Assessment of Gender Difference on Learning Styles Preferences among Regular Undergraduate Students of Mekelle University Collage of Health Science

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Abstract

Introduction: Learning styles are the characteristics, strengths and preferences in the way people receive and process information. An individual's learning style specifies their way of processing, internalization and memorizing new information. These styles help students learn more easily, remember information longer, think more positively about school and learning subjects, achieve academic goals quickly, and utilize information effectively. If students find a mismatch between their own learning styles and the lecturer's teaching style, they are likely to reject the learning environment, lose interest in class, leading to poor performance in tests and examinations, failing their courses, and ultimately dropping out.

Objectives: Assessment of gender difference on learning style preference among Regular undergraduate Students of Mekelle University, College of Health science

Methods: A comparative cross section study design was employed with quantitative approach obtained by the use of Visual, Aural, Read/write and Kinesthetic (VARK) self-answered questionnaire at Mekelle University, College of Health Science which was collected between April10-30,2016 with a sample size of 415.Data was reported as percentage of students in each category of learning style preference while comparison of learning style preference based on gender was done using X^2 analysis to determine if significant gender differences exist for each group, p-value less than 0.05 was considered as significantly associated.

Result: This study showed that of the total 415 students 305(73.5%) of the students were unimodal of which 187(71.6%) were males and 118(76.6%) were female students. Among these 67(27.7%) of the male and 38(24.7%) of the female students dominantly preferred visual while also finding there was no significant association between gender and learning style preference (P=0.373).

Conclusion and recommendation: Tough there were preference differences among male and female students, significant associations between gender and learning style preferences were not found to be evident therefore instructors must integrate the use of materials that aid in enhancing Visual understandings.

Keywords: Learning style preferences; Gender; Neil fleming model; Vark questionnaire

Introduction

Background

Education is considered as a first step for every human activity. It plays a vital role in the development of human capital and is linked with an individual's well-being and opportunities for better living [1]. Teaching on the other side is an activity, a unique, creative, rational and human activity that is not merely an art, but the most difficult of all arts and profound of all sciences [2].

Self-directed learning focuses on the process whereby students take ownership of their own learning, by setting their own goals and striving towards achieving them, identifying resources and skills to achieve these goals, and assessing their own progress. Therefore, awareness of learning styles empowers students to become self-directed, independent and active learners [3]. When students' learning preferences match their instructors teaching styles, student motivation and achievement usually improve [4]. Adults are autonomous, self-directed, goal oriented, need to know why they are learning something and are practical problem-solvers who are generally aware of their learning strengths and weaknesses, and want relevant, useful information presented in a way that is comfortable, intellectually challenging, and time efficient [5,6]. In addition, they seek a collaborative learning process with their instructors [7]. Students who are taught by an approach compatible with their learning do better than those whose learning styles are not matched to teaching approaches [8]. Teacher-based strategies can change to student-based strategies in learning environments, and this requires gaining knowledge about the learning styles of students and adapting teaching strategies [9].

Learning styles are the characteristics, strengths and preferences in the way people receive and process information. Learning materials shouldn't just reflect of the teacher's style, but should be designed for all kinds of students and all kind of learning styles [10]. This styles includes the specific and personal learning skills of reading, listening, writing, coding; and the learning processes of reflection, trial and error, or repetition and a way an individual processes information and also describe a person's typical mode of thinking, remembering or problem solving [5]. An individual's learning style specifies their way of processing, internalization and memorizing new information [11]. This style help students learn more easily, remember information longer, think more positively about school and learning subjects, achieve academic goals quickly, and utilize information effectively [12].

Learning styles denote to the cognitive, affective, and physiological behaviors which accomplish as fairly steady instruments of how people perceive, interplay with, and respond to their environment' in learning circumstances by recollecting their stored data from brain [13]. From the students' perspective, the learning style indicates a general preference for learning and encompasses cognitive, affective, psychomotor, and physiological dimensions [14]. Learning processes vary from person to person due to the presence of biological and psychological differences. More than three-fifths of a person's learning style is biologically imposed. Moreover, all learners have individual attributes relating to their learning processes [15].

