

## REVIEW ARTICLE

## Learning Styles of Faculty Members

## أساليب التعلم عند أعضاء هيئة التدريس

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**Background:** Given importance to learning and given priority to this point that human beings acquire more of their abilities and competencies through learning, learning styles are focused as a pivotal factor in realization of mental and potential abilities. Empowering academic members in the areas of teaching, scholarship, and leadership leads to the achievement of the missions and goals of the educational institutions; therefore, identifying their learning styles and providing training courses will become important.

**Methods:** This is a systematic review that aims to study the learning styles of faculty members. Searching for articles was done online using Persian keywords and their Latin equivalents, including learning style, faculty members, Kolb, VARK, Reid's perceptual learning style preference, Gregorc learning style, Marshall and Merritt learning style, the dominant pharmacy inventory learning styles, individually or in combination in national and international databases, regardless of limitation in time. In the initial search, a total number of 213 studies were found, out of which 15 studies that fully associated with the learning styles of faculty members were carefully reviewed.

**Results:** The findings of the present study were categorized into four tools of Kolb's learning style, pharmacy inventory learning styles, Gregorc learning style, and Reid's perceptual preferential learning style, among which the dominant learning style of professors was converging and assimilating of Kolb tool, concrete-sequential of Gregorc tool, and assimilating of the pharmacy inventory learning styles tool.

**Conclusion:** Awareness of different learning styles can be used to evaluate and design educational programs, and it is suggested to design empowerment courses of faculty members based on their learning styles.

**Keywords:** Learning, Style, Faculty member, Empowerment

الخلفية والهدف: بالنظر إلى أهمية التعلم والنظر في أن البشر يكتسبون المزيد من القدرات والكفاءات من خلال التعلم، يمكن أن يكون لتحديد أساليب التعلم عاملاً مهماً في القدرة على التحقق من القدرات العقلية والإمكانات. إن تمكين وتقوية أعضاء الهيئة التدريسية في مجالات التدريس والمنح الدراسية والقيادة يؤدي إلى تحقيق مهام وأهداف المؤسسة التعليمية، وبالتالي فإن تحديد أساليب التعلم الخاصة بهم وتوفير الدورات التدريبية على هذا الأساس أمر مهم.

**الطريقة:** هذه الدراسة من نوع مراجعة النسخ تهدف إلى دراسة أساليب التعلم من أعضاء الهيئة التدريسية. البحث عن المقالات باستخدام الكلمات الفارسية والمكافئات اللاتينية وتشمل أساليب التعلم، أعضاء الهيئة التدريسية، كلب، وارن، أسلوب التعلم الإدراكي ل ريد، أسلوب تعلم كركوك، أسلوب تعلم مارشال ومريت تم تنفيذ أسلوب التعلم السائد لدى الصيادلة، إما بشكل فردي أو جماعي، على قواعد بيانات داخلية وخارجية، بغض النظر عن قيود الوقت، وعلى الإنترنت. في البحث الأولي، تم العثور على ما مجموعه 213 دراسة، في النهاية، تمت مراجعة 15 دراسة مرتبطة بشكل كامل بأساليب التعلم للفصائل الأكاديمية بعناية.

**النتائج:** يمكن تصنيف نتائج الدراسة في أربعة أدوات من فط التعلم في كول، وهو أسلوب المتعلم لدى الصيادلة، وأسلوب التعلم في جريجورج، وغط التعلم المتبكر المحيطي ل ريد، والذي يعتبر منه فط التعلم السائد لأعضاء هيئة التدريس والتقارب هو الأداة النظرية المتسلسلة. كانت أداة جريجورج جذابة لأسلوب التعلم عند الصيادلة.

**الاستنتاج:** يمكن استخدام الوعي بأساليب التعلم المختلفة لتقييم وتصميم البرامج التعليمية ومن المقترح أن يتم تصميم دورات لتقوية أعضاء الهيئة التدريسية بناءً على أساليب التعلم الخاصة بهم.

**الكلمات الدلالية:** التعلم، أسلوب، كلية، تمكين

## سبک های یادگیری اعضای هیات علمی

## اکیڈمیک کونسل کے اراکین کے تعلیمی طریقے

**زمینه و هدف:** با توجه به اهمیت یادگیری و با نظر به اینکه انسان بیشتر توانایی‌ها، و شایستگی‌های خود را از طریق یادگیری کسب می‌کند، بنابراین شناسایی سبک‌های یادگیری می‌تواند عامل مهمی در به فعلیت رساندن توانایی‌های ذهنی و بالقوه شناخته شود. توانمندسازی اعضای هیات‌علمی در زمینه‌های تدریس، دانش‌پژوهی و رهبری، سبب می‌گردد رسالت‌ها و اهداف گسترده موسسه آموزشی به‌خوبی تحقق یابند، لذا شناسایی سبک‌های یادگیری آنان و ارائه دوره‌های آموزشی بر آن اساس مهم می‌باشد.

