

TEACHING STYLES OF YEMENI SCIENCE TEACHERS

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ABSTRACT

In Yemen, traditional approaches to teaching science have remained unchanged over the past years. There is a need for change in the teaching of science to keep pace with the changing world. What is needed is not only providing students with knowledge, but also developing their problem solving skills by using kinesthetic and tactile teaching/learning styles. Before any attempts to initiate change, it is necessary to first find out what the present teaching approaches are like. This paper reports on a quantitative and qualitative research study investigating the teaching styles of science teachers in Yemen. The study is based on a modified version of the perceptual learning style preferences by Peacock (2001): visual, auditory, group, tactile, kinesthetic, and individual. The sample group comprised 50 teachers from the faculty. Data was collected by means of questionnaires, interviews, observations, field notes, and videotaped classroom sessions. The questionnaire data was coded and analysed using the SPSS programme while the interview data was transcribed, organized, coded, categorized, and analysed. The observations, field notes and videotaped classroom sessions were used to triangulate the findings. The emergent findings in this study suggest that the auditory and visual styles were the most prevalent among the teachers, who adopted mainly lecturer-fronted, chalk-and-talk teaching approaches. The paper highlights the implications for the teaching of science literacy, particularly at Yemeni tertiary institutions.

Keywords:

Teaching style, Science Education, Science Teachers, Science Teaching, Preferred Teaching Style, Sciebcce Learning

INTRODUCTION:

Many scholars have acknowledged the lucid and remarkable imprints that Arab and Muslim scholars have left on contemporary scientific fields (Rowe, 2004; Woods, 2004; Razak & Abdul Majeed, 1998; Maziak, 2005). They played a very important role in hastening the world scientific renaissance, and continued the effort of developing human knowledge until it reached a remarkable zenith in the period 900-1200 A.D. During that period, Muslims made significant progress and exceptional achievements in such areas as medicine, agronomy, botany, mathematics, chemistry, and optics, and works of Muslim scholars were disseminated from Spain to the rest of Europe. Then, the Arab-Islamic scientific inventions started to decline due to the slowing down of broader Islamic scientific study, which has been attributed by many scholars to the “closing of the Muslim mind” (Raziak & Abdul Majeed, 1998).

The teaching of science in the university seems to have followed this decline. It is observed that most universities and technical schools in the Arab world adopt an approach in which the teacher is viewed as the centre of the teaching and learning process (Badran, 2003). In Yemen, the typical didactic methodology has the teacher standing in front of the students and explaining the subject matter while students listen to him passively; hence, there is little interaction (Mahyoub, 1996). Furthermore, there is little support for science education at all

levels in the Arab world (Segal, 1996; Castillo, 2004). According to Castillo (2004), there is neither a vision nor strategy for science education. It is feared that if the education system remains unchanged, the prospects not only for graduate employment, but worse, for the progress and development of Muslim nations will sink to an abysmal low. This might not only have a disastrous effect on the Arab world but is likely also to have a spill over effect on the rest of the world. It is a critical time, and science educators must seriously rise to the challenge.

In a study conducted by Mahyoub (1996), he critiqued the overemphasis on teacher-centred approaches and pedagogies, claiming that these neglected the development of critical thinking, problem-solving, capability of inquiry and investigative skills which are characteristics of most trained scientists.

The review of literature shows that teachers in Yemen use traditional methods of teaching science and they consider these traditional methods good (Mahyoub, 1996). This finding is of concern to me, and is what has prompted me to investigate salient issues in the teaching and learning of science in Yemen, particularly as no study has yet investigated this problem. One of the major issues is that the focus of learning science in Yemen has been on acquiring basic knowledge, and that this has failed to lead to scientific application (Mahyoub, 1996).

LITERATURE REVIEW

Many authors have done research on teaching and learning styles such as Felder and Silverman (1988), Felder (1993), Tobias (1993), Reid (1995), Felder (1995), Peacock (2001), Zhenhui (2001), Zhang (2007), Vaughn and Baker (2008), Quiamzade and Mugny (2009), Tertemiz (2010), Naimie, Siraj, Piaw, Shagholi, and Abuzaid (2010), Hsieh, Jang, Hwang, and Chen (2011), Dinçol, Temel, Oskayc, Erdogan, and Yilmaz (2011), Gilakjani and Ahmadi (2011).