Learning styles are not stable. Students might adopt different styles depending on their subject and their learning environment [14]. Educational researchers have reported that each individual has a specific learning style and if the method of information delivery conforms to their learning style, learning is more effective [2]. Every person has its own method or set of strategies when learning [10]. Many theories assume that all may learn, though in different ways and at different levels [16]. Each individual may possess a single style or could possess a combination of different learning styles [11].

Students have dominant learning styles that they use in preference to other learning styles, there are some students who make use of multimodal learning styles preferences and also there are learning styles prevalent in faculties. But there is no learning style that is inferior to another, but learning styles have different attributes. Students interact with information differently, hence their variety of learning styles. Further asserts that students are drawn into certain disciplines because of the similarities that exist between the learning demands of a specific discipline and the students' learning styles. Students with multimodal learning styles may adjust to different teaching styles and learning environments [3].

Learners 'behaviors provide insight into the ways learners perceive, interact with, and respond to the environment in which learning occurs [4]. It is now both an accepted and well-documented fact that people learn, or perhaps more accurately put, prefers to learn, in different ways. The simple fact that many instructors teach different groups in the same manner, but that student success varies, provide credence to this hypothesis [8].

Therefore students with high self-confidence should do well academically and students with orientation for one particular learning preference may achieve different level of academic grade as compared to another student with a different learning style [17]. In general Educational researchers postulate that everyone has a learning style and, if instruction is adapted to accommodate that style, it is anticipated that improved learning will result [7].

Research in learning styles is no longer limited to the domain of psychology, from which many of the central concepts and theories originated. Nowadays, learning-style research is spread across a variety of disciplines-medical and healthcare training, management, industry, vocational training and many settings and levels in the field of education. To some extent, this may explain the many variations in how learning styles are categorized, defined, grouped and measured [8]. There are several perspectives about learning-thinking styles. Two of which are the sensory preferences and the global analytic continuum. Sensory preferences states that individuals tend to gravitate toward one or two types of sensory input and maintain dominance in one of the following types namely, visual learners, auditory learners isnd tactile or kinesthetic learners [11]. Due to these different models they classify learning under the categories of Visual (seeing graphs, charts, flow diagrams, drawings, diagrams, pictures, colored word accents, demonstrations etc.) Auditory (listening, interacting, discussing, speech, Reading

writing - textual contents, reading books, word lists, writings, handouts) and Kinesthetic (physical touch, manipulating objects or materials) [17].

Statement of the problem

A student's style of learning, if accommodated, can result in improved attitudes toward learning and an increase in thinking skills, academic achievement, and creativity. In studies done at Kenya and Malesia [18,19]. Results have shown that there is strong and positive statistically significant relationship between learning styles and academic achievement among male and female students.

With this in mind, In a study done at three colleges in Oromia, academic achievement of male which was 2.8041 and female student's was 2.4179, which shows that male students are performing better in colleges levels than female students while the academic achievements of female students are in the same range at colleges in Asella (2.486), Jimma (2.4082), Nekamte (2.3966), which are all below Cumulative GPA of 2.50 [20]. Also in another study done at a primary school at western wolayita zone academics cores out of hundred was 59 and below for 83.3% of female students and 16.7% of male students, while 76.5% of male and 42.6% of females got b/n 60-81 out of hundred [21]. Why such Disparity?

Female students' enrolment in the regular undergraduate program at Jimma University has been slightly increasing from 20 percent in 2000 E.C. to 31 percent in 2004 E.C. But these figures still demonstrate that the gender imbalance in favor of males is about 70 percent implying the fact the wide gender gap.

