



Predicting the Role of Learning Approaches, Studying Strategies, Metacognitive Strategies, and Reflective Thinking in Students' Academic Achievements

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Abstract

The present study aimed to predict the role of learning approaches, studying strategies, metacognitive strategies, and reflective thinking in students' academic achievements. A cross-sectional analytical study was carried out in Iran. The statistical population encompassed all 5000 students at Roudehen Islamic Azad University throughout 2020-2021. According to Morgan's Table, the sample size was estimated to be 384. Five standard questionnaires including studying strategies, learning approaches, metacognitive strategies, reflective thinking and academic achievement were used for data gathering. Structural equations based on partial least squares were used to analyze the data. The results showed a moderate relationship between learning approaches and metacognitive strategies while a significant relationship was observed between learning approaches, studying strategies, and reflective thinking ($P < 0.05$). There was also a weak relationship between learning approaches and academic achievement. Besides, a moderate relationship was observed between metacognitive strategies and academic achievement, and a significant relationship was revealed between reflective thinking and academic achievement. Numerous factors affect academic achievement. Managers and families by recognizing these variables and providing appropriate conditions could smooth the rate of success for students.

Keywords: Learning approaches, studying strategies, metacognitive strategies, reflective thinking, academic achievement

Introduction

One of the important characteristics of human beings is having the ability to learn. Today, considering cognitive and metacognitive theories, a successful person is one who has learned the method of learning. Nowadays, in advanced societies, the claim that the task of the education system is to transfer information from the previous generation to the future no longer makes sense. Rather, the basis of the education system in the 21st century is to provide an empirical context for educational activities and how to think and how to learn. In the recent century, education is an important part of every person's life. In addition, the quality and quantity of this education plays an important role in the future of the individual. For this reason, psychologists have been working extensively for nearly a century (Hosseini et al., 2005).

Humans strive for progress and achievements in all aspects of life. One of these achievements, which can also pave the way for other developments, is academic achievement. Academic achievement is used as a criterion to evaluate and select individuals for various academic and occupational positions. In addition, according to the significance of education for individuals, the community pays great expenses for individual education. Therefore, achieving positive results in academic fields are of great importance for the community and nation. Accordingly, in different societies, expert groups and psychologists have always emphasized the study of different aspects of education (Khademi et al., 2006).

Academic achievement as well as teaching and learning approaches are influenced by various cognitive indicators. The most important of these include "Epistemological Beliefs", "Learning Approaches", and

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"Reflection" (Fan & Williams, 2010). Bigg's model is one of the models aligning these variables in relation to each other. In this model, learning approaches are considered as a learning process and other studied variables are considered as learner-related variables. Bigg's model demonstrates three aspects required in the classroom. The "presage" aspect in this model includes things that happen before learning, the "process" includes happening while the students are learning, and the "product" includes the dimensions relating to after learning and encompasses the results of learning (Davida et al., 2019). This model suggests that there are three prevalent approaches to learn: *the shallow approach* encompassing the recreation of what has been taught and responding to minimum needs, the *in-depth approach* entailing a real understanding of what has been taught, and *the advanced approach* including strategies aimed at the highest individual capabilities. Each approach is a combination of two factors including strategy and motivation. Motivation explains why the approach has been selected while strategy relates to the activities conducted by the students to learn (Biggs, 2003). Different combinations create motivation and strategy for different types of learners. Effective learning requires a balance between motivation and strategy. On the other hand, learners may have mixed approaches to teach (Alario et al., 2017).