Teaching and learning styles are the behaviours or actions that teachers and learners exhibit in the teaching-learning exchange. Teaching behaviours reflect the beliefs and values that teachers hold about the learner's role in the exchange. Learner behaviours provide insights into the ways learners perceive interact with and respond to the environment in which learning occurs (Brown, 2003, p. 3).

Teaching style, defined by Butler (1984) encompasses:

A set of attitudes and actions that open formal and informal worlds of learning to students; it is a subtle force that influences student access to learning, and teaching by establishing perimeters around acceptable learning procedures, processes and products. The powerful force of the teacher's attitude toward students as well as the instructional activities used by the teacher shape the learning/teaching experience, and require of the teacher and student certain mediation abilities and capacities (*ibid*: p. 52).

According to Moore (1993, p. 14), there is some indication that teachers choose instructional styles that closely approximate to their own learning preferences. It has also been found that teachers tend to have preferred teaching styles with which they are comfortable and revert to in chaotic situations (Vaughn & Baker, 2008, p. 239-240). In many respects, the relative matching of instructional styles and learning styles may also have implications for students' achievements. Kuchinskas (1979) cited in Dinçol, Temel, Oskayc, Erdogan, & Yilmaz (2011) concluded in their study that the instructor's teaching style is one of the most important

factors that influence the learning environment. Teaching styles are the leading factors that shape and assure the success of a highly complex teaching-learning process (Artvinli, 2010).

Grasha (2002) views a teaching style as the continuous and consistent behaviours of teachers in their interactions with students during the teaching-learning process. Some teachers focus on rules, others lecture, some demonstrate, others emphasize memory and some others understanding (Yüksel, 2008). Grasha (2002) integrated these different styles into a model which might help to understand the nature of teacher-student encounters. He presents five teaching styles (five positive preceptor styles): Expert, Formal Authority, Personal Model, Facilitator, and Delegator.

This study adopts Peacock's (2001) model of teaching styles in order to examine the teaching styles of Yemeni teachers in the field of science. A modified version of Reid's (1995) Perceptual Learning Style Preference Questionnaire (PLSPQ) is used. The model is categorised into six preferences: 1-visual (these learners prefer seeing things in writing), 2-auditory (prefer listening-hearing words spoken and oral explanations), 3-kinesthetic (prefer active participation in activities), 4-tactile (prefer hands-on work-working with experiments in a laboratory-writing notes or instructions), 5-group (prefer studying with others-group interaction) and 6-individual (prefer studying alone-remember information by themselves) learning styles.

PREVIOUS STUDIES ON TEACHING STYLE

According to Felder and Silverman (1988) students' different learning styles can be categorized as seeing and hearing (visual), reflecting and acting (kinesthetic), reasoning logically and intuitively, analysing and visualizing and lastly, steadily and in fits and starts. On the other side of the coin, teaching methods vary among teachers and lecturers with some who prefer to just lecture, while others prefer to demonstrate or lead students to self-discovery; some emphasize memory and others understanding; while some focus on principles and others on application. Felder and Silverman in this particular study of theirs found that there existed mismatches between the learning styles of most students in a class and the teaching style of the teachers/lecturers: the students may become bored and inattentive in class, perform poorly on tests, get discouraged by the courses, or the curriculum. In some cases, they may change to other curricula or drop out of school. Hence the immediate importance of matching teaching styles to learning styles to accommodate the specific needs of students' learning styles.

Daniel and Yusoff (2005) carried out a study to examine if there was any mismatch between teaching and learning styles in primary school classrooms. The study revealed that the teachers involved in the study were enthusiastic about various teaching styles. More than 80% of the teachers preferred conducting class discussions and brainstorming sessions, 43% indicated they preferred didactic lecture styles, 81% said they liked to use creative teaching styles, such as games and role play, and more than 80% of the teachers stated that they liked to conduct activity-based lessons. The study also revealed that the majority of learners (34.7%) in Selangor seemed to use a partial combination of kinesthetic-audio-visual styles, 19.5% were apparently auditory learners, 18.1% appeared to be kinesthetic, 4.1% indicated that they preferred a combination of kinesthetic-visual styles and 16.1% indicated a preference for a combination of kinesthetic-auditory styles. Surprisingly, only 4.6% seemed to prefer a visual learning style while a mere 0.5% appeared to use a combination of visual-auditory style of learning.