In Addis Ababa University a larger number (53% of the total 833) of female students were academically dismissed within two academic years (2004-2005 to 2005-2006 G.C). In the case of Haramaya University the share of academically dismissed students in these years was above 60 percent.

Female students found in the honorable academic achievements during the moment of graduation at Addis Ababa University and Haramaya University in 2006 G.C were very insignificant. This is, of course, not to mean that they were not entirely good in their academic work. It means that the honorable lists seem to be the reserved "right" of male students. Only a diminutive proportion of female students, about 10 percent in average from both universities' regular undergraduate degree students, were within the range of distinction and above. The gender gap in honorable graduates for the Bachelor degree was 86 percent.

Percentage of female student graduates from the regular undergraduate, of Addis Ababa University in 2006 was 16 percent. The scenario in these programs at Haramaya University in the same year for female students was 12 percent [22]. Why such gap?

Regarding to this gaps and problems, no known study has been carried out to determine the if there is any link between matching learning style of students, Gender and the teaching styles addressed by the teachers and the effect it has on the academic achievements of the students in Ethiopia which might be a factor for poor academic achievement and the gender gap in school performances in the country.

This study's outcome thus will seek answers to find out the influence of genderon learning styles preferences of students in order to integrate with the contents of teaching styles on getting excellent academic achievements, competent and skilled health workers.

Methodology

Study area and period

Mekelle University is a higher education and training public institution located in the city of Mekelle, situated in the northern Tigray Regional State of Ethiopia. It is 783 kilometers away from Addis Ababa, the capital, to the north. Established on May 2000 .In 2015/16 (2007E.C) It has 6 Campuses with7 Colleges, 8 Institutes and 2 Schools constituting 26747 undergraduate students and 2052 graduate students a total of over 31,000 students in the regular, continuing education program and summer, evening, distance education and in-service programs in both undergraduate and graduate program sundermore than 90 undergraduate and 70 postgraduate programs

The College of Health Sciences is one of Mekelle University branches which encompasses one school, one institute and 6 departments which give 29 post graduate with a total number of students of around 212 students, one PhD program with six students and eleven undergraduate (two medical Doctorate and nine Bachelorette Degrees) programs having 2750 (1818 male and 932 female) Students (2007 E.C)

The study will be conducted between February and June 2016 at Mekelle University, Collage of Heath Science.

Study design

A Comparative institutional based Cross sectional study was conducted.

Source population

All Mekelle university, Collage of Health science students

Study population

Undergraduate regular students enrolled in Mekelle University, collage of Health science during the study period.

Eligibility criteria

Inclusion criteria: All college of health science undergraduate regular students will be in the study.

Exclusion criteria: Students who are unavailable and not willing to participate during the time of the study.

Variables

Dependent variables: Learning Style preference

Independent variables: Personal profile of the student

- Department

- Class Year

- Gender

- Place of Residence

Comparator variable: Gender

Sample size and sampling procedure

Sample Size calculation

The assumptions used to calculate the actual sample size are using double proportion population:95% level of confidence with 0.05 α value (which yields Z α/2=1.96 on the standard normal distribution curve), 5% margin of error, estimated proportion of male and female students using multimodal learning preference at kota, India are 92.98% and 76.27% respectively. This assumption using a double population proportion formula:

$$n = \frac{Z_{\alpha/2}^2 \left(p_1 q_1 + p_2 q_2 \right)}{d^2}$$

Where, n is sample size

z=the value of the standard normal curve score corresponding to the given

Confidence interval=1.96

P_1=estimated proportion of male students using multimodal learning preference at Kota, India, i.e., 92.98%

P_2=estimated proportion of female students using multimodal learning preference at kota, India, i.e., 76.27%

d=the permissible margin of error (the required precision)=5%

$$n = \frac{\left(1.96^2\right)\left(0.9298 * 0.0702\right) + \left(0.7627 * 0.2373\right)}{0.05^2} = 378$$

After adding 10% non-response rate the final sample size will be 415.