The focus of epistemological beliefs on learning and academic achievement began with Perry studies. Epistemology is a branch of philosophy that deals with the nature of knowledge and the justification of beliefs (Fan & Williams, 2010). Cognitive researchers believe that a person's system of personal beliefs about the nature of knowledge and learning - epistemological beliefs - is the context or set of assumptions that occur through thinking and learning. Early researchers, on the other hand, examined epistemological beliefs in a general dimension through interviews. In this regards, epistemological beliefs were examined in more or less independent dimensions using a questionnaire. Therefore, the dimensions of epistemological beliefs are: 1. the ability to learn is inherent; 2. knowledge is certain and certain; 3. knowledge is a simple category; and 4. learning happens fast. On the other hand, educational research shows that epistemological beliefs influence learning approaches and mental learning outcomes (Elhamifar et al., 2019). The roots of learning approaches go back to the work of Marton and Saljo (1976) who identified two main categories of learning approaches: "superficial" and "deep". Based on this view, students may adopt a learning approach by understanding the relationship and its meaning in relation to personal knowledge and experience. In comparison, students may have superficial learning to

the extent that they simply retain information for reproduction and do no analysis (Awidi & Paynter, 2019).

One of the influential individual variables in the learning process that is brought to the learning environment is the 'study strategies' that the individual chooses. Studying strategies are referred to as a wide range of conscious and deliberate actions that learners perform to accomplish their learning objectives. Individuals employ studying strategies to make their learning worthwhile and identify and eliminate the probable issues in this regards. The most essential studying strategies are cognitive strategies (in-depth and superficial), metacognitive strategies, and resource management (Kamenez et al., 2018). Superficial strategies are defined as memorizing and storing information in one's mind or rote learning. Deep strategies are defined as the desire to make sense of the subject and to extend it to other experiences and lessons learned. Metacognitive approaches essentially include planning, reviewing, and making adjustments that help learners control their learning. Resource management is defined as individuals' strive to coordinate other factors relating to the study and learning, which includes time management, study environment management, studying with classmates, and seeking help from classmates and teachers. Several studies have pointed out that learning about studying strategies during one's education results in increased learning. Metacognitive strategies are other cognitive variables that have gained great attention. Metacognition is defined as thinking about the act of thinking which was first introduced by Flavell (1979). He defined metacognition as the awareness of cognition and cognitive processes as well as controlling, coordinating, and reviewing cognition actively. Metacognitive processes encompass independent but related aspects such as cognitive knowledge, cognitive coordination, and cognitive experience (Moritz & Lysaker, 2018). According to the literature, three types of metacognitive knowledge were pointed out including declarative knowledge (knowing how factors affect one's cognition), procedural knowledge (knowing how certain skills work and are employed), and conditional knowledge (knowing when we need strategies) (Stephanou & Mpiontini, 2017).

Cognitive coordination refers to a set of activities helping students to control learning, encompassing three dimensions of planning, monitoring and review, and evaluation. Planning incorporates using suitable strategies and allocating resources that influence performance. Monitoring involves one's spontaneous perceptual awareness and task performance, and evaluation involves one's assessment of their learning outcomes and productivity, including actions such as

self-evaluation of results and objectives (Curşeu & Pluut, 2013).

Reflective thinking can be an impactful individual factor in the process of education. This concept is not a novel point of view. According to Dewey's viewpoint, reflective thinking is defined as the constant, active, and accurate investigation. Also, reflective thinking refers to results obtained from beliefs and eventually suggests actions to deal with individual and professional obstacles. Reflective thinking promotes meaningful learning in the process of learning and teaching and helps students enhance particular skills regarding a critical point of view and eventually gain richer professional experiences (Mann et al., 2009).

Four subsets of reflective thinking were considered including; ordinary action which is an automatic and regular activity and requires little consciousness; understanding in which a person uses the existing knowledge to a point that knowledge forms out of meaningful viewpoints and patterns, but no creativity is involved in thinking; contemplation: involving constant and active attention to every proposed idea and seeking the best viewpoint, and last but not least, critical contemplation as the highest level of reflective thinking, involving awareness of why we understand things and how we feel and act (Jansen & Spitzer, 2009). The present study aimed to investigate how learning approaches, studying strategies, metacognitive strategies, and reflective thinking can predict academic achievements.

Method

A cross-sectional analytical study was used in this study.

