



# Match and Mismatch between Learning and Teaching Style in the Agricultural Education Process

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## Abstract

Teaching and learning processes in universities have not achieved expected outcomes. The mismatch between learning and teaching styles is a challenge in the education process. Instructors should strive to incorporate their teaching style with students' learning styles in order to ensure effective teaching and learning process in higher education. The present descriptive-survey study aimed to explain the compatibility of students' learning styles using Witkin's (1976) Group Embedded Figures Test (GEFT) and teachers' teaching style using van Tilburg and Hamilich's (1990) test. The target population consisted of students and faculty members at the agricultural college at Razi University, Iran. Results revealed that the majority of males were field-independent and the majority of females were field-dependent learners. Concerning four teaching styles (expert, provider, facilitator and enabler), the instructors tended to use the enabler teaching style. Instructors should consider the characteristics and needs of both field-dependent and field-independent students and use different teaching methods. Recommendations about matching learning and teaching styles are provided based on the results.

**Keywords:**  
*Education; field-dependent; field-independent; learning style; teaching style*

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## INTRODUCTION

The learning style focuses on individual learning capabilities, learning paths, preferred learning content, and performance (Balasubramanian & Margret Anoncia, 2018). How individual acquires, retains, and retrieves information is collectively termed the individual's learning style. In other words, the learning style refers to the way in which a student prefers to learn (Aissaoui et al., 2019). Learning styles are personal qualities that influence how students interact with their learning environment, peers, and teachers (Alkhasaweh et al., 2008). The learning style preference impacts how well a group of students responds to their curricula (Stirling, 2017).

Instructors also have different teaching styles. The teaching style is the way in which instructors present and organize information for learners and facilitate their participation (Cox, 2008). Most teachers teach in the same way that they were taught (Katsioloudis & Fantz, 2012).

Recent studies have shown that teaching practices in the classroom have not achieved expected outcomes. There are a lot of challenges in the education process, one of which is the mismatch between learning and teaching styles. This mismatch can reduce class participation, which in turn affects grades and attendance rates of students and leads to dissatisfaction (Alkhasaweh et al., 2008).

Researchers have indicated that the match between learning and teaching styles is optimal to increase learning and teaching competencies. There are a lot of mismatches between learning and teaching styles, so instructors should try to identify the students' learning styles and teach based on them. The mismatch between learning and teaching styles has a negative effect on the students' attitude and motivation. On the other hand, the match between teaching and learning style will promote understanding and lead to the retention of new information at a conceptual level versus surface learning that only includes memorization (Wittmann-Price &

Godshall, 2009).

Students' academic excellence is the main agenda for any educational institution and college. To ensure that academic excellence can be achieved, it requires action and cooperation by all parties. A learning environment that is welcoming, conducive and fun is essential in teaching and learning because the students' ability and readiness to learn depend not only on the students themselves but also on the suitability of a teacher's teaching style (Shaari et al., 2014).

Instructors should try to provide an optimal learning environment that is suitable for the majority of students. Matching learning and teaching style can allow saving learning time (Franzoni & Assar, 2009) and improving learning outcomes. It is, therefore, recommended that before starting education, the students' learning style and the instructors' teaching style should be evaluated by psychological tests. Obviously, various teaching methods influence students' outcomes. Instructors can be encouraged to change the method of delivering information and developing student skills. For example, an experimental study prospectively measured the difference between communication and problem-solving ability in a large group of Korean nursing students (Yoo & Park, 2015). The students were exposed to two different styles of teaching the same material. One group was taught using in-class, didactic methods. The other group was taught using case-based, interactive small-group learning. The students in the case-based group improved their ability to communicate with patients and to solve problems.

Stirling (2017) showed that many faculties at the College of Nursing were interested in using a variety of styles of teaching. The faculty spent a large portion of time teaching with kinesthetic methods. This is in line with the learning style preference of the students at the College of Nursing. However, the amount of time that they spent using visual teaching methods such as watching videos and demonstrations was not congruent with

the learning style preference of the students that they were teaching.

In recent years, learning style theory has been criticized. For example, [Donggun and Carr \(2017\)](#) state that learning styles theories have a number of significant pitfalls that make them useless for explaining learning or achievement. Specifically, the theories describe and categorize behaviors but fail to explain the developmental processes and causal mechanisms that underlie these behaviors. Another problem is that the learning style measures often use rank ordering which forces individuals to rank one style higher or lower than another, creating differences that are not evident in measures that separately assess the different styles. Furthermore, many of the measures of learning styles lack reliability and validity. Finally, the work on learning styles assumes that gearing instruction to learning styles produces better achievement, but the research either does not exist or does not support that assumption.