Sampling procedure and technique: All departments in Mekelle University, Collage of Health Science having a Regular Undergraduate program were included in the study. The selected departments have a total of 2187students. After finding out the total proportion of male & female students in each department by using Probability to Proportional size (PPS) allocation the right proportion of male and female students will be allocated for each department. Students selected for the study from each department will be selected by simple random sampling after taking representative proportions of male and female from each department **(Figure 1)**.

Data collection instrument and procedure

The qualitative data were collected using a structured questionnaire which is in English and designed to meet the study objective. The questionnaire has a two part in which the first
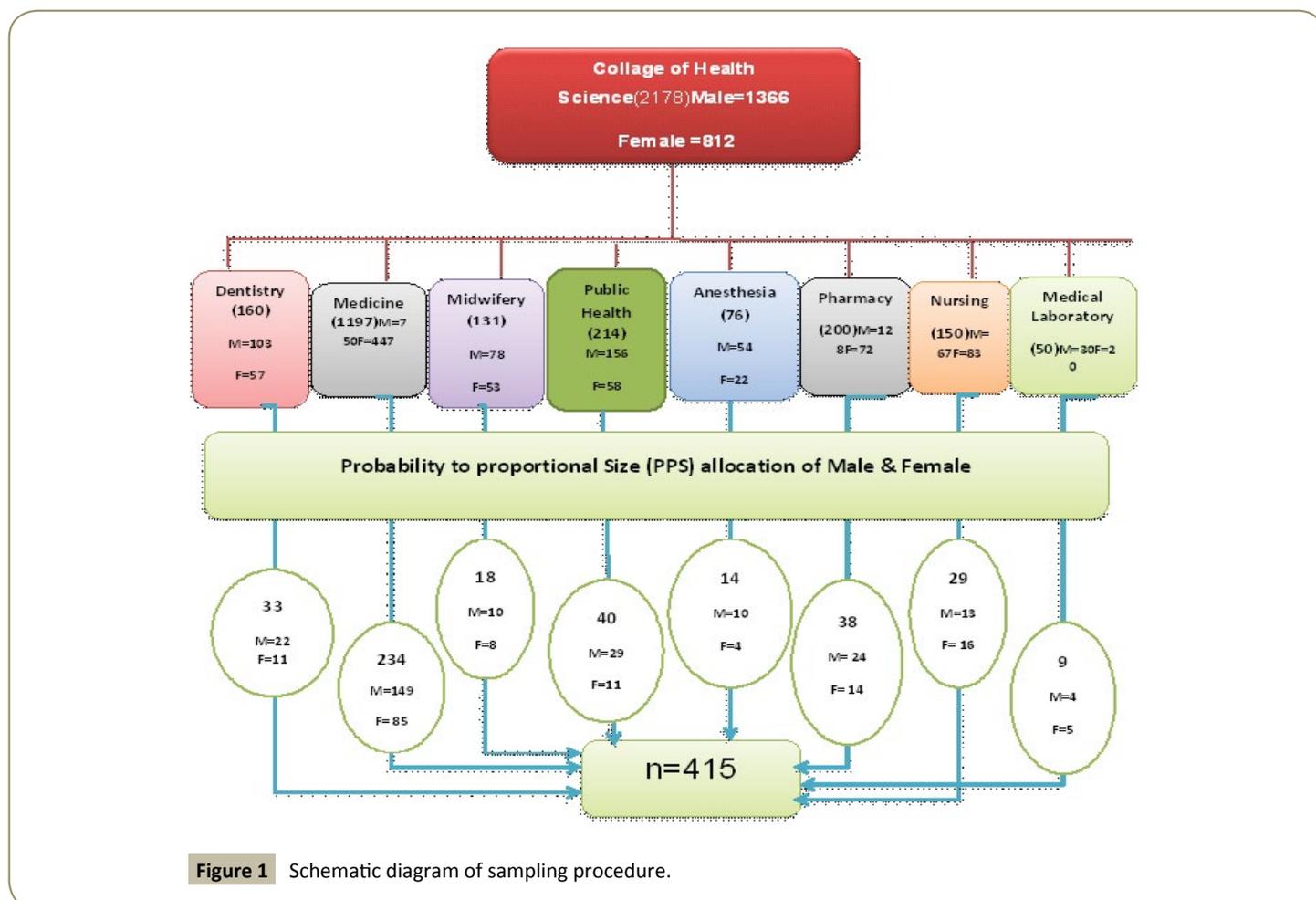