Participants

In this study, the statistical population consisted of all students of Roudehen Islamic Azad University throughout 2020-2021 that have been over 5000 people. According to Morgan Table, 384 people were selected as the study sample. To select the participants, simple random sampling method was used. In simple random sampling, each element of the target community has an equal chance of being selected.

Instruments

The *Studying Processes Questionnaire (SPL)* is originated from a 10-scale studying behavior questionnaire. Factor analysis of these 10 scales indicates that they could be interpreted at two levels of in-depth and superficial (Biggs, 2003). Biggs has designed his 3P model by integrating individual and

personal factors and proposing the three Ps including presage, process, and product.

Also, the *Learning Processes Questionnaire (LPQ)* is used as a tool for monitoring the teaching and learning environment. According to the Malik et al., study, Cronbach's alpha value for LPQ was found acceptable at 0.79 and 0.72 for the deep approach and surface approach scales, respectively (Malik et al., 2019). Also, the findings of a study confirmed the construct validity and internal consistency of the SPQ for measuring approaches to learning in students (Mogre & Amalba, 2014).

Reflective Thinking Questionnaire is the standard reflective thinking scale questionnaire developed in 2000 by Kember et al. (2000) to assess learners' reflective thinking. In examining factor analysis of reflective thinking items four factors were identified for this scale, each of which is measured by four terms. The subscales of this questionnaire are: habitual practice, comprehension, reflection and critical thinking. Therefore, this scale is a 16-item self-report tool, and the subject must indicate on a five-point Likert scale (strongly disagree = 1, disagree = 2, have no opinion = 3, agree = 4, and strongly agree = 5) the extent to which he/she agrees or disagrees with each of its statements. To get the score of each subscale, it is enough to add the score of all the expressions related to the desired subscale. The scale of reflective thinking in Iran has been standardized by Kadivar et al. (2013). Cronbach's alpha coefficient for the scale was 76% and showed that the reflective thinking scale has an acceptable and satisfactory validity. The construct validity of this questionnaire was examined through factor analysis. Based on this analysis, four subscales of habitual practice, comprehension, reflection and critical thinking were obtained, which is consistent with the research of Kember et al. (2000). The components of the reflective thinking questionnaire by material number are as follows: normal operation (1,5,9,13), understanding (2,6,10,14), reflection (3, 7,11,15), and critical reflection (4,8,12,16) (Kember et al., 2000).

The Metacognition Questionnaire used in this study was developed by Harold O'neal and Jamal Abedi in 1996. According to factor analysis, four factors of the tool include: metacognitive awareness, cognitive strategies, planning, and self-review. The questions were scored on a four-point Likert scale (one to four) with no reverse scoring. This questionnaire consists of four subscales including metacognitive awareness (1-5-9-13-17), cognitive strategy (19.15.11.7.3), planning (4.8.12.16.20) and self-review (2.6.10.14.18) (Shirinzadeh et al., 2009). The validity of the questionnaire was confirmed by the experts and specialists in the behavioral sciences' field. According to

a previous study, reliability of the questionnaire by Cronbach's alpha was calculated to be 0.84 (Shirinzadeh et al., 2009).

Academic Achievement Questionnaire is one of the most common paper and pencil questionnaire to assess the need for achievement. Hermance (1977) constructed this questionnaire based on experimental and theoretical knowledge about the need for achievement. The initial questionnaire included 29 questions developed based on 10 characteristics that distinguish people who have high achievement motivation with those who have low achievement motivation. After trial implementation and analyzing the questions and calculating the correlation of individual questions with total test, 29 questions were selected as the final questionnaire of academic achievement. The questions of the questionnaire were stated as incomplete sentences and multiple options were given for each of them. To equalize the value of questions, four options were written for all 29 questions. The options were given score in terms of intensity of motivation of achievement from high to low or low to high. The validity of the questionnaires was confirmed by the experts in field. Also, the reliability of the questionnaire was measured by Cronbach's alpha to be 0.79 (Gilavand et al., 2016)

Procedure

In the beginning of the study, the researchers contacted the Deputy of Research for coordination and obtaining

license for data gathering. The researcher went to the faculties and selected the studied samples based on the sampling method. The questionnaires were given to all participants, and the objectives of the study were explained to them. Moreover, they were assured that all the obtained data will be used only for the purpose of publishing the report of the present project. Then, after three days, the questionnaires were returned to the researcher. According to the participants' cooperation, all the questionnaires were gathered (response rate was 100%). For the data analysis, the SPSS version 21 was used. Analytical tests were used to estimate the relationship between variables. The level of significance was considered as 0.05.