**روش:** این مطالعه مروری نظام مند است که با هدف بررسی سبک‌های یادگیری اعضای هیات‌علمی انجام گرفت. جستجوی مقالات با استفاده از کلیدواژه‌های فارسی و معادل لاتین آنها که شامل سبک یادگیری، اعضای هیات‌علمی، کلب، وارن، سبک یادگیری ترجیحی ادراکی رید، سبک یادگیری گرگورگ، سبک یادگیری مارشال و مريت، سبک یادگیری غالب داروسازان، به‌صورت جداگانه یا ترکیبی در پایگاه‌های اطلاعاتی داخلی و خارجی بدون در نظر داشتن محدودیت زمانی و به‌صورت آنلاین انجام شد. در جستجوی اولیه در مجموع تعداد 213 مطالعه یافت شد که در نهایت 15 مطالعه که به‌طور کامل بیشترین ارتباط با سبک‌های یادگیری اعضای هیات‌علمی را داشتند، مورد مرور دقیق قرار گرفت.

**یافته‌ها:** یافته‌های حاصل از بررسی مطالعات را می‌توان در قالب چهار ابزار سبک یادگیری کلب، سبک یادگیری داروسازان، سبک یادگیری گرگورگ، سبک یادگیری ترجیحی ادراکی رید دسته‌بندی کرد که از این میان سبک یادگیری غالب اساتید همگرای و جذب‌کننده از ابزار کلب، ترتیبی-مفهومی از ابزار گرگورگ، جذب‌کننده از ابزار سبک‌های یادگیری داروسازان بود.

**نتیجه‌گیری:** آگاهی از سبک‌های گوناگون یادگیری می‌تواند برای ارزیابی و طراحی برنامه‌های آموزشی استفاده شود و پیشنهاد می‌گردد که طراحی دوره‌های توانمندسازی اعضای هیات‌علمی بر اساس سبک‌های یادگیری آنان باشد.

**واژه های کلیدی:** توانمندسازی، عضو هیات علمی، سبک، یادگیری

**بیک گراوند:** پژوهن اور سیکهنے کی اہمیت کے پیش نظر انسان اپنی توانائیوں اور لیاقتوں کو پڑھائی اور سیکھنے کے ذریعے پروان چڑھاتا ہے۔ لہذا پڑھائی اور تعلیمی طریقوں سے آشنائی صلاحیتوں کو نکھارنے میں اہم کردار کی حامل ہے۔

تدریس، تحقیقات، اور علمی قیادت اکیڈمیک کونسل کے ممبران کی علمی صلاحیتوں کو جلا بخشنے کے طریقے اپنانے سے کسی بھی تعلیمی مرکز یا کالج اور یونیورسٹی کے اعلیٰ اہداف آسانی سے حاصل کئے جاسکتے ہیں۔ اسی بنا پر اکیڈمیک کونسل کے اراکین کے علم حاصل کرنے کے طریقوں کی شناخت اور ان کے لئے کریشن کورس رکھنے سے بے حد فائدہ ہوگا۔

**روش:** اس تحقیق میں اکیڈمیک کونسل کے اراکین کے علمی طریقوں کو جاننے کی کوشش کی گئی ہے، اس ہدف کے لئے انٹرنیٹ کا سہار لیا گیا اور مختلف طرح کے طریقوں جیسے پڑھائی کے اصول، کلب، ورک، ترجیحی بنیادوں پر علمی طریقے اپنانا، مارشل اور میرٹ جیسے طریقوں کی چھان بین کی گئی۔ اس چھان بین میں پندرہ طریقوں پر بھریور کام کیا گیا جو اکیڈمیک کونسل کے اراکین کی علمی روشوں سے اپنی آگہی میں اضافہ کرنے سے قریب تھے۔

**نتیجے:** اس تحقیق سے حاصل ہونے والے طریقوں کو چار عناوین کے تحت پیش کیا جاسکتا ہے۔ کلب لرننگ میتھڈ، کیسٹ لرننگ میتھڈ، گرگورگ لرننگ اسٹائل، ترجیحی بنیادوں پر پڑھائی کے اصول کو پسند کیا ہے۔