Despite the criticisms against this theory, these are just useful descriptions of a common behavior pattern. They are always subject to challenge, yet a number of most common learning style models have been employed frequently to help instructors design their instruction more effectively and comprehensively, help students recognize their own learning styles and hence the learning process, and finally help them realize that every individual is different from the other and there is nothing to worry about it as differences are often worth celebrating ([Saeed Khurshid, 2015](#)).

Considering the importance of matching teaching style and learning style, the purpose of this descriptive-survey study was to describe the characteristics of students' learning style using [Witkin's \(1976\)](#) Group Embedded Figures Test and agricultural instructors' teaching style using [van Tilburg and Hamilich's \(1990\)](#) test. The research questions are as follows:

What are the agricultural students' learning

styles based on Witkin's Group Embedded Figures Test?

Is there a significant difference between the learning styles of the students according to their gender?

What are the agricultural instructors' teaching styles based on Van Tilburg and Hamilich's test?

What teaching styles are compatible with what learning styles?

There are several models for learning and teaching styles. In this study, Group Embedded Figures Test (GEFT) ([Witkin, 1976](#)) was used to determine the students' learning styles and [van Tilburg and Hamilich's \(1990\)](#) test was used to determine instructors' teaching style. Further details on these two models are provided below.

#### **Witkin's (1976) learning style theory**

The field dependence-independence theory is one of four cognitive style theories. Cognitive styles include the ways in which people acquire and process information. [Witkin \(1976\)](#) believed that some people reach perceptual judgments without being influenced by the context, while others do. Field-independent people can identify the complicated or messy shape in a complex field while field-dependent people may have difficulty in finding simple shapes in a complex field.

[Witkin et al. \(1977\)](#) enumerated several characteristics of individuals with field-dependent or field-independent cognitive styles. Field-dependent people are less analytical and do not pay attention to details, so they learn better through group discussion and other group learning. They are in harmony with the environment and social components. Field-dependent people are, on the other hand, social people and tend to communicate with others. They are willing to study in the humanity fields.

Field-independent people are spontaneous and self-motivated learners. They simply analyze objectives and pay attention to details. They are interested in abstract and theoretical issues. They do not like team works and

prefer to work individually. They are not influenced by others and usually study in mathematics and science fields. To identify individual learning styles, Witkin et al. (1977) developed the Group Embedded Figure Test (GEFT).

**Group Embedded Figure Test (GEFT)**

In this test, the participant is shown a simple geometric figure, and then it is removed. A complex figure is shown to the participant who is, then, asked to locate the simple figure within this complex figure. Field-independent individuals can find the simple figure quickly from the complex design. Conversely, the field-dependent individuals are not able to identify the simple figure in the time allowed for the test. The score for the embedded figure test is the mean time taken to find the simple figure in the complex design in 12 trials of the test (Witkin et al., 1974). A sample of the embedded-figure test item is shown in Figure 1.

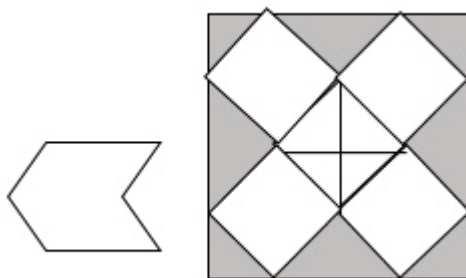


Figure 1. A sample of the embedded figure test item (Source: Witkin et al., 1977)

**van Tilburg and Heimlich’s (1990) teaching style**

van Tilburg and Heimlich (1990) classified teaching styles into two domains, i.e. sensitivity and inclusion. The sensitivity domain includes the ability of the instructor to understand the characteristics of the students. The inclusion domain suggests that the instructor has the tendency and ability to use educational strategies that match the students’ characteristics. An instructor can be classified into one of four teaching styles according

to their sensitivity and inclusion scores. The four quadrants of teaching styles are (Figure 2):

*Expert*: the low-inclusion and low-sensitivity quadrant is labeled “expert”. The “expert” instructors prefer to use the lecture method and they are subject-oriented.

*Provider*: the low-inclusion and high-sensitivity quadrant is labeled “providers”. The “provider” instructors are learner-oriented and try to teach effectively. They prefer to use demonstrations, group discussions, and guided activities.

*Facilitator*: the high-inclusion and low-sensitivity quadrant is labeled “facilitator”. The “facilitator” instructors are teacher-centered and choose teaching methods appropriate to the subject matter.

*Enabler*: the high-inclusion and high-sensitivity quadrant is labeled “enabler”. The “enabler” instructors are learner-orientated and allow students to determine the learning process and activities.

