Assessment of the Learning styles of MBBS Students at the University of Kassala, Kassala State, Sudan, 2022

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Abstract
Introduction: Since the 1970s, Learning styles of health science students have been researched. It's important to know the Learning styles of medical students these will be rewarding for both the instructor and the student. **Objectives:** This study aims to determine the learning styles of the medical students at the University of Kassala**. Methodology:** Cross sectional descriptive study conducted between 21/3/22 to 23/8/22 at the University of Kassala. After collecting the completed questionnaires, the data was analyzed using R language software Version R i386 4.0.2**. Results:** Out of 251 study sample, 228 responded with Questionnaire response rate of 90.8%. Wrong filled questionnaires were excluded resulting in 206 usable survey. 66.50485 % of our participants were females, 33.49515 % were males. The average age of the participants in years was 21.71359 +/- 1.933755. Reflectors (61.16505%) were the most prevalent learning style among medical students at the University of Kassala. Differences was noted in learning styles among the different sexes (p-value= 0.0371). No difference between the educational levels concerning the learning style (p-value = 0.09029). The living area does not affect the learning style (P-value = 0.3143). **Conclusion and recommendations:** Most of our students are reflectors, thus they prefer to watch rather than practice, they might be good at subjects that are more of watching type more than subjects that need practice. The results reveal the need to endorse self-directed learning. Further research is need to identify the most reliable teaching modality and instructional strategies.
Keywords: Learning styles, Klob's Inventory, Medical students
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1. Introduction

The learning style was presented in 1960 by Rita Dunn. Since then, Psychologists underwent many studies and development a number of inventories so as to identify individual's learning styles. Kolb's Learning Style inventory was frequently used for medical schools (Gurpinar, Bati and Tetik, 2011).

After the 1970s, researches related to learning styles among health science students become more evident (Olivier, Verdonck and Caseleijn, 2020).

David Kolb's learning styles is well known and widely used learning style theory. It classifies learners on "how they acquires knowledge" (Wang and Liu, 2019).

According to Kolb's, there are four learning styles namely Accommodator, Assimilator, Converger, and Diverger. Honey and Mumford has renamed these learning styles as activist, theorist, pragmatist, and reflector respectively (Alfonso and Sophia, 2019).

Divergers/ reflectors prefer to watch rather than do, Assimilators/ theorists perfer to watch and think, Convergers/ pragmatists prefer working (technical tasks) and thinking, and Accommodators/ activists are 'hands-on, and rely on instinct rather than logic (Skillshub.com, 2019)(McLeod, 2017).

 It's important to know the Learning styles of medical students these will be rewarding for both the instructor and the student (Breckler, Joun and Ngo, 2009).

This study aims to determine the learning styles of the medical students at the University of Kassala

2. Methodology
2.1. Study design:
Cross sectional descriptive observational study conducted between 21/3/22 to 23/8/22

2.2. Study area:
The study was carried at University of kassala, faculty of medicine at the city of Kassala, Sudan.
The university of kassala is located in Kassala Town (Latitude: 15° 27' 3.56" N Longitude: 36° 23' 59.93" E). Kassala state is bordered by Eritrea from the east, Red Sea and River Nile States from the north, Gezira State from the west and Al Gaderef State from the south. Kassala state has a total population of 1.5 million (4.6% of

total Sudan population) about 20 % (300,000) of them live in Kassala town, the state capital. Kassala is about 650 kilometers from Khartoum the capital of Sudan (Ahmed and Hassan, 2019).

2.3. Study population:
All the Medical students at the University of Kassala.
2.3.1.   Inclusion criteria:
The students at the University of Kassala, Faculty of medicine, who studied for at least one year
2.3.2.   Exclusion criteria:
Final year medical students who are studying under different curriculum.
Transfer students who didn't attend more than one year at the university
Freshmen students who have not completed one year
Paramedical students

2.4. Sample size and Sampling technique:
Total population = 719
Stratified random sample was obtained from the different classes, by calculating the percentage of contribution of each class to the whole total, then simple random sample was performed with in each class.
Steven k. Thompson formula was used to obtain the sample size

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times (d^2 \div z^2)\right] + p(1-p)\right]}$$

Formula Key
Population (N)
Sample (n)
Significance level (z) = 1.96
Probability (p) = 0.5
Margin of Error (d) = 0.05

Sample size = = 251
Level 1 = (135/719)*251 = 47
Level 2 = (140/719)*251 = 49
Level 3 = (150/719)*251 = 52
Level 4 = (160/719)*251 = 56
Level 5 = (134/719)*251 = 47

2.5. Data collection:
The research tools, including demographic questions and Kolb Learning Style Inventory was administered on the sample. The validity and reliability of the questionnaire was approved by Kolb and his colleagues. The questionnaire has 80 statements, each with two choices to agree or disagree. Incomplete or wrong answers were excluded.