**سفارش:** پڑھائی کے مختلف اصولوں اور راستوں سے آگہی سے فائدہ اٹھا کر ہم تعلیمی پروگرامز کا بھی جائزہ لے سکتے ہیں، یہاں یہ سفارش کی جاتی ہے کہ اکیڈمیک کونسل کے ارکان کی علمی صلاحیتوں کو بڑھانے کے لئے مذکورہ بالا طریقوں کو اپنا نا چاہیے۔

**کلیدی الفاظ:** اساتذہ، اکیڈمیک کونسل، تعلیمی پروگرام

## INTRODUCTION

Training is a complex process which can lead to the loss of forces and facilities, as well as failure in efforts if it is considered simple. The development and transformation of education requires the knowledge of the educational processes and awareness of the modern ways of its implementation (1). Learning is the basis of everyone's behavior. The ultimate goal of every educational activity is to create favorable changes in learners' behaviors and experiences (2). The learners are the key to learning while building their knowledge through selection of actions and strategies (3). Learners' response to learning and educational activities as well as the amount of energy they use can be different (2).

Researchers believe that each learner has preferential ways to understand, organize, and store information in a recognizable and sustainable manner. Identifying the effective factors in learning is one of the important categories considered by these researchers, and learning styles, which are the habits of processing information received by individuals, can be considered as one of the effective factors in learning (4). In references, the concept of learning style is initially defined as a path, tendency, a talent, a cognitive feature. For example, Patureau (1990) argues that the individuals' learning style is their learning style which is shaped by their cognitive style (their mode of action) and their experience as learners. Dunn & Dunn (1978) explain that learning styles are a way for each learner to focus on new and difficult information, process them, and maintain them. Reiner (1976) believes that learning style includes how individuals plan to receive, understand, remind, and use new information (3). Psychologically, learning style is the way in which people focus, obtain experience, and acquire knowledge and information (5). Hohen (1995) writes: "the term learning style refers to beliefs, preferences, and behaviors used by individuals to help them learn in a given position" (6). According to Kolb, learning styles are shaped by heritable factors, previous experiences of life, and the needs of the present environment which are based on the neural structure and personality of individuals (4).

In general, the learning style is used to refer to "an individual way of collecting, organizing, and thinking about information." This term which has become popular over the past decades is based on the belief that knowing the preferred learning style and also having the preferential approach to learning can be useful in informing the learners how to adapt and maximize learning (7).

Fidalgo, Sentos and Thormann (2018) concluded in their investigation that if learning preferences of learners and their learning styles were to be considered, the educational process could be improved and performed more successfully (8). Vizesifar and Torabizadeh (2018) also found that learning based on specific styles not only improves the academic performance of learners, but increases the professional satisfaction of instructors (9).

Considering the importance of learning and teaching methods in employees, and given that human beings acquire

most of their abilities, skills, and competencies through learning, identifying learning styles can be an important factor in realization of potential and mental abilities, so it can lead to intellectual development of individuals (10). In higher education institutions, efforts are being made to continuously improve the professional development of the members through empowerment strategies, including training, retraining, and motivating members regarding their roles and responsibilities (11). Faculty members are the most important capital of each institution in higher education system and their empowerment in the areas of teaching, scholarship, and leadership, makes the missions and goals of the educational institution well realized (12). Certainly, faculty members, like many other people in diverse professions, have many needs, such as the constant need for progress, satisfaction, and communication with others, as well as updating their skills, knowledge, and competencies (13).

It is said that the instructors' awareness of their own learning preferences is important, because the instructor's learning style is likely effective in activities that are provided in a learning environment. Professors and educational planners should use more effective teaching methods, media, and various technologies to maximize the participation of learners in education (14). On one hand, professors need to continue to learn in order to maintain and enhance their own capabilities, so identifying their learning styles and providing training courses is of a great importance. Therefore, it should be sought whether the planners and instructors of empowering courses know what learning styles are used by professors. Thus, the present study aims to study learning styles of faculty members.

## METHODS

This is a systematic review which was performed in May, 2018. The results of this study are based on articles published in national and international journals. Since in this study different learning styles were investigated, searching for articles was done online using Persian keywords and their Latin equivalents, including learning style, faculty members, Kolb, VARK, Reid's perceptual learning style preference, Gregorc learning style, Marshall and Merritt learning style, the dominant pharmacy inventory learning styles, individually or in combination in databases of Pubmed, Eric, Scholar, Wiley, Proquest, Springer, and Taylor, regardless of the time restriction. The inclusion criteria for the study were the keywords in the title and abstract of the articles, while the exclusion criteria of the study were the content of the research that was not related to the purpose of this study, the articles that had investigated the keyword of the faculty member, but had not included the learning style, and the articles related to university professors except faculty members. Accordingly, in the initial search, a total number of 213 studies were found and their titles were then reviewed. In the next step the abstracts of 180 articles were studied and subsequently 65 articles were completely investigated, out of which 15 studies fully associated with the learning styles of faculty members were carefully reviewed (figure 1).