Figure 1 Schematic diagram of sampling procedure.

part contain the socio demographic questions, while the VARK questionnaire containing sixteen questions aimed to find out the students learning style preference by using real life situations to differentiate a student' sinnate learning style preferences.

The VARK survey instrument(Version 7.8) constructed by Neil Fleming, was selected because it is a simple inventory that has been well-received, dimensions are intuitively understood and its applications are practical and also concise and quick to complete(10). All choices correspond to the four sensory modalities measured by VARK (visual, aural/ auditory, read/ write, and kinesthetic). The students could select one or more choices based on the sensory modality preferred by the student to take in new information. The following are internet links for the VARK homepage and questionnaire: http://www.vark-learn. com/english/index.asp & http://www.varklearn.com/english/ page.asp?pquestionnaire.

Collection of the data was taken place at the end of classes in the respective class rooms the students are learning, wards the students will be attaching for clinical practice and the questionnaire will take a maximum of 20-30 minutes to complete.

Data analysis

Data was reported as percentage of students in each category of learning style preference. Data was entered and processed using the Statistical Package for the Social Sciences (SPSS) software, version 20.Comparison of learning style preference based on gender will be done using X^2-analysis and P-value less than 0.05 will be considered as significantly associated.

Data quality assurance

The questionnaires were assessed and meanings of all items were checked accordingly. Items interpretability and understandability by the study participants were evaluated by pre-testing the questionnaire on 5% of the students from a privet school that are not included in the main study area and necessary correction was taken accordingly. The questionnaire was provided in the original language to avoiding the need for translation and maintaining consistency of the questions and responses.

Data collection was carried out by five Graduate Assistant II teachers under the supervision two Assistant lecturers. After important training was given to guide them in collecting the appropriate data, data collection was carried out for a period of three weeks. Participants were given a brief overview of the project, along with the distribution of the self-report questionnaire during with also consents were obtained for participating in the study and filling the questionnaire.

Ethical consideration

Ethical clearance were obtained from Research and Community Service Council (RCSC) in Collage of Health Science, Mekelle University, Official letters were received from the department of Midwifery and was submitted to the departments which will participate in the study. The purposes of the study were explained to participants. Informed consent was obtained from participants. Participants' involvement in the study was on voluntary basis and participants were asked to write their names.

Confidentiality was reserved and all participants had the right to withdraw from the research at any time during the study.

Dissemination and utilization of results

After the study is completed, the results were presented and submitted to Mekelle University, Collage of Health Science. Soft and hard copy of the result were submitted to the Department Of Midwifery. It was disseminated to the stakeholders who are concerned with relation of education and curriculum development. Also, manuscript(s) were submitted for publication in peer reviewed scientific journals and results were presented in scientific conferences for better communication of the results.

Results

Learning style preferences

Four hundred five students participated in the study and of the total, 305 (73.5%) of the students preferred to use one of the four modalities(Unimodal) to learn while out of these four modalities the majority of the students preferred to use the visual way of learning accounting 105 (25.3%) while students least preferred to use kinestetic, 50 (12%).