2.6. Data analysis:
After collecting the completed questionnaires, the data was analyzed using R language software Version R i386 4.0.2. Chi-square was used in the analysis.

2.7. Ethical approval:
Ethical approval was obtained from ethical committee at the University of Kassala.
Informed consent was taken from all the participants prior to the study.

3. Results
Out of the 251 study sample, 228 responded with Questionnaire response rate of 90.8%
The wrong filled questionnaires were excluded resulting in 206 usable survey

Table 1. Socio-demographic characteristics of the respondents (n=206)

Socio-demographic characteristics	Response	No.	%
Sex	Female	137	66.50485
	Male	69	33.49515
			100.00
Total		**206**	**100.0**
Age (Average)		21.71359 +/- 1.933755	
Address	Kassala	116	56.31068
	Outside Kassala	90	43.68932
Total		**206**	**100.00**
Education level	Level 5	34	16.50485
	Level 4	54	26.21359
	Level 3	40	19.41748
	Level 2	43	20.87379
	Level 1	35	16.99029
Total		**206**	**100.00**

Females accounted for 66.5 % of the sample, 56.3% % of our students were from Kassala city, the average age of the study participants in years was 21.7. Batches contribution to the overall sample was between 16 to 26 %.
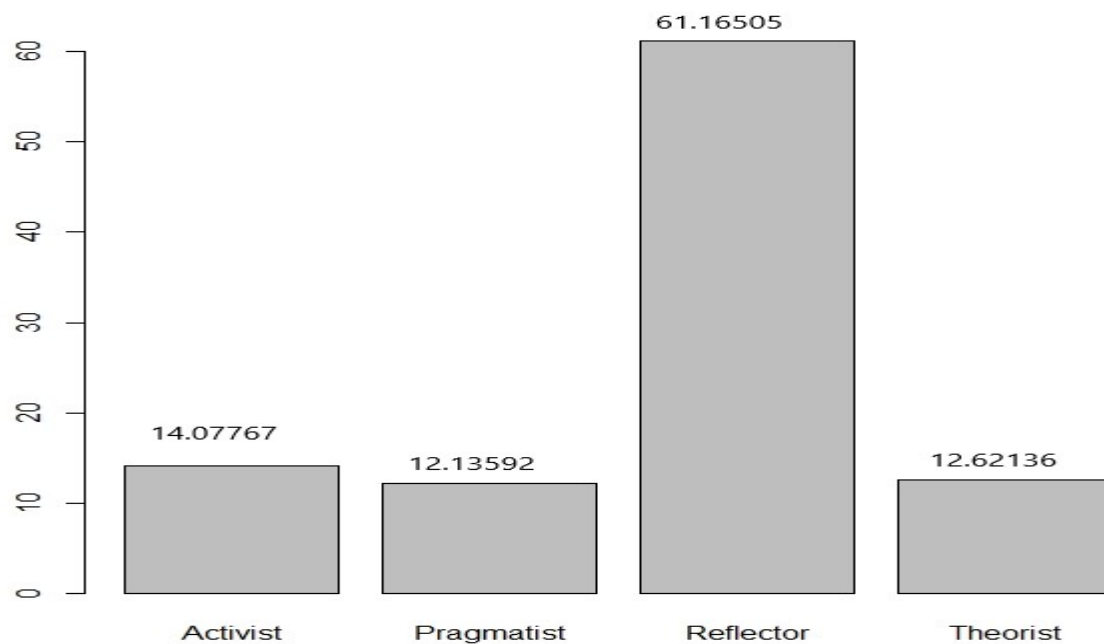

Figure 1. Prevalence of the learning Styles among medical students

According to figure 1, Reflectors (61.16505%) were the most prevalent learning style among medical

students at the University of Kassala.