Findings

In the study 384 students participated that among them 241 persons (62%) were female and 143 persons (38%) were male. The students' field of study was as follows: 197 persons in humanities and social sciences, 103 persons in engineering, and 84 persons in art and architecture. The results of the study are presented according to the research hypotheses as follows:

The first hypothesis of this study was determining the relationship between learning and studying approaches and metacognitive strategies whose results The results are shown in Table 1.

Table 1.

Results of Correlations between Learning and Studying Approaches and Metacognitive Strategies

Variables	R statistic	Path coefficient	R ²	P-value
In-depth approach → metacognitive awareness	7	0.960	0.30	P= 0.05
In-depth approach → cognitive strategies	9.36	0.885	0.441	P= 0.05
In-depth approach → planning	8.94	0.878	0.405	P= 0.05
In-depth approach → self-review	8.29	1	0.414	P= 0.05
Superficial approach → metacognitive awareness	2.98	-0.418	0.340	P= 0.05
Superficial approach → cognitive strategies	2.21	-0.239	0.441	P= 0.05
Superficial approach → planning	2.37	-0.262	0.405	P= 0.05
Superficial approach → self-review	3.94	-0.457	0.414	P= 0.05

According to Table 1, a moderate correlation was observed between learning approaches and metacognitive strategies. According to the R statistics obtained, the strongest relationship was observed between cognitive strategies and the in-depth approach

(R=9.36), and the R² value indicates that cognitive strategies' susceptibility to the in-depth approach was 44.1%. Table 2 presents the relationship between learning approaches, studying strategies, and reflective thinking among the students.

Table 2.*Results of the Correlation between Learning Approaches, Studying Strategies, and Reflective Thinking*

Variables	R statistic	Path coefficient	R ²	P-value
In-depth approach → ordinary action	2.854	0.304	0.966	P < 0.05
In-depth approach → understanding	2	-0.296	0.947	P < 0.05
In-depth approach → reflection	2.228	-0.228	0.966	P < 0.05
In-depth approach → critical reflection	7.974	1	0.723	P < 0.05
Superficial approach → ordinary action	6.492	0.691	0.966	P < 0.05
Superficial approach → understanding	9.313	1.247	0.947	P < 0.05
Superficial approach → reflection	11.971	1.184	0.946	P < 0.05
Superficial approach → critical reflection	1.971	0.230	0.723	P < 0.05

As shown in Table 2, a significant correlation was observed between learning approaches, studying strategies, and reflective thinking. According to the R statistic, the highest correlation was observed between the superficial approach and reflection (R=11.971), and R² indicates that the reflection's susceptibility to the

superficial approach was 94.6%. According to hypothesis of the study, the relationship between learning approaches, studying strategies, and academic achievement was analyzed. The results are shown in Table 3.

Table 3.*Results of Correlations between Learning Approaches, Studying Strategies, and Academic Achievement*

Variables	R statistic	Path coefficient	R ²	P-value
In-depth approach → academic achievement	5.207	0.872	0.229	P > 0.05
Superficial approach → academic achievement	2.491	-0.439		

A weak correlation was observed between learning approaches, studying strategies, and academic achievement. According to the R statistic, the highest correlation was observed between the in-depth approach and academic achievement (R=5.207), and the

respective R² value indicated that academic achievement was susceptible to the in-depth approach by 22.9%. Table 4 presents the relationship between academic achievement and metacognitive strategies among the students.