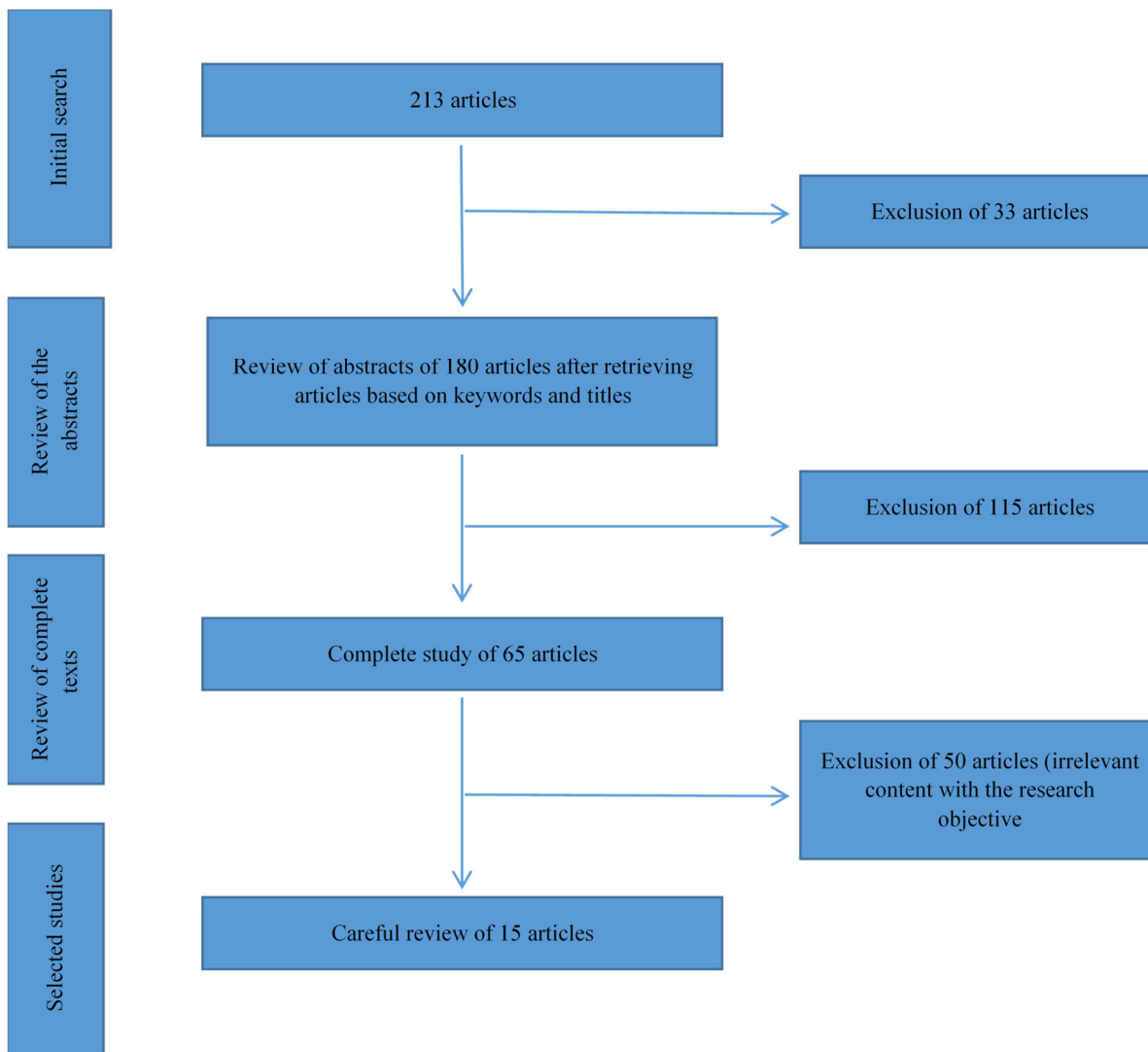


Figure1. Selection process of the articles

## RESULTS

There are various methods for recognizing learning styles based on different psychological behaviors, which can be determined using various tools, including questionnaires prepared by Dunn, Kolb, Keefe, Gregorc, Felder Fleming, and Soloman (15).

Of the 15 papers reviewed in this study, 7 articles had examined Kolb learning style in faculty members, 3 articles were related to the pharmacy inventory learning styles, 3 articles were related to Gregorc learning style, 1 essay was associated with Perceptual Learning Style Preference Questionnaire (PLSPQ) of Reid, and 1 article had also examined Marshall and Merritt learning style.

