Abstract

Introduction: Learning meta-cognitive skills is important for ones success in education and carrier. Awareness about factors related to meta-cognitive strategies could lead to using modern education for having better learning. According to the importance of learning styles and their relationship with meta-cognitive learning, the researchers intended to investigate the relationship between Vark's learning styles and meta-cognitive learning among students of Zahedan University of Medical Sciences.

Material and Methods: This was a cross-sectional study. The sample volume was 363 students chosen randomly from different medical majors. Data was collected through a questionnaire which had three parts. The first part collected the demographic information. Second part was consisted of Vark's learning style questionnaire. The third part was related to meta-cognitive questionnaire designed by Pintrich and colleagues. Finally data were analyzed through descriptive statistics, qui square test, Pearson correlation, t test and ANOVA by SPSS v.19.
**Results:** The mean age was 21.26±2.53. 166 students were male while 197 were females. There wasn’t any significant relationship between gender, learning style and meta-cognitive strategies. There wasn’t any significant relationship between age and these two variables too. The ANOVA had shown a significant relationship between learning styles and strategies of Meta-cognitive learning.

**Conclusion:** The results of this study had shown the significant relationship between learning styles and meta-cognitive strategies.

**Keywords:** Learning style, meta-cognitive strategies, students.
Introduction
Recognizing and understanding the different learning styles was a huge step forward in 20th century psychology. Learning styles are different in every individual. Choosing proper learning style could lead to proper learning (1). Learning styles are usually divided to three categories: cognitive styles, emotional styles and physiologic styles (2). The cognitive styles tell us how someone understands soothing, how does he remind it, how does he think and how does he solve the problems? Cognitive styles have categories too. Categories such as: related to thinking styles and learning styles based on experimental learning patterns (3). Therefore student's learning styles are preferred, natural, exclusive methods for collecting, processing and keeping the information and new skills. Uncoordinated learning and teaching styles could lead to learning failure, disappointment and decreased motivation. While studies had shown that coordinated learning and teaching styles could lead to increased rate of motivation and academic achievement (4). Today in this unknown world memorizing information does not worth as much as collecting abilities of knowledge and thinking or meta-cognitive process. Thus learning meta-cognitive skills is important for ones success in education and carrier. Awareness about factors related to meta-cognitive strategies could lead to using modern education for having better learning. Meta-cognition is an important component of cognition. The relationship between meta-cognition, learning and academic achievement interested the researchers all the time. Therefore some of its concepts came into researching variables in educational and learning research during the time. Meta-cognitive learning strategies are main dimensions of learning strategies. Bakers says they have two basic dimensions: the first dimension is that the learner must be aware about the nature of learning assignments and the importance of doing them. The second dimension is this that the leaner must have the knowledge for making the learning assignments (5). Meta-cognition is known as awareness about cognitive processes, active monitoring and subsequently regulation and organization of this process about the data and cognitive aims (6). Given that meta-cognitive awareness is necessary for learning and academic achievement, and also for personal and social progress, recognizing the related factors would be important (7). Some studies state that these awarenesses are much Important in bachelor course than other lower educations (8). According to the importance of learning styles and their relationship with meta-cognitive learning we aimed to investigate the relationship between Vark's learning styles and meta-cognitive learning among students of Zahedan University of Medical Sciences.