The rest of the students 110 (26.5%) preferred to use more than one modalities (Multimodal) and out of these 84 (20.2%) preferred to use two combinations (bimodal) under which of these students the majority of them 25 (6%) preferred to use the combination of Visual and read/writing while only 3 (0.7%) choose to use all the four modalities(quadrimodal). Students who preferred three combinations out of the four modalities (trimodal) accounted 24 (5.8% and out of these more students, 7 (1.7%), choose the three combinations of Visual, Aural and read/ write (VAR) **(Figure 2).**

Gender and learning style preferences

Out of 305 (73.5%) of the students who were unimodal, 187 (71.6%) were males and 118 (76.6%) were female students. Out of these 67 (27.7%) of the male and 38 (24.7%) of the female students were the visual.

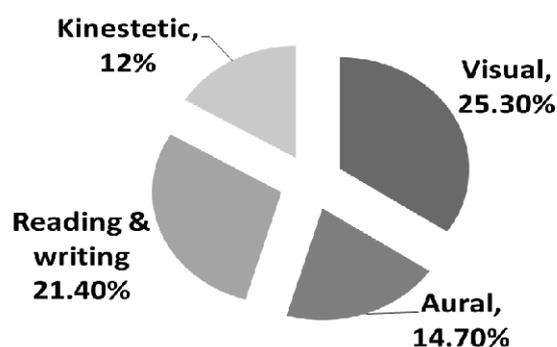Fifty Five (21.1%) males and 29 (18.8%) female students were bimodal learners.18 (6.9) and 6 (3.9) male and female

Figure 2 Unimodal learning style preferences distribution of students.

respectively were also trimodal learners accounting a total of 24 (5.8%) while lesser students used all four modalities which were only 3 (0.7%), while males students least preferred to use all four modalities (VARK) accounting only 2(0.8%) and none of the females preferred VAR (Visual/Aural/Read-Writing) learners.

The gender difference was also seen as 74 (67.3%) males and 36 (32.7%) females choose the multimodal methods of learning. Out of which 55 (21.1%) males and 29 (18.8%) females were bimodal and 18 (6.9%) males and only 6 (3.9%) females preferred the combinations of the three modalities (Trimodal) **(Figure 3)**.

Influence of gender on the student's learning style preferences

In general looking at our study there was no significant difference in learning style preferences between the two genders (p=0.373) **(Table 1)**. Looking in depth of the learning modalities being a male or a female has no significant to being Unimodal or being multimodal preferring student (P=0.267).

Figure 3 Learning style preference differences b/n male and female students.
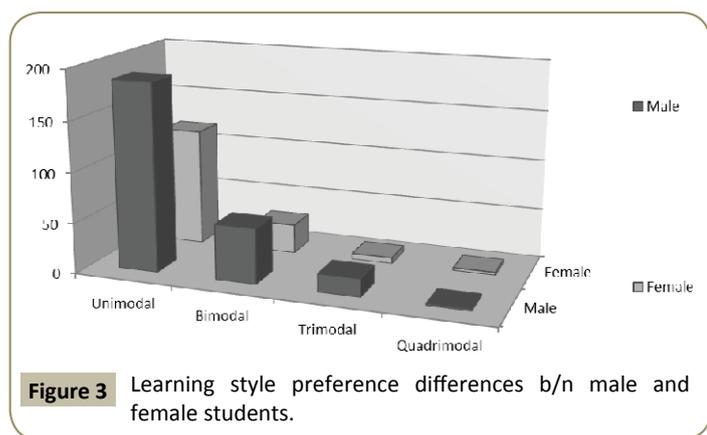
Discussion

Unimodal vs. multimodal

Seventy three point three percent of the students participated were unimodal having one dominant learning style preferences which is greater compared results from studies in Iran (48.4%), Kasturba Medical College (31.3%), North Indian Dental College (51%), Oman (35%), Australia (21.3%), and Saudi Arabia (27.4%) (9,25,29,24,34). With respect to the multimodal learning preferences 26.5% of the students chose to learn with more than one dominant way of learning, this result compared to studies done in Iran (51.6%), Kasturba Medical College (68.7%),Turkey(63.9%),49% in North Indian Dental College and in Saudi Arabia(72.6%) was found to be lower than the studies done above (9,25,35,27,34).