Table 4.*Results of the Correlations between Academic Achievement and Metacognitive Strategies*

Variables	R statistic	Path coefficient	R ²	P-value
Metacognitive awareness → academic achievement	1.884	-0.37	0.433	P = 0.05
Cognitive strategies → academic achievement	1.946	-0.696		P = 0.05
Planning → academic achievement	3	-1.151		P = 0.05
Self-review → academic achievement	1.172	0.468		P = 0.05

A moderate correlation was observed between metacognitive strategies and academic achievement. According to the R statistic, the highest correlation was observed between planning and academic achievement (R=3), and the respective R² value indicated that

academic achievement was susceptible to planning by 43.3%. Table 5 presents the relationship between academic achievement and reflective thinking among the student in Iran.

Table 5.*Results of the Correlations between Academic Achievement and Reflective Thinking*

Variables	R statistic	Path coefficient	R ²	P-value
Ordinary action → academic achievement	0.364	-0.058	0.936	P < 0.05
Understanding → academic achievement	0.256	0.082		P < 0.05
reflection → academic achievement	0.945	0.269		P < 0.05
Critical reflection → academic achievement	8.485	0.734		P < 0.05

As shown in Table 5, a significant relationship was observed between academic achievement and reflection. According to the R statistic, the highest correlation was observed between critical reflection and academic achievement ($R=3$), and the respective R^2 value indicated that academic achievement was under the influence of critical reflection by 93.6%.

Discussion

The present study aimed to determine between learning approaches, studying strategies, metacognitive strategies, and reflective thinking with academic achievements among the students in Iran. According to the results, moderate correlation was observed between learning approaches and metacognitive strategies. The results of R statistics showed, strongest relationship between cognitive strategies and the in-depth approach ($R=9.36$), and the R^2 value indicates that cognitive strategies' susceptibility to the in-depth approach is 44.1%. Such results confirmed the idea that effective and efficient teaching and learning are accomplished in an environment designed properly and based on scientific principles. The students who aim beyond mere memorization and strive for learning things at high cognitive levels and understand analytical concepts and application are greater than other students in the educational system in terms of skill enhancement and metacognitive awareness. Hayat et al., (2020) investigated the relationship between studying and learning approaches and metacognitive strategies and discovered that students who use metacognitive strategies are quite successful learners. It could be suggested that these students have higher precision, concentration, and orientation compared to other students since they employ proper studying and learning approaches and are more likely to accomplish academic achievements.

According to the results, significant correlation was observed between learning approaches, studying strategies, and reflective thinking. Based on the R statistic, the highest correlation was observed between the superficial approach and reflection ($R=11.971$), and R^2 indicates that the reflection's susceptibility to the superficial approach is 94.6%. As Williams & Tang (2020) have indicated, improper learning approaches are correlated with poor learning results and weak educational performance. They suggest that those who employ specific learning approaches are more aware of exercising reflective thinking. Also, reflection is learning through previously-received knowledge that nudges the learner toward a critical viewpoint of himself and the universe. An individual without reflection would only learn superficially and would not search for

meanings, while a reflective person would move beyond his own ideas through searching and developing hypotheses as well as considering other's ideas, expanding his thoughts, and learning at a deeper level. Hence, students with the right learning approaches who adopt a critical point of view, develop hypotheses, and reflect on their study materials have better academic performance and tend to accomplish great academic achievements.

