure

To implement this teaching method, instructors first prepared the content for grammar, comprehension, and conversation separately. In the production of grammar content, comprehension, and conversation according to the content topics, interactive educational slides with questions and dialogues for the end of each section were designed and produced by PowerPoint software (because of its easy access via mobile phone). For further explanations on each topic, an educational booklet and workbook were prepared and provided to the students before the beginning of the course. Then, instructors considered the appropriate social network platform according to easy access (Telegram and WhatsApp). With this social network, learners and instructors can communicate by sharing educational content, ideas, questions, homework, and tips. This group was limited to participants in the course. It means that only pre-registered students were allowed to enter the classroom.

In addition to holding a pre-test in all groups and skills, instructors gave a brief explanation of the work procedure to the learners at the first session. Researchers first performed the Cassidy and Long's ([1996](#)) problem questionnaire as a pre-test on two experimental and control groups in two skills to evaluate constructive and non-constructive problem-solving styles of

English language learning of students under the Flipped Learning (FL) based on the Problem-Based Teaching Approach (PBTA). Then, in the control group, instructors used the traditional and conventionally teaching method in lectures, books, and pamphlets in the classroom. In this way, students had to attend class to learn and did not know the content of the new lesson before teaching.

In the experimental group under the pattern of flipped learning based on the problem-solving teaching approach, by receiving textual content in electronic and printed formats (books and pamphlets), audio, and video in small frames, via flash (face-to-face), social networks such as Telegram and WhatsApp, they were trained before the start of the class (at the time of registration). In each session, the instructor solved learners' potential problems with the learning content given to the experimental group before the beginning of the session. Then, learners solved the questions and discussed how to solve them based on previously studied information with the instructors' guidance and in collaboration with their classmates. The instructor gave the learners complimentary session activities to consolidate the concepts and provided them with the required content for the next session at the end of the class after debugging and resolving their problems. Contrary to the traditional teaching methods, in this way, teaching is done at home by media, and doing homework and solving problems are in

the classroom. It means that learners are somewhat familiar with the content before starting the lesson, and come to class with a set of questions. In addition to monitoring activities, the instructor is also in the class social network group and class while asking questions, giving feedback to learners, and solving learners' problems. Finally, researchers performed the post-test in two groups.

3.4

ata Collection and Analysis

Researchers analyzed and compared the scores of the two groups in the two stages of pre-and post-test by the repeated measurement test and parametric t-tests of one sample to evaluate the amount of learning and response to the research hypotheses. To check the normality of the study population, one of the tasks to perform the statistical test of univariate analysis of covariance (ANCOVA) is the M Box test or internal correlations examined in the study. To achieve the results of statistical analysis of the present study, first, the collected data were entered in MS Excel 2010 and analyzed using IBM SPSS version 20.

4. Results

Before performing the test, instructors confirmed the basic assumptions of this test (normality of data distribution, homogeneity of variance, regression slope equality). It is a need to do ANKOVA analysis is Box's M test or internal correlations. It is necessary to be higher than 0.05 in the significance level of this test. Due to the lack of internal correlation, it is not possible to continue the ANKOVA analysis test.

correlations of covariance matrix

Table 1. Box's M test results Internal homogeneity

| Scale | Box's M | F | 1 st df | 2 nd df | Sig |
|---|---------|--------|--------------------|--------------------|------|
| Constructive problem solving styles | 117.805 | 39.001 | 3 | 17 | 0.2 |
| Non-constructive problem solving styles | 183.318 | 60.69 | 3 | 180 | 0.12 |

Because of being higher than 0.05 in the significance level of Box's M test, the assumption of homogeneity of the covariance matrix in the two scales of constructive and non-constructive problem-solving styles for the two groups (control and experiment) occurred with no error in the pre-test and post-test stages. Considering the necessary statistical assumptions in Table 1 of Box's M test results, There are internal correlations of covariance matrix homogeneity.

To achieve the results of testing the first hypothesis- the implementation of a flipped learning model based on the problem-solving teaching approach has the effect of

strengthening the problem-solving styles of students' constructive English language learning- the researchers used a repeated measurement test to compare two times (pre-test and post-test) in the two control and experimental groups, first, to investigate the normality of the learners' constructive problem-solving style variable, as shown in Table 2.

Table 2. Description of data on the constructive problem solving styles of learners towards the English language learning in two groups and two stages of pre-test and post-test

| Group | Test | Descriptive indicators | | |
|--------------|-----------|------------------------|-----------|----------|
| | | <i>n</i> | \bar{x} | <i>s</i> |
| Control | pre-test | 160 | 15.28 | 4.99 |
| | post-test | 160 | 17.16 | 5.82 |
| Experimental | pre-test | 160 | 12.65 | 2.96 |
| | post-test | 160 | 17.86 | 6.21 |

solving styles of learners the English language learning

Table 3. Results of repeated measurement test, comparison of the constructive problem

| Stage | F | df | sig |
|--|---------|----|--------|
| The effect of the method in experimental group | 208.384 | 1 | 0.0001 |
| The effect of the method on performance of | 46.117 | 1 | 0.0001 |

| | | | |
|---|------|---|-------|
| experimental to control group | | | |
| The effect of the method × The effect of the group | 3.43 | 1 | 0.065 |

Considering Table 3, the effect of the method is significant. It means the flipped learning model based on a problem-based teaching approach affects students' constructive problem-solving styles of English language learning ($F = 208.384$ and $p = 0.0001$). The experimental group's performance was better and more significant than the control group, too ($F = 46.117$ and $p = 0.0001$). But the effect of the method was not significant in the group ($F = 3.43$ and $p = 0.065$). It means the pre-test did not affect the post-test of the two groups.