	Facilitator (Teacher)	Enabler (Learning)
Inclusion	Expert (Content)	Provider (Learner)
	Sensitivity	

Figure 2. The distribution of learning styles in four quadrants of Van Tilburg and Heimlich’s (1990) Theory

**METHODOLOGY**

The study was a descriptive survey. The target population consisted of agricultural students and the faculty members at Razi University, Iran. Using the stratified random sampling technique, 135 students were selected using Krejcie and Morgan (1970)’s table of sample size. The census study was used due to the limited number of agricultural faculty members, so a total of 38 faculty members participated in the study. In order

to identify students' learning styles, GEFT (Witkin, 1976) was used. The reliability of the instrument is 0.82 as calculated by Witkin et al. (1977). The instrument consisted of three sections. The first section is only for practice without scoring. It has seven pictures and should be answered in two minutes. The second and third sections have nine pictures and each section should be answered in five minutes. Participants should answer the questionnaire in 12 minutes. The score of the exam obtained from the second and third sections is in the range of 0-18. The mean score of the exam is 11.4. Participants who gain the scores higher than mean are considered to be field-independent and those whose scores are smaller than mean are considered to be field-dependent.

To identify instructors' teaching style, van Tilburg and Heimlich's (1990) teaching style questionnaire was used. The questionnaire contains questions on four areas of teaching styles, Faculty members were asked to respond to questions using a five-point Likert scale. The mean responses to each area of the teaching styles were calculated for each faculty member. Based on the mean score, the teaching style of the faculty members was

specified. Descriptive statistics including frequency and percentage and analytical statistics such as independent-sample t-test were used for data analysis.

## RESULTS AND DISCUSSION

### Determining the agricultural students' learning style

According to Table 1, the mean of the agricultural students' learning style is 10.66, which was less than the mean score (11.4). As already discussed, participants whose scores were higher than the mean score were considered to be field-independent and those whose scores were lower than the mean score were considered to be field-dependent. The learning styles in this group of agricultural students were field-dependent.

### Determining the agricultural students learning style according to their gender

Based on the findings, 40.6 percent of the males were field-dependent and 59.4 percent of the males were field-independent. Among the females, 78.6 percent were field-dependent and 21.4 percent were field-independent (Table 2).

Table 1

*The Mean and Standard Division of the Agricultural Students' Learning Style*

Variable	f	M	SD
Learning style	135	10.66	2.25

Table 2

*The Agricultural Students' Learning Style According to Their Gender*

Gender	Field-dependent		Field-independent	
	f	%	f	%
Male	13	40.6	19	59.4
Female	81	78.6	22	21.4
Total	94	69.6	41	30.4

### Determining the difference in students' learning style according to gender

According to the findings in Table 3, the independent-sample t-test was employed to determine the difference in the students' learning styles according to their gender. There is a significant difference between females and males' learning styles with a 99 percent confidence. The males' learning style (12.22) was higher than the mean score (11.4) and the females' learning style (9.10) was less than the mean score, so the majority of males were field-independent and the majority of females were field-dependent.

### Determining the agricultural instructors' teaching style based on the van Tilburg Heimlich theory

According to Table 4, 7.89 percent of the instructors prefer the expert, 15.78% prefer the provider, 21.05% prefer the facilitator, and 55.26 percent prefer the enabler teaching style.

### Matching learning and teaching styles

The question as to what teaching styles are compatible with what learning styles can be answered as below:

According to Table 5, field-independent students prefer expert and facilitator instructors because these instructors use teaching methods that facilitate the learning process for them. The instructors employ tutorials technology-based presentations, exams/grades emphasized, term papers, and teacher-centered questioning and lectures. Field-dependent students prefer provider and enabler instructors because these instructors use teaching methods that facilitate the learning process for them. These instructors use case studies, cognitive map discussions, critical thinking discussions, fishbowl discussions, key statement discussions, laboratory projects, problem-based learning, role plays/simulations, and roundtable discussions.

Table 3

*The Comparison of the Mean Differences between Females and Males' Learning Style*

Gender	f	M	SD	Range	t-value	p-value
Male	32	12.22	3.89	3-18	4.167	0.0001
Female	103	9.10	4.81	2-18		
Total	135	10.66	4.38			

\*Maximum score:18

Table 4

*The Instructors' Teaching Style Based on the Van Tilburg and Heimlich Theory*

Teaching style	f	%
Expert	3	7.89
Provider	6	15.78
Facilitator	8	21.05
Enabler	21	55.26
Total	38	100

Table 5  
Matching Learning and Teaching Styles

Learning style	Teaching style
Field-independent	Expert (subject-oriented) Facilitator (teacher-oriented)
Field-dependent	Provider (learner-oriented) Enabler (learner-oriented)

The results in Table 5 are an analytical finding. In fact, this finding is a comparison between the characteristics of the learning style of the students with the teaching style of the instructors. The expert teaching style is subject-oriented and the facilitator teaching style is teacher-oriented. Both these two teaching styles are consistent with the field-independent learning style because these students are reluctant to learn through communication with other people. They prefer subject-oriented learning without communication with the environment. The provider and enabler teaching styles are learner-oriented. They are consistent with the field-dependent learning style because these students tend to learn more collectively and through communication with other learners and they are not subject-oriented and they prefer to be communication-driven.