Unimodal learning style preferences

This study showed that out of the 73.5% students who preferred one dominant learning modality the major learning way was the visual accounting 25.3% while it's the similar to studies done Australia with 80%, Northern Cyprus visual (41.7%),Salem district of Tamil Nadu state, India (33.16%),India university(50%), of which the participants were also visual (24,11,26,27). On the other side a study in Iran showed that the major dominan tunimodal learning style was the reading and writing(R) (21.7%) learning modality, while in Kasturba Medical College majority (45.5%) and in Islamic school, Malaysia(61.2%) and in Saudi Arabia (11.6%) of the students were mostly auditory (25,31,34). Other studies also have showed different dominate unimodal learning preference like 27% and 31.7% of the student in North Indian Dental College and Australia respectively were kinesthetic (24,27).

Table 1 Learning style preference as compared to both genders.

Learning Style preferences	Male		Female		Significance (P value) Chi-Square test	Over all sig. (p value)
	Count	%	Count	%		
Unimodal	187	71.6	118	76.6	0.267	0.373
Visual(V)	67	25.7	38	24.7		
Aural(A)	36	13.8	25	16.2		
Read/Writting(R)	58	22.2	31	20.1		
Kinesthetic(K)	26	10	24	15.6		
Bimodal	55	21.1	29	18.2	0.583	
VA	8	3.1	5	3.2		
VR	17	6.5	8	5.2		
VK	7	2.7	5	3.2		
AR	9	3.4	8	5.2		
AK	7	2.7	2	1.3		
RK	6	2.3	1	0.6		
Trimodal	18	6.9	6	14.8	0.206	
VAR	7	2.7	-	-		
VRK	3	1.1	3	1.9		
ARK	3	1.1	2	1.3		
VAK	5	1.9	1	0.6		
Quadrimodal (VARK)	2	0.8	1	0.6	0.892	

Multimodal learning style

Students who were included in this study showed 20.2% of them were bimodal, 5.8% trimodal and only 0.7% were quad moda. When comparing with other studies in Iran, 20.1% preferred bimodal which is similar to our study but a greater number as 15.1% of participants preferred tri-modal (9). There was also similar pattern of outcome in North Indian Dental College in which 23% were bi-modal followed by 17% tri-modal, 9% had quad-modal preferences (28). Another study in Kasturba Medical College showed d/t results with quadmodal 36.6% was selected by the majority of the participant followed by bimodal (18.1%), and trimodal (14%) (25). While in Saudi Arabia 34.9% were bimodal, 42.5% tri-modal and 22.6% quad modal as a dominant learning style preference (34).

Gender and learning style preferences

Male students and learning style preferences: Seventy one point six percent (71.6%) males preferred one dominant (unimodal) way .This compared with studies in Iran(56.5%), Kota, India (6.25%)) and Wayne State University male (43.9%) showed to be greater (9,8,33). while out of the unimodal preferences of learning the majority (25.7%) were found to be Visual learners while the lowest preferences was kinesthetic (10%) that is similar to the study done in Salem district of Tamil Nadu state, India (Visual-35.10% &kinesthetic- 9.82%) (26). Another study at Michigan State University out of the 12.5% unimodal learners none of the students preferred Visual way of learning (32).

Female students and learning style preferences: Seventy six point six percent (76.6%) female students preferred one dominant (unimodal) way of learning .This compared with studies in Iran (44.3%), Kota, India (23.75%) and Wayne State University (43.4%) (9, 8, 33) showed to be greater.

While out of the unimodal preferences of learning the majority (24.7%) were found to be visual learners while the lowest preferences was kinesthetic (15.6%) that is similar to the study done in Salem district of Tamil Nadu state, India(V-31.23%),K-11.92%) (26). But showed a difference in a study at Michigan State University where out of the 54.2% unimodal,33.3% of the students preferred Kinesthetic,16.7% of the students preferred R, 4.2% of the students preferred Visual, while none were aural learners (32).