### **Kolb learning style:**

Kolb designed one of the first learning styles to achieve learning preferences (16). The theory of Kolb learning styles is based on empirical learning theory (ELT). In the theory of empirical learning, learning is "a process in which

knowledge has been created through the transformation of experience; knowledge has been derived from the integration of understanding and experience" (17). To understand experience, learners typically use one of the two dialectical modes: Concrete Experience or Abstract Concept. For transformation of experience, they are dependent on one of two dialectical states: Reflexive Observation or Active Examination. These four modes occur in the reversible process, resulting in a four-step learning cycle (17). These preferences are grouped into four learning styles for particular learning modes, namely Diverging, Assimilating, Converging, and Accommodating (17).

Those who have an assimilating learning style have the ability to create theoretical models and use the deductive reasoning as well as abstract concepts such as science and mathematics (18). Divergent learners are highly imaginative while they have vast cultural interests. They seek information and tend to specialize in arts and humanities. These learners are dependent on people (people-oriented), able to look at

problems from multiple perspectives and organize ideas together, so they are considered as conceptual learners (18). The type of accommodating learners includes those who implement the ideas, are visual, adapt well to changing circumstances, and are considered as conceptual learners. These types of learners can solve problems using observations, trials, and errors, but they are weak in collecting information and making decisions. They are successful when they are doing something under the guidance of others (18). The converging learning style is determined by the practical application of ideas and the hypothetical argumentation which reflects the abstract learner (18). Learners may also provide a balanced learning profile that emphasizes all four models together (18). Most studies that have been conducted on learning styles of faculty members based on Kolb questionnaire have referred to the converging type as the dominant learning style among faculty members (14, 19-22). Some studies focus on the combination of converging and accommodating (23), while others (24) focus on assimilating learning style as the dominant styles. Also, faculty members tend to show higher abstract conceptualization (AC) (19, 22).

#### **Pharmacy Inventory Learning Style:**

The pharmacy inventory learning style was first described in resources in 2004 and was specifically for pharmaceutical education. This tool is based on Kolb style (25). The questionnaire divides the learning styles of pharmacists into four categories of Diverging, Assimilating, Converging, and Accommodating (26). A number of researchers examined the faculty members' learning styles using this tool and concluded that faculty members predominantly preferred an assimilating learning style (27-29). Moreover, the most common secondary learning style of faculty members was converging (27, 28).

Linares (30) study which was conducted in 1999 on 30 faculty members entitled "learning styles of students and faculty members in healthcare professions", introduced the Marshall and Merritt Learning Style Questionnaire (1986). The results of this study showed that faculty members often used the converging learning style.

#### **Gregorc Learning Style:**

The other exclusively used instrument was developed by Canfield which was based on accepted theories of human learning and motivation. The cognitive learning cycle was also determined by Hill. In 1982 Gregorc introduced a new cycle. The Gregorc style was based on the Jung theory. According to Jung, differences between individuals can be explained by how they use their power to understand and judge (judgment or belief). Perceptual abilities or ways in which one understands information can be concrete or abstract. Abstract individuals prefer intellectual thinking ability to exchange new information, while concrete individuals are involved in the use of physical senses. Judgment and decision (belief) refer to the way people organize the information. In judging and decision-making, different individuals tend to use a variety of methods, including step by step, systematic or random arrangement, or non-linear arrangement. These qualities make it possible for four different learning styles: concrete - sequential,

abstract - sequential, abstract - random and concrete - random (16). In studies that used Gregorc's questionnaire to determine the dominant learning style of faculty members, the concrete-sequential learning style was obtained as the dominant learning style of faculty members (16, 29).

Also Birchman, Sadowski and Harris (31) in their survey of graphic arts students and professors provided at the ASEE Annual Conference in Portland in 2005, found that 70% of professors had a concrete-sequential learning style and 34% were interested in the concrete-random learning style.

#### **Reid's Perceptual Learning Style Preference:**

By examining four perceptions (auditory, visual, tactile, and kinetic) and two preferences for social learning (collective and individual), Reid (1995) designed perceptual learning style questionnaire for identifying the learning preferences of English learners as second language (ESL) and English learners as a foreign language (EFL) (32).