Based on the findings, students have different learning styles and instructors also have different teaching styles. Instructors should accommodate their teaching methods and employ different teaching strategies to improve students' learning. Instructors face many obstacles in choosing suitable teaching methods, such as large classes, scarce resources, and educational institutions demands. It should be noted that circumstance sometimes prevents instructors from using the proper teaching methods, but instructors should explore the characteristics of students' learning style and choose teaching styles that approximately match the characteristic of students' learning style.

Agriculture is a practical field mixed with theoretical subjects where classroom teach-

ing is not enough for sustainable learning. Students should learn by doing, instructors could use "project-oriented" teaching. Project-oriented learning and problem-solving learning are more effective. Rae and Carswell (2000) have expressed that the use of the project approach can cause more pragmatism among students and increase stable and continuous learning.

Instructors should use different teaching methods and should not think only about the transfer of knowledge. Problem-solving learning and the use of existing student's knowledge to solve new problems will improve practical performance among students. To improve the learning process, instructors can use "action research method" to find practical manners as to how to match teaching methods with students' learning styles. For example, for field-dependent students, instructors can use collaborative learning, discussion group, and educational workshops. This finding is consistent with the research results of Aissaoui et al. (2019).

For field-independent students, they can use lecture, individual research project, and problem-based learning. They can also use "education in small groups" method to improve the learning process because, by using this method, students can offset one another's weaknesses. This finding is in agreement with the research findings of Bota and Tulbure (2015).

According to the findings, there is a significant difference between males' and females' learning styles. The majority of males were field-independent and the majority of females were field-dependent. This conclusion

corroborates the reports of Fruza (2014), Witkin (1976), Torres and Cano (1994), Barkley (1995), and Davis (2006).

Results revealed that instructors have different teaching styles, but enabler is the most frequent teaching style used by the instructors. The instructors should be aware of their teaching style using psychological tests such as van Tilburg and Heimlich (1990)'s questionnaire. As such, they can adopt other teaching styles to improve students' learning.

Expert instructors who only want to transfer the information should pay more attention to improve the learning process by developing an effective learning environment. Provider instructors who emphasize teaching effectiveness should pay more attention to the cognition of learner's characteristics in order to use different teaching methods according to students' learning styles and try to match teaching and learning styles. This conclusion supports the results reported by Fruza (2014) and Bota and Tullbure (2015).

Facilitator instructors who are teacher-orientated and emphasize content should be informed that what is important for the selection of teaching methods is not only educational content but also learner characteristics that should not be neglected. Enabler instructors who are learner-orientated and have the best teaching styles should not neglect the fact that learners cannot select processes and learning activity without teachers' guidance, so they should sometimes change their teaching style to support and lead weak students.

### CONCLUSIONS AND RECOMMENDATIONS

There are a lot of challenges in the agricultural education process, one which is the mismatch between learning and teaching styles. Teachers should strive to incorporate their teaching style with students' learning styles to ensure effective teaching and learning process in higher education. The learning style of agricultural students can be determined by the use of Witkin's (1977) Group

Embedded Figures Test (GEFT). Agricultural instructors have different teaching styles and instructors should be aware of their teaching style using psychological tests such as van Tilburg and Heimlich (1990)'s questionnaire. According to the findings, the majority of males were field-independent and the majority of females were field-dependent learners. With respect to the four teaching styles (expert, provider, facilitator, and enabler), instructors tended to use the enabler teaching style. Thereby, instructors can adopt other teaching styles to improve students' learning. For better applicability of the study results, the following recommendations can be drawn:

Before holding educational courses, psychological GEFT can be applied to separate students into field-dependent and field-independent groups. The teaching strategies should be accommodated to students' learning styles.

If students cannot be separated, instructors should consider the characteristics and needs of both field-dependent and field-independent students and use different teaching methods. Instructors can use instructional methods that align with the students' preferred learning styles. For example, instructors can make coordination between objective information (data, facts, experiments, results) and abstract concepts (principles and theories), thereby they can meet the learning needs of both field-independent and field-dependent students.

According to the findings, males' preferred learning style is field-independent and females' is field-dependent, so instructors can separate male and female students and teach in accordance with their learning styles.

Some instructors are not aware of the differences between learning and teaching styles. They should, therefore, be informed about it by in-service educational programs.

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