Possible explanations

Learning style preferences can differ from person to person, student to student and individual to individual due to different factors that may influence the ininnate choices on how to learn. In our studies this differences are seen from relative to d/t studies around the world. There for finding answers on why this occurs, needs further explanations the possible assumptions for this to occur b/n this study and others might be due to one or the combinations of two or three of them.

- Influence of peers in class room and outside class.
- Technologies in the classroom and knowledge and use of this materials by instructors

- Childhood socializations: How students were raised as children in their society
- Ecological Adaptations regarding their geographical and social residence and integration
- Biological and psychological differences (Genetics, Brain and physical Development)
- Difference between Instructional language and student's mother tongue.

Influence of gender on student's learning style preferences

The study showed there was no significant difference in learning style preferences between the two genders (p=0.373). This was different comparing to other studies which showed significant difference as seen in two of the following studies one done in America which showed very nearly significant relationship between gender and learning style preference (P=0.09) (36). While on the other side a study in Saudi Arabia showed that There was also a significant difference in learning style preferences between genders (p=0.028) (37). There was tough a similarity of results, as compared to a study done at Medical College in Kota India showed that There was a significant gender differences in the percentages of males and females students who preferred multimodal or unimodal styles of information presentation (p<0.05) but there were no significant gender differences in the specific multimodal preferences (p>0.05) meaning there were no gender differences in the percentage of males and female students who preferred bi-, tri-,or quad modal styles of information presentation (p>0.05) (38).

Strength and Limitation of the Study

Strength of the study

Included all the department teaching undergraduate regular programs, Mekelle university collage of health science Enough Sample size with a response rate of 10% response rate As a result of a simple, concise and easier standardized questionnaire, Shorter and simpler time needed for collection Budget was enough for the coverage of the whole expense needed.

Limitation of the study

Cross sectional study may not show the true view of the general students status which is harder to generalize availability of the whole students in the study areas was hard as a result of students being on final exam, on a long break or out for community attachment at the time of data collection.

Conclusion

Based on the data collected, unimodal way of learning was dominantly chosen by both genders. Out of which most of the students were visual learners with the least students preferring kinesthetic way of learning. This was the same for both Male and female students', both of which preferring the unimodal, out of which most were visual learners.

The numbers and types of modality combinations were not significantly different between genders. Both female and male students tended to be more diverse Although not significantly different, encompassing a broader range of sensory modality combinations within their preference profiles, most sensory modality combinations were seen in this study.

Recommendations

When teachers and students understand how they learn and their preferred ways to learn, the probability for learning increases therefore:

For instructors

Since majority of the students are unimodal finding out every students in class using the same VARK questionnaire and making of groups and addressing students based on their dominant preferences is one option in addressing each students while also increasing the relationship between teachers and students.

We need to assess and understand how to reach all students by understanding how to present information integrating instructional materials that are visually pleasing and paint mental pictures for learners effectively Since the study showed that students have diverse way of learning, moving away of the use of only one method particularly the lecture method is strongly recommended.

For researchers

The results of this study can provide useful information for improving the quality of the teaching and learning experiences of students. However, more research on this topic needs to be undertaken before the association between learning style preferences and teaching and learning strategies is more clearly understood.

It is recommended that this study be replicated with a larger sample size involving more than one university using the same instrument for comparison purposes.

Since our study reviled most students are unimodal and visual learners a deeper exploration regarding what different ways and methods can be used to address students their dominant preferences while also not forgetting to integrate multimodal student's combination of preferences to fit their learning?

For students

Students need to develop workplace skills more closely related to their dominant unimodal and in depth on their visual learning style characteristics.

Individual students need to know their way of learning preferences and adopt to those preferences away from their perceived ways of learning. Matching to their biological made preferences will help them move a step further in achieving once academic goals.

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