To achieve the results of testing the second hypothesis- the implementation of a flipped learning model based on the problem-

solving teaching approach has the effect of strengthening the problem-solving styles of students' non-constructive English language learning- the researchers used a repeated measurement test to compare two times (pre-test and post-test) in the two control and experimental groups, first, to investigate the normality of the learners' constructive problem-solving style variable, as shown in Table 4.

Table 4. Description of data on the non-constructive problem solving styles of learners towards the English language learning in two groups and two stages of pre-test and post-test

| Group | Test | Descriptive indicators | | |
|--------------|-----------|------------------------|-----------|----------|
| | | <i>n</i> | \bar{x} | <i>S</i> |
| Control | pre-test | 160 | 20.83 | 1.68 |
| | post-test | 160 | 21.51 | 2.25 |
| Experimental | pre-test | 160 | 19.93 | 0.71 |
| | post-test | 160 | 21.9 | 2.54 |

Table 5. Results of repeated measurement test, non-comparison of the constructive

problem solving styles of learners the English language learning

| stage | F | df | sig |
|--|---------|----|--------|
| The effect of the method in experimental group | 857.544 | 1 | 0.0001 |
| The effect of the method on performance of experimental to control group | 119.025 | 1 | 0.0001 |
| The effect of the method × The effect of the group | 4.07 | 1 | 0.059 |

According to the information obtained in Table 5, the results of the repeated measurement test show that the effect of the method is significant. That means the flipped learning model based on the problem-solving teaching approach affects students' non-constructive problem-solving learning styles ($F = 857.544$ and $p = 0.0001$). Based on this, the experimental group's performance was also significant ($F = 119.025$ and $p = 0.0001$), and it was better than the control group. But the effect of the method was not significant in the group ($F = 4.07$ and $p = 0.059$), and the pretest did not affect the posttest of the two groups.

5. Discussion

This study aimed to investigate the effect of a flipped-learning model based on the problem-solving teaching approach on students' problem-solving styles of English language learning. They tried to compare, reinforce, and defend the results by examining studies being conceptually and indirectly relevant to the subject.

According to the results obtained from the mean of pre-test and post-test in the control group compared to the experimental group of constructive (Table 2) and non-constructive (Table 4) problem-solving styles, the researchers inferred that the flipped learning model based on the problem-solving teaching approach has a notable effect on students' constructive and non-constructive problem-solving styles of English language learning. Dmitrenko, Petrova, and Podzygun (2020), Terasne and Setianingsih (2020), Hwang, Hsu, Lai, and Hsueh (2017), Abdullah and Tan (2016), Hassanpour Dehkordi and

Heydarnejad (2016), Que and Van (2015), and Zare and Nahravanian (2017) achieved the same results as the results obtained from this study.

Bakar, Norhayati, and Lau (2009) have also shown that using problem-solving learning in English language classes improves students' comprehension of English. Azman and Shin (2012) found that learners have a positive attitude towards problem-solving language methods and problem-solving learning. In other research findings, Mahmoodinezhad, Masoudiyekta, Samsampour, Zamaniyan, Mahmoodinezhad, and Kasani (2020) showed that there is a relationship between motivation for progress and problem-solving styles (creativity, confidence, and tendency). Instructors can strengthen learners' motivation for progress and creativity in solving problems from an initial age. Instructors can strengthen learners' motivation for progress and creativity in solving problems from an initial period and develop their creative ways to deal with issues for improvement in learners by holding educational workshops.

Feizi Konjini, Fadakar Soghe, Chehrzad, and Kazemnejad (2016) have also stated in their studies that learners can learn problem-solving skills. Another study also shows that people who have learned a second language with higher information processing power and faster learning ability can collect and summarize information about the subject matter more accurately and quickly than people who know only one language (Haddadi, Zare, and Alizadehfard, 2020).

6. Conclusion

According to the results of this study and the findings of other related studies, instructors concluded that the flipped learning model based on the problem-solving teaching approach affects students' constructive and non-constructive problem-solving styles in English language lessons. This teaching method can be more successful in teaching this lesson among this group by recognizing learners' characteristics and paying attention to the main ways of problem-solving.

This research is suitable for all teachers who deal with education. Available sampling, conducting research in an educational center, and participants of different ages with different experiences of their performance are the limitations of this research. Researchers can do more research in their future research on other main variables affecting this teaching method and the requirements and prerequisites for implementing the flipped learning model in either English or other subjects, especially considering age, gender, and geographical differences. Researchers suggest further research to identify the models' benefits, barriers, effectiveness, and efficiency in teaching-learning activities.

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