Perceptual Learning Style Preference Questionnaire includes six learning styles, each of which has 5 questions, which means that this questionnaire has a total of 30 questions. The desired styles are: visual, auditory, kinetic, tactile, collective learning, and individual learning. The first to the fourth styles are perceptual learning styles and the last two styles form the social category (33). Visual learners learn more effectively through the eyes (sight) (34). They need visual stimulation of bulletin boards, films and videos, as well as written instructions for classroom work (32). Hearing learners can learn effectively through ears (34). They like to take part in discussions and group work (32). Tactile learners learn by touching (hands) more effectively (34). They need to touch and deal with objects, and they learn through making artwork related to language learning (32). Kinetic learners learn more effectively through physical experiences (34). They like the activities in which they are allowed to move. Collective learners also have a greater motivation to participate in collaborative learning (32).

Hassanein (35), in his review in 2015, studied the learning styles of 27 foreign language professors. In this study, Reid's perceptual learning preference questionnaire (1984) was used and the results showed that faculty members had multiple learning styles.

It has been observed that there is no relationship between gender and faculty members' learning styles (14, 24, 27). However, Crawford, Alhreish and Popovich (29) concluded in their 2012 survey on pharmacy faculty members using the Gregorc questionnaire that the dominant style of male faculty members was respectively, abstract-sequential and abstract-random, while the predominant learning style of women was abstract-random. They also conducted a survey using the questionnaire of pharmacy inventory learning styles, and the results showed that women were more assimilating while men were diverging.

There was no relationship between the age and faculty members' learning styles (14, 24). Although Richard, Deegan and Klena (19) concluded in their study that age could also be effective in faculty members' learning preferences, so that none of those who were 26 years old or younger had an assimilating learning style.

<b>Table1. Overview of the reviewed articles</b>			
<b>Authors</b>	<b>Objective of the Study</b>	<b>Population of the Study</b>	<b>Conclusion</b>
<i>Kolb Learning Style</i>			
Richard, Deegan, Klena (19) (2014)	Investigating the learning styles of faculty members at an academic program	orthopedic residents, faculty members	The most common style among the participants was the converging learning style
Aalaa et al (14) (2013)	Comparing learning styles of students and faculty members	Medical Students and Faculty in Pre-Clinical Stage of Medical Education	The most common style among students and faculty members was converging
Engels, de Gara (23) (2010)	Assessing Learning Styles of the Medical Students, residents of general surgery, and Faculty members	Second year medical students of Physiopathology, Residents of General Surgery, Faculty Members of General Surgery	Lower prevalence of a combination of converging and assimilating styles in first-year residents / lower prevalence of converging Learning style among medical students compared to residents / more prevalence of a combination of converging and accommodating learning styles among Faculty Members
Jack et al (20) (2010)	Comparing learning and teaching preferences of faculty members, residents, and students	faculty members, residents, and students of medical sciences	The dominance of converging learning style in all three categories / tendency of faculty members to teaching style of modeling teacher-centered role / significant relationship between learning style and teaching
Adesunloye et al (24) (2008)	Investigating Kolb preferred learning style and predicting different learning styles among residents and faculty members of an internal medicine residency program.	Internal residents and faculty members of Moorehorse University of Medical Sciences	Assimilating learning style was dominant among faculty members and residents
Mitchell, Nyland (21) (2005)	Differences in learning styles of students and faculty members	Senior students of nutrition and faculty members	Higher prevalence of converging and assimilating learning styles in faculty members / Significant difference between learning style and functional domain: converging in faculty members with teaching clinical nutrition, converging in faculty members with teaching management, accommodating in faculty members with teaching general nutrition
Kosower and Berman (22) (1996)	Comparison of pediatric residents and faculty members' learning styles	pediatric residents and faculty members	Assimilating and converging learning style in faculty members/ accommodating and diverging learning style in residents
<i>Pharmacy Inventory Learning Styles</i>			
Loewen, Jelescu-Bodos (27) (2013)	Investigating Learning styles of Canadian pharmacy practice residents and faculty members	Pharmacy residents and faculty members in British Columbia	The predominant teaching view among faculty members is apprenticeship / high prevalence of assimilating style among residents and faculty members as the dominant learning style / different distribution of secondary learning styles, with assimilating and converging as the most common secondary learning styles among faculty members and diverging as well as accommodating as the most prevalent learning styles among residents
Robles, Cox, and Seifert (28) (2012)	Identifying learning styles of students and faculty members in order to investigate its effect on students' performance	Students and faculty members of Texas Faculty of Pharmacy	The dominant learning style among faculty members was assimilating and secondary converging /the dominant learning style among students was assimilating