According to the results, a weak correlation was observed between learning approaches, studying strategies, and academic achievement. Based on the R statistic, the highest correlation was observed between the in-depth approach and academic achievement ($R=5.207$), and the respective R^2 value indicates that academic achievement is susceptible to the in-depth approach by 22.9%. Biggs (2003) believed that in-depth learning approaches based on individual needs to understand are associated with learning challenges, while the superficial approach of learning is achieved by the minimum challenge in doing homework. The superficial learning approach is attributed to students who are seeking to achieve their intended results through the smallest amount of work (motivation). Such a motivation inclines students to reach out to solutions such as mere memorization to satisfy their momentary academic needs. This approach does not involve analytical learning and results in poor learning results. On the other hand, the in-depth approach is characterized by focusing on developing a critical understanding of the studied materials. Behaviors stemming from this approach include the integration of newly-learned materials with old materials and getting actively involved with the study material. Results of the present study indicate a relationship between studying and learning approaches and academic achievement, demonstrating the highest correlation to exist between academic achievement and in-depth approaches, which is consistent with the results of Shahrabadi et al. (2013). Also, it is consistent with the findings of Seif and Kayyer (2008). To explain this relationship, it must be noted that better academic achievements through the in-depth approach could be due to the facts that: 1. the learner asks himself questions about the study material while using the in-depth learning and studying approaches, 2. such people tend to spare time to better understand interesting subjects mentioned in various classrooms, such people are always ready to give presentations or classroom lectures.

As the results showed, moderate correlation was observed between metacognitive strategies and academic achievement. According to the R statistic, the highest correlation was observed between planning and

academic achievement ($R=3$), and the respective R^2 value indicates that academic achievement is susceptible to planning by 43.3%. Metacognitive strategies are defined as any thought or action used by the learner while learning to help to learn, organizing, and storing the knowledge and skills and facilitate their use in the future. Domestic studies confirm that metacognition helps students think and grow thinking skills (Qobari-Bonab et al., 2012). Williams (2020) has also stated that metacognition improves learning by helping to fulfill tasks and solve problems. Results of the present study indicate a relationship between academic achievement and metacognitive strategies as well. Results are consistent with that of Blackwood (2010) quoted by Bear (2012), indicating that metacognitive skills help students make a useful decision throughout life as well as increasing their chance of success in their study major. Besides, the results of this study are consistent with the results of Perkins et al., (1990), indicating that teaching cognitive and metacognitive strategies impact social science studies in almost all cases and improve learning and has enhanced learner's academic performance in both learning and memorization.

According to the results, significant relationship was observed between academic achievement and reflection. Hence, the highest correlation was observed between critical reflection and academic achievement ($R=3$), and the respective R^2 value indicates that academic achievement is under the influence of critical reflection by 93.6%. Results of the study are consistent with findings obtained by Fouladchang (2005) indicating that critical reflection can positively predict academic achievement. So, to justify the result indicating the relationship between reflective thinking and academic achievement, it could be suggested that people with reflecting thinking are more capable of analyzing their reasons for learning and education and can test hypotheses. Such people have a self-reliant spirit which is the foundation of reflective thinking and is an indicator of academic achievement.

Conclusion

In general, the findings supported the theoretical notion that learning approaches, studying strategies and reflective thinking influence students' academic achievement. Therefore, numerous factors affect academic achievement among student in Iran. Using any of these strategies will increase academic performance. Managers and families can smooth the rate of success for students by recognizing these variables and providing appropriate conditions. In this regards, considering that reflective thinking can be learned and taught, educational courses are recommended to be held

for students in this field to help them accomplish academic and occupational achievements through the timely use of these skills. Furthermore, faculty members are recommended to raise awareness among their students regarding their cognitive abilities using metacognitive methods and adopt a new teaching method resulting in students' awareness of themselves and shedding a light on the paths they are going to take in terms of learning. Moreover, future research is needed to verify the current study results. On the other hand, future inquiries are suggested to investigate the impact of variables such as teaching methods on reflective thinking. Also, it is recommended that more concise questionnaires will be used in future projects to make the participants respond more precisely. The assessment of the role of confounding variables on the studied variables are suggested in forthcoming investigations. Moreover, it is also suggested to study the relationship between other variables affecting students' academic achievement.

Like all studies, this study had some limitations as follows:

1. The population was limited to a university; therefore, this cannot be generalized to all universities.
2. The role of confounding variables in this study was not investigated.

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Conflict of Interests

No conflicts of interest declared.

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