Material and methods:
We have chosen 345 students randomly from different schools of Zahedan university of medical sciences (including, schools of medicine, dentistry, nursing and midwifery, health, paramedical and rehabilitation) for this cross-sectional study. Inclusion criteria was passing one semester in the University for our Study. A three section questionnaire was used for data collection. Section one determined the demographic information. Section two was the Vark's learning style standard questionnaire which contained 16 questions about all 4 learning styles (visual, audio, reading-writing and motor). In visual style people would learn things better while they are seeing it. In audio style they learn better while they are hearing it. In reading-writing method they learn
better while they take notes and study books. And in the motor style they learn better while they are doing the job and making a physical activity. The questions are designed based on person's reaction in different situations. Each question has four choices. Each of them states for one of learning styles. According to this each respondent would get a score from 0 to 16 from each learning style. The highest score would shows the learning style for that respondent. If a respondent had equal scores in two styles or more he would be considered as multiple functioning learning style. Validity of questionnaire was confirmed by academic staff. Its reliability was 0.80 calculated through retest by Javadinia and colleagues (9). Third section was the meta-cognitive learning strategies designed by Pintrich and colleagues (1993). This questionnaire contained 31 questions. The learning strategy section contains 31 items regarding students’ use of different cognitive and meta-cognitive strategies. This section is a subset of Pintrich's learning strategies questionnaire. The scale of this questionnaire was a part of Motivated Strategies for Learning Questionnaire (MSLQ). (10, 11). Respondents scored their answers by a 7 point Likert scale according to the questionnaire's instruction. The score of each scale would be the mean score of that scale. The reliability of questionnaire was 0.73 calculated by Pintrich and colleagues (10). In this study, the reliability calculated again through Cronbach's alpha and it was 0.73. The aim of the study was explained for participants orally. Participation in this research and filling out the questionnaire was voluntary. After getting the verbal consent the questionnaires were given to them. After completing the questionnaires, they given back to the researcher. If questionnaire was incomplete, the respondents were asked to complete them respectfully. Finally all data were analyzed using SPSS 21.0 software package. A t-test was run to see differences between males and females used learning meta-cognitive strategies. The one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of learning styles score and meta-cognitive learning strategies scores. Also Pearson correlation test used in this study. Significance level was considered less than 0.05 in this study.

Results:
The mean age was 21.26±2.53. Male students were 166 (48.1%) and the rest were females. The t-test had shown that there was a significant relationship between gender and meta-cognitive strategies among students (p=0.467). The meta-cognitive strategies were more among females. The qui-square test had shown that there wasn’t any significant relationship between gender and learning styles (p=0.118). The Pearson correlation didn’t show any significant relationship between student's age and meta-cognitive strategies (p=0.364). In other hand ANOVA couldn’t show any significant relationship between age and learning style (p=0.134). Despite all of these the ANOVA showed a significant relationship between learning styles and meta-cognitive leaning strategies among students (P=0.033).

Table1 shows the relationship between learning styles and meta-cognitive learning strategies.

<table>
<thead>
<tr>
<th>Learning Styles</th>
<th>Meta-Cognitive Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>0.033</td>
</tr>
</tbody>
</table>

Table1. Relationship between learning styles and meta-cognitive learning strategies (ANOVA)
Discussion:
The results of this study showed a significant relationship between learning styles and meta-cognitive strategies. This result was consistent with some other studies (12-14, 8, 14). Meta-cognitive strategies were more in respondents who had kinesthetic learning styles. Meta-cognitive strategies would help students to understand that concepts are made of arrangements in objects or events or labels which we use for these arrangements (16). Meta-cognition has the basic role in learning process. Using the meta-cognition means to the learner and his teacher that learners can improve their learning to awareness about their thoughts during reading, writing and problem solving. Teachers could improve this awareness easily by making aware the students about problem solving strategies and discussing about cognitional and motivational characteristics of thinking (17, 18). Students who go to higher levels of cognition and analyzing the concepts instead of memorizing the information in learning are smarter than other students. They have a high level of awareness about them self as a learner. They know what are they doing or studying because of their attention in the job. This attention helps them to use the best strategy for learning. Therefore they will have a great power of coordinating them self with the situation.

Today meta-cognitive awareness is an important factor. Because as the world changes and gets unknown the learners would need much more abilities to control and monitor their learnings (19). According to the relationship between learning styles and meta-cognitive learning strategies this study suggests the authorities to recognize the learning styles among students before teaching them and coordinate the teaching style with student's learning styles. Despite that some studies had shown that meta-cognitive awareness would increase with teaching (7).

Conclusion:

The results of this study had shown the significant relationship between learning styles and meta-cognitive strategies. By using this meta-cognitive strategies, students of medical sciences find their responsibility for more learning and they learn to solve problems too, make logic decisions, manage their learning.

Acknowledgment:
This study is extracted from a research project which got its approval from Zahedan University of Medical sciences. All the students who took part in this study and the authorities of Zahedan
University of Medical Sciences are highly appreciated for their corporation and financially and scientifically support

Conflicts of Interests
The authors have declared that no competing interests exist.

Corresponding Author: Gholamreza Ghoreishinia, Student Scientific Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
Email: reza.ghoreishi0830@yahoo.com
References

15. Hoskin PWO. Affecting increased student achievement in geoscience education by instruction in metacognition: A small class case study. 2000.