<b>Table1. Continued</b>			
<b>Authors</b>	<b>Objective of the Study</b>	<b>Population of the Study</b>	<b>Conclusion</b>
Crawford, Alhreish, Popovich (29) (2012)	Comparison of learning styles of pharmacy students and faculty members	Pharmacy Students entering from 2008 to 2010 and faculty members of Illinois University, Chicago	Total learning styles Respectively included: assimilating, converging, multiple, diverging, accommodating/ there was no significant difference between basic and clinical faculty members/ there was a significant difference based on gender, so that women tended to be assimilating while men were mostly diverging
<i>Gregorc Learning Style</i>			
Crawford, Alhreish, Popovich (29) (2012)	Comparison of learning styles of pharmacy students and faculty members	Pharmacy Students entering from 2008 to 2010 and faculty members of Illinois University, Chicago	Significant difference between the basic and clinical faculty members/ dominant faculty members' learning styles in basic sciences, abstract sequential, and among clinical faculty members concrete sequential / There was a significant difference between learning style and gender / prevalence of abstract sequential and concrete random in men and abstract random in women
Birchman, Sadowski, Harris (31) (2009)	Assessment of Graphics Students and faculty members learning styles	Computer graphics Students and faculty members of Purdue University	70% of faculty members had concrete sequential and 34% had concrete random learning styles
Berlocher and Hendricson (16) (1985)	Investigating learning styles of faculty members	Clinical faculty and dental students at the Texas Dentistry School	Dominant style in all groups was concrete sequential / students had secondary abstract random learning style.
<i>Reid's Perceptual Learning Style Preference</i>			
Hassanein (35) (2015)	Identifying learning style preference of faculty members and students using data on learning styles in E-Learning Instructional Design	Non-Arabic faculty members whose first language was English and Students of English language	The predominant style in both groups was multiple learning style
<i>Marshal and Merritt Learning Style</i>			
Linares (30) (1999)	Identifying learning styles of students and faculty members and the relationship between learning style and preparation for self-centered learning	Students and faculty members of Nursing and Health School	Willingness of faculty members to prepare for self-centered learning compared to students/ significant relationship between learning style and preparation for self-centered learning: increased self-centered learning in converging style

As age increases, there is a prioritized reduction in learning with practice and more priority for learning with reflection (reflective observation-active experimentation). Two learning styles that use active experimentations (converging and accommodating) indicate a reduction over time, while two learning styles that use reflective observations (diverging, assimilating) showed an increase per say(19). Similarly, as age progresses, abstract conceptualization increases as well. The increase corresponds to the percentage of "assimilators", because both reflective observation and abstract conceptualization are used (19).

In some studies, it has been shown that there is no relationship between the functional field of faculty members and their learning styles (14), while others found significant differences among faculty members learning preferences and their functional areas (21). At the same time, some researchers (29) used two tools to investigate this issue and concluded that using the Gregorc questionnaire shows a difference between the basic and clinical faculty members' learning styles, but based on pharmacy inventory learning styles, there was not a significant difference between the dominant learning styles of basic and clinical faculty members.

Most studies which were reviewed reported that there is a coordination between learning styles of students and faculty members learning preferences (16, 20, 24, 27, 28), while there are also a number of significant statistical differences between faculty members' dominant learning styles and the students (14, 22, 29, 31, 35). However, few studies concluded that the coordination of the learning style of instructors and students' performance (28).

It seems that teaching experience affect faculty members' learning styles (28). Robles, Cox, and Seifert (28), in their 2012 study, used the pharmacy learning style questionnaire to study the learning preferences of 67 faculty members at the School of Pharmacy, Texas Medical University. They concluded that instructors who had 6 years of experience or less have a dominant assimilating learning style, while those with more than 6 years of teaching experience tend to have converging learning style.

The willingness of faculty members to self-centered learning was more than students, while the level of preparation for self-directed learning was related to learning styles, so those with converging learning style were more self-centered than other learning styles (30). There was also a significant relationship between the learning styles and the faculty members' teaching style, so those with converging learning style tended to use teacher-centered role modeling (20).

**DISCUSSION**

The purpose of this research was to investigate the faculty members' learning styles. More than 70 models of learning styles have been documented up to now (7). Out of fifteen articles in this study, the dominant learning styles included: converging and assimilating from Kolb tool, concrete-sequential from Gregorc tool, and assimilating from the pharmacy inventory learning styles tool.

Learning styles were first introduced by Hermann Wetkin (1962). He extracted field-dependent and field-independent styles and used them in language teaching. Later these styles were further examined by Chapel and Green (1992).

According to them, people who have an analytic style are independent in analyzing backgrounds of different parts of language learning. However, individuals with a general learning style or those who are dependent on the background see the language as a whole and thus, they are more successful in communication skills of the language (36).

Learning styles are influenced by personality, career choices, educational features, present work, and tasks (37).