In Peacock's (2001) study of the learning style preferences of EFL and ESL students, the results show that the teaching methods mostly suit auditory learners whereas students prefer kinesthetic learning styles above others.

From the theoretical perspective, much recent research has been devoted to learning styles, with many studies focusing on the effects of culture on students' learning styles (Merifield, 1996). Teaching styles, in contrast, have received little attention. Since learning styles are affected by teaching styles, it is important to investigate teaching styles so that efforts may be made towards enhancing the match between teaching and learning styles. In this study, we focus on science education teachers' preferences in the ways they take in and deliver science information.

RESEARCH METHOD

A combination of qualitative and quantitative methods was adopted for this study. The site of investigation is the Faculty of Science, Sana'a University, in the capital city of Sana'a in Yemen. The faculty is made up of six departments, but this research is confined to the Biology department.

PARTICIPATION AND CONTEXT

The participants of this study were Biology science teachers at the Faculty of Science, Sana'a University, Yemen. The biology science teachers consisted of 29 males and 21 females, all between 24 - 60 years old at the time of the study. They were drawn from the population in a simple random sampling method. Their teaching styles were analysed and described from the data collected.

INSTRUMENT

Three instruments were used in this study: a questionnaire, interviews and an observation checklist

QUESTIONNAIRE

The questionnaire is adapted from Peacock (2001) and it contains two parts: part one is to elicit the background information of Biology science teachers and part two is to collect data on the teachers' teaching style preferences. The background information of Biology science teachers' profiles contains teachers' age group, sex, years of teaching experience, university education, and level of proficiency in the English language. Data on teaching styles was collected using Peacock's (2001) modified version of the *Perceptual Learning Style Preferences* (PLSPQ) by Reid, 1995. The purpose of this questionnaire was to identify the science teacher's teaching styles. The teachers of the science department were asked to respond to each of the 12 statements as it applied to their teaching of science, using a five-point scale - always/often/sometimes/rarely/never. The participants were required to tick the column that corresponded to their degree of agreement or even indicate neutrality. This questionnaire contained 12 statements covering Reid's six learning style preferences: visual, auditory, group, kinesthetic, tactile and individual. In processing the data via computers, responses were collected using the SPSS or Statistical Package for Social Sciences. All questionnaire items were written in both English and Arabic. The English was translated by one of the researchers into Arabic to ensure full understanding by all participants.

OPEN-ENDED INTERVIEWS

The interview questions from Peacock (2001) were adapted and modified with appropriate prompt questions. The objective of this interview was to obtain data in order to understand the respondents' views on teaching styles and on how science was perceived at the Faculty of Science. To ensure that the interviewed participants understood the questions clearly, the researcher translated the questions from English into Arabic for more clarity and understanding of the interviewed participants

OBSERVATION CHECKLIST

A classroom observation checklist was used during the observation process and was designed to account for all the necessary and very much related aspects of the present study. There were twelve main categories in the observation checklist: science classroom, science class lesson, teachers' attitudes towards teaching science, and science lesson atmosphere. The observation checklist was made by the researchers based on the requirements of the study.

DATA COLLECTION PROCEDURES

Before collecting the data, teachers were invited to participate in this research and were included in the study if they granted permission. The data collection was done over one month at the Faculty of Science, Sana'a University, Yemen. A modified version of the perceptual learning style preference questionnaire (PLSPQ) was filled in by teachers to gather information related to their teaching styles. The teachers' teaching style questionnaire was approximately done over a 30-minute period. Semi-structured interviews were conducted with 10 lecturers, each lasting 30 minutes to one hour. Probing questions were asked to explore lecturers' responses in greater depth. The interview sessions were videotaped and also recorded on an audio tape recorder. One of the researchers also observed the lecturers as a non-participant observer in the science classrooms and labs using the observation checklist.

DATA ANALYSIS PROCEDURES

The quantitative data from the questionnaire was coded and analysed using descriptive statistics. The SPSS program was used to obtain descriptive analysis inferential statistics such as frequency (%), means (μ), and standard deviations (σ). Qualitative data collected from interviews, observations and field work was first transcribed, and translated, before categorizing them for analysis. All the results were then analysed by categorizing them according to the aforementioned teaching style preferences (PLSPQ) by Peacock (2001) and presenting them in tables and figures. The teachers' interview data was transcribed and translated into English and used to supplement data from the questionnaire. Data from the classroom observation checklists was also analysed.