Table 2. Learning styles difference according to sex

	Activist (No)	Pragmatist (No)	Reflector (No)	Theorist (No)	Total (no)
Female	11.165049% (23)	5.825243% (12)	42.718447% (88)	6.796117% (14)	66.50485% (137)
Male	2.912621% (6)	6.310680% (13)	18.446602% (38)	5.825243% (12)	33.49515% (69)
Total	14.07767 (29)	12.13592 (25)	61.16505 (126)	12.62136 (26)	**100% (206)**

Differences was noted in learning styles among the different sexes (p-value= 0.0371)

Table 3.Prevalent learning styles among educational Status

	Activist (No)	Pragmatist (No)	Reflector (No)	Theorist (No)	Total (No)
Level 5	0.9708738 (2)	1.9417476 (4)	11.6504854 (24)	1.9417476 (4)	16.50485 (34)
Level 4	2.9126214 (6)	4.8543689 (10)	14.5631068 (30)	3.8834951 (8)	26.21359 (54)
Level 3	3.3980583 (7)	2.9126214 (6)	12.1359223 (25)	0.9708738 (2)	19.41748 (40)
Level 2	4.8543689 (10)	1.4563107 (3)	11.1650485 (23)	3.3980583 (7)	20.87379 (43)
Level 1	1.9417476 (4)	0.9708738 (2)	11.6504854 (24)	2.4271845 (5)	16.99029 (35)
Total	14.07767 (29)	12.13592 (25)	61.16505 (126)	12.62136 (26)	**100% (206)**

No difference between batches concerning the learning style (p-value = 0.09029).

Table 4. Prevalent learning style according to living area

	Activist (No)	Pragmatist (No)	Reflector (No)	Theorist (No)	Total (no)
Home	8.737864 (18)	5.339806 (11)	36.407767 (75)	5.825243 (12)	56.31068 (116)
Dormitories	5.339806 (11)	6.796117 (14)	24.757282 (51)	6.796117 (14)	43.68932 (90)
Total	14.07767 (29)	12.13592 (25)	61.16505 (126)	12.62136 (26)	**100% (206)**

Whether you live with your family or not, does not affect your learning style (P-value = 0.3143).

4. Discussion

In our study, we found that most (61.1%) of our students are reflectors i.e. Divergers, these was similar to a study done in Faculty of Health Sciences at an Australian University (Brown, Cosgriff, and French, 2008), which is also Similar to the findings of a study done by Hauer and colleagues which reported that nursing students tended to prefer the Diverger learning style (Hauer, Straub and Wolf, 2005). A study done in Taibah University in Saudi Arabia among medical students had similar results. (Guraya et al, 2014). Our findings is contradictory to another study done in Saudi Arabia where the most popular learning style was Accommodator (Al Shaikh et al, 2019).

When compared to the different specialties, our students has learning style similar to pediatric residents according to a study done among pediatric residents (Kosower and Berman, 1996).

However, our medical students have learning style that is different from the surgical residents who are convergers (Mammen et al, 2007), they also have different learning styles from the internal medicine residents who are assimilators (Adesunloye et al, 2008) (Olanipekun et al, 2020).

In our study there was gender difference with respect to the learning styles, this was similar to a study done in California State University (Ames, 2003), which was also similar to a study done among surgical residents showing differences between males and females (Mammen et al, 2007).

This finding was unlike a study done in UK where no statistically significant associations were found among the different sexes (Cavanagh, Hogan and Ramgopal, 1995).

Our study shows no significant difference between the different educational statuses as to the preferred learning style, this finding is similar to a study done in the USA which shows no significant difference between the learning styles when compared across educational statuses (Olanipekun et al, 2020).

No difference was found in the learning style according to the student living area, this is similar to a study done by Gurpinar and his colleagues where no difference was found between home and shared accommodation (Gurpinar, Bati and Tetik, 2011).

Conclusion and recommendation

Most of our students are reflector, thus they prefer to watch rather than practice, they might be good at subjects that are more of watching type more than subjects that need practice

The results reveal the need to endorse self-directed learning.

Further research is need to identify the most reliable teaching modality and instructional strategies.

Conflict of interest: None declared.

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