As shown in numerous studies, people with converging style prefer to learn from the combination of abstract conceptualization and active experimentation; they like to deal with objects rather than people. Those with this learning style have the most ability in the practical application of ideas and theories. If faculty members have this style, they can solve problems and decide based on the solutions they find on issues (6).

As Richard, Deegan, and Klena (2014) have pointed out, learning through active experimentation decreases with age, while learning through abstract conceptualization increases (19). Individuals who learn through abstract conceptualization are driven by learning and are more successful in constructing basic plans or systematic programs. They prefer to think through scientific approaches in solving the problem (37). Faculty members also solve issues through scientific approaches. Therefore, it can be a reason for increasing the converging learning style among faculty members compared to students.

On the other hand, people with assimilating learning style prefer to learn through the combination of abstract conceptualization and reflective observation. These people have the greatest ability to understand a lot of information and combine them logically. They love the organized and accurate presentation of the information and are willing to get the right answer. Likewise, this learning style is effective for jobs which require information and knowledge (6) like what faculty members have as their characteristics.

In fact, the common aspect of the two dominant learning

<b>Learning Style Questionnaire (Investigation Tool)</b>	<b>Professors' Dominant Learning Styles in Studies Performed</b>	<b>Studies Performed</b>
Kolb	Converging	Richard, Deegan, and Klena (19) – Aalaa et al (14) – Mitchell and Nyland (21) - Kosower and Berman (22)
	Assimilating	Jack et al (20) – Adesunloye et al (24) - Mitchell and Nyland (21) - Kosower and Berman (22)
	Multiple	Engels and de Gara (23)
Reid's perceptual learning style preference	Multiple	Hassanein (35)
pharmacy inventory learning styles	Assimilating	Loewen, Jelescu-Bodos (27) - Robles, Cox, Seifert (28) - Crawford, Alhreish, Popovich (29)
Gregorc	concrete -Sequential	Berlocher, Hendricson (16) - Crawford, Alhreish, Popovich (29) - Birchman, Sadowski, Harris (31)
Marshal and Merritt	Converging	Linares (30)

styles among faculty members (assimilating and converging) in the learning cycle as derived from the studies, is seen in abstract conceptualization which indicates that faculty members are contemplating a subject and analyzing it to learn. Also, they are consistent with those self-guided learning styles. Since professors are considered adult learners, they learn based on their own educational needs and have self-centered learning that can be a reason for these learning styles.

In relation to the prevailing learning style of professors, the studies conducted using the Gregorc tool found a predominantly concrete-sequential learning style. The learners of this style move from the details to the whole and appreciate the measurable results. These learners prefer structured activities that have clear instructions and are also practical. They also like to learn from their physical senses (38). This learning style can be applied to clinical faculty members, because they work in the clinical setting in a practical way using the senses and moving step-by-step from one component to the next in their diagnoses.

In most studies, it has been shown that there is no relationship between demographic characteristics and learning styles (14, 24, 27). It should be noted that learning styles are influenced by personality, career choice, educational characteristics, present work, and tasks (37). Also, learning styles can be changed over time in different environments. These factors can have a dominant influence over demographic characteristics.

Awareness of different learning styles can be used to evaluate and design educational programs. Learning style preferences of faculty members may affect teaching styles, students' learning, students' engagement levels during learning, problem-based learning, and empirical teaching activities (29). On the other hand, professors need to continue to learn to maintain and enhance their own capabilities, so identifying their learning styles and providing training courses is an important issue. In higher education institutions, efforts are being made to continuously improve the professional development of non-academic and academic members through empowerment strategies

including training, retraining and motivating members to play roles and accept responsibilities (11). Faculty members' empowerment programs vary from university to university and can be presented officially and informally. Official patterns include workshops, seminars, short courses, fellowship, individual counseling, and informal patterns include education by colleagues, formal education, e-learning, and self-learning (10). Therefore, recognizing the faculty members' learning styles and providing empowerment courses are important.

It is suggested that faculty members' empowerment courses are designed based on their learning styles. The knowledge provided in this article is applicable to professors as well as to educational managers. It is recommended that some training courses are held and the necessary information is provided.

Considering the fact that a quick look at the articles and studies shows the number of articles that have examined the variables of the present research and their relationship directly has been limited, it can be said that the most important limitation of this study has been the low number of articles and studies reviewed.

#### Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

#### ACKNOWLEDGMENTS

We appreciate the vice chancellor in Mashhad University of Medical Sciences for unconditional support provided.

#### Financial Support

This article is part of the Master's thesis for Educational Technology in Medical Sciences under number 970519 which was funded by Mashhad University of Medical Sciences.

**Conflict of Interest:** The authors declare that they have no competing interests.

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