FINDINGS

This part presents and discusses findings on teachers' teaching styles at the Faculty of Science in Yemen based on the data collected from questionnaires, classroom observations, and field notes.

The results from the modified version of the perceptual learning style preference questionnaire (PLSPQ) administered to the science teachers are presented in Tables 1, 2, 3, 4, 5, and 6. This questionnaire contains 12 statements covering Reid's six learning style preferences: visual (2 items-5 & 8), auditory (2 items-1 & 7), tactile (2 items-9 & 11), kinesthetic (2 items-2 & 6), group (2 items-3 & 10), and individual (2 items-4 & 12). Students were invited to indicate their learning style preferences on a five-point scale as were the teachers of the science department, in responding to each of the 12 statements as it applied to their teaching of science, but using a different 5-point scale - always/often/sometimes/rarely/never. Mean (μ) and Standard Deviation (σ) were calculated to obtain the percentages indicative of the science teachers' teaching styles. The following is a discussion on the findings of the science teachers' most preferred teaching styles.

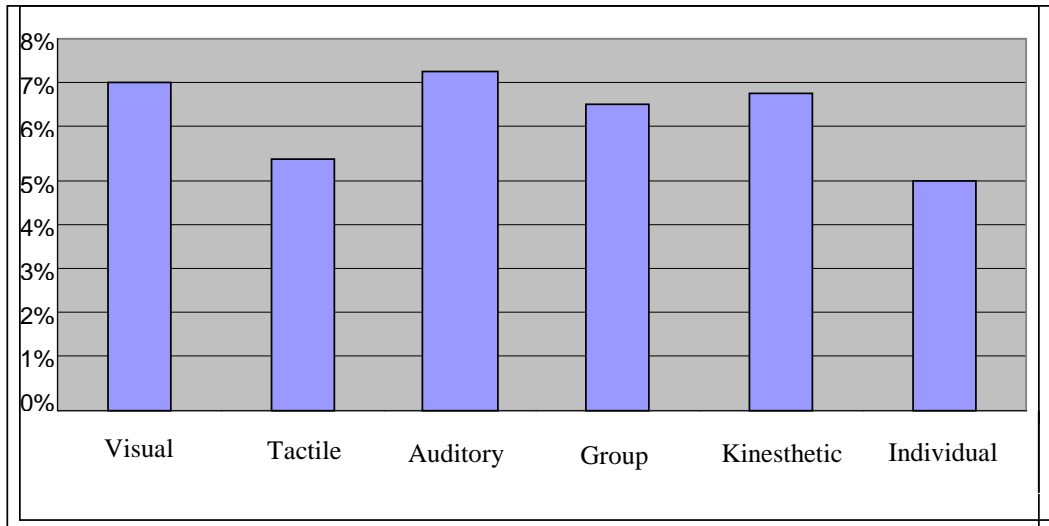


Figure 1: Teachers' Teaching Style

Table 1: Auditory teaching style

Item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total %
1. I give oral instructions to my learners in class because this helps them understand things better.	4.0	4.0	22	42	28	3.8600	1.01035	70
7. I tell things verbally to my learners in class because they remember things they hear better than things they read.	6	12	24	44	14	3.4800	1.07362	58

Note: μ = Mean; σ =Standard deviation

The results for auditory teaching style are presented in Table 1. The percentages of teachers who choose always and often for the auditory category were as follows: item no.1 (70%) and no.7 (58%) respectively. Figure 1 shows that the auditory teaching style is ranked first in the overall list of the Yemeni science teachers' preferred teaching styles categories. Two teachers interviewed explained why they preferred the auditory teaching style: teacher 3 explained that "he tell things verbally to his science students in class because this helps them understand things better". Teacher 8 indicated that "the prevailing method in the hall is almost 70% depending on the teacher and 30% on the student since lack of other explanatory means such as data show". Teacher 7 mentioned that "this was due to a lack of learning facilities, such as LCD, microphones and the absence of an updated curriculum. Therefore students depended on the handouts and the teacher, rather than finding out more on their own by, for example, doing research in the library". This, apparently, has resulted in students having a low level of knowledge of science. This is also reinforced in the classroom observation where the researcher observed that there is lack in the active learning and verbal interaction between the students and teachers in science classroom. This phenomenon is supported by the Social Development Theory of learning by Vygotsky (1978) which emphasized on the need for the social interaction of students and "more knowledgeable others" (e.g. teachers, parents, coaches, peers and experts, etc); Vygotsky believed that students' cognition is influenced by social and cultural contexts.

Table 2: Visual teaching style

Question Item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total%
5. In class I write things on the blackboard because my learners learn better by reading.	2	8	28	50	12	4.0200	1.02000	62
8. In class I give handouts because when my learners read things, they remember them better.	4.0%	28	36	16	16	3.1200	1.11831	32

Note: μ = Mean; σ =Standard deviation

The results for Visual teaching style are presented in Table 2. The percentages of teachers who choose always and often for the visual category are as follows: item no. 5 (62%) and no. 8 (32%) respectively. Figure 1 shows that the visual teaching style is ranked second in the overall list of the Yemeni science teachers' preferred teaching styles categories. One teacher interviewed explained why he preferred the visual teaching style: teacher 4 explained that he preferred to write things on the blackboard because his students learned better by reading. The students seemed to be passive learners in the classroom. As a result there is a lack of active learning and verbal interaction between the students and teachers in the science classroom. This perhaps gives a significant indication that the teachers preferred to teach science by giving handouts and lecture notes. Based on the researcher's observation and teacher interviews' data, students memorized the handouts and the teachers' notes for reproduction during the examination. This seems to be consistent with Mahbyoub's (1996) finding regarding teachers' preferences for auditory and visual teaching styles. Support for this finding is also found in the classroom observation, where the researcher observed that the teacher did not shift his/her style: it was mostly oral explanations, discussions, reading of handouts, and use of the whiteboard. This implies that the teachers are autocratic figures who rarely have discussions with their students.

Table 3: Kinesthetic teaching style

Item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total%
2. I prefer to teach by having my learners do something in class.	12	8	42	22	16	3.2200	1.18304	38
6. I have my learners do something in class because they learn better that way.	2	8	28	50	12	3.6200	0.87808	62

Note: μ = Mean; σ =Standard deviation

Table 3 shows the percentages of teachers who choose always and often with statements indicating a preference or kinesthetic teaching style were as follows: item no. 2 (38%) and no. 6 (62%) respectively. The kinesthetic teaching style is ranked third in the overall list of teachers' preferred teaching styles categories (Figure 1). This result shows a medium positive response by some teachers; but there is also a negative response by another group to kinesthetic learning by their students. This shows that some teachers encourage learning through kinesthetic work, but the positive percentage is not very high (62%). This is supported by two excerpts from the teachers' interview data, teacher 3 indicated that in science classroom, I preferred my students to participate in activities, but the huge numbers of students prevent interaction in the classroom. Teacher 5 said that "my students learn better if they do something in classroom". It is apparent that teachers like their students to participate in activities and do something in class. But science teachers emphasized that it was difficult to apply the kinesthetic style because of the huge number of the students in the science classrooms, where the teacher

obliged to give only the lecture and examinations. Although, teachers illustrated that they preferred the kinesthetic teaching style but regrettably they do not engage it in the science classroom. This perhaps gives a significant indication that the teachers did not use kinesthetic style enough as was noticed in class observations. The results reinforced that most teachers barely used activities relating to movement, constructing things, taking notes or doing projects. And this might be because of the huge numbers of students where there were almost 140-150 students in a hall, and it was difficult for the teachers to apply the kinesthetic teaching style because this style needs students to learn with something in their hands such as practical experiments and physical activities which will be difficult with the huge number of the science students in a classroom.

Table 4: Group teaching style

Question item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total %
3. I have my learners study in groups in class because they learn more that way.	6	22	12	42	18	3.4400	1.19796	60
10. I have my learners work with others in class because they learn best that way.	4.0	16	44	28	8	3.2000	0.94761	36

Note: μ = Mean; σ =Standard deviation

From the questionnaire results in Table 4, the teachers indicated a mixed reaction towards group learning by the students. 60% indicated that they had their learners study in groups in class because they believed that they would learn more that way, while 36% indicated that they had their learners work with others in class because they would learn best that way. Group teaching style is ranked fourth in the overall list of teachers' preferred teaching styles categories (Figure 1). This result shows a medium high positive response by some teachers, but a negative response to group learning by their students. This shows that some teachers do support the students' preference for learning by group work. This is supported by excerpts from the teachers' interview data. Teacher 15 emphasized that "I prefer my students to work in groups because they learn easily", teacher 6 says that "I do like my students to work with other students because they remember information better". The excerpts show that students prefer learning by working in groups because they remember better what they have discussed with their friends. Based on the questionnaire data, observation data and field notes, it is indicated that teachers support the students' preference for learning by group work. This could be attributed to the fact that Arab learners in general liked to be in groups as part of their culture. "Collectivism" versus "Individualism" is one of the values conflicts that can be found among Arabs (Hill et al. 1998). In a society in which group cohesiveness is thought to be essential, as we have in Yemen, students are supposed to de-emphasize self and to be concerned about the group. This then is not a surprising result as Yemeni students are taught to have socially acceptable behaviour without "acting out" or "speaking out". Group success rather than individual performance is rewarded more in this society. These findings are also related to the

study by Hofstede (1980), who stated that Arab world is a collectivistic society as compared to western world that practiced individualistic culture.

The significance of Vygotsky's Social Development Theory of Learning (Vygotsky, 1978) is that it highlights the importance of communication and social interactions, and the impact of the social interactions among the students themselves, and with other individuals who are 'more knowledgeable' in order to acquire knowledge. Arab students in general and Yemenis in particular are people who like to be in groups and share their feelings with one other (Hofstede, 1980). Teachers should therefore exploit this natural inclination for sharing with the group in their pedagogy, especially since the practice is supported by Vygotsky's theory.

Table 5: Individual teaching style

Item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total %
4. I have my learners work alone in class because when they work alone, they learn better.	32	16	16	17	2.0	2.5800	1.31071	19
12. In class I have my learners work alone because when they work alone, they work better.	20	48	24	4.0	4.0	2.2400	0.95959	8

Note: μ = Mean; σ =Standard deviation

The results in Table 5 show a very negative response to students learning individually. 19% of the teachers believed that their students would understand better when they work alone in class and 8% believed that their students would work better in class when they work alone. Auditory teaching style is ranked fifth in the overall list of teachers' preferred teaching styles categories (Figure 1). The data is supported by teachers' interview excerpts where student 8 said that "I don't prefer my students to work alone because they don't learn better that way", teacher 1 stated that "I have some of my students work alone because they say that they remember information by themselves". This is also reinforced in the classroom observation, where the researcher observed that the science classroom does not include any activities or tasks to be taken except for few activities where teachers prefer their students to work in group learning style and rarely use the individual teaching style. In the Arab culture, independence of its members is not encouraged as it is solidarity and loyalty dependence. The society offers its members protection and guidance, on which individuals are supposed to follow its regulations of patriarchal relationship which does not breed authoritarianism. The patriarchal relations are societal rules that are blended with compassion, as the following example represents it: A father directs and supports his son because he wants him to protect the image of their family, and that he does not miss his destiny.

Table 6: Tactile teaching style

Question item	Never	Rarely	Sometimes	Often	Always	μ	σ	Total%
9. I have my learners physically make something for in-class projects because they learn more that way.	16	16	60	4.0	4.0	2.6400	0.94242	8
11. I have my learners make something for in-class projects because they prefer learning that way.	20	48	24	4.0	4.0	2.2400	0.95959	8

Note: μ = Mean; σ =Standard deviation

Table 6 shows the percentages of teachers who often and always agree with statements indicating preference for tactile teaching style category: item no. 9 (8%) and no. 11 and (8%). The lowest positive inclination was towards the tactile style of teaching. Figure 1 indicates that the least preferred teaching style was the tactile learning style. It is ranked sixth in the overall list of teachers' preferred teaching styles categories. The excerpts from the teachers' interview data explain why this teaching style is preferred: teacher 4 says that in science classroom I have my learners write notes or instructions or make class projects because they remember information and prefer learning that way, but because of the huge number of students and facilities in the science classroom, I tried to give the lecture verbally and sometimes write on the blackboard". This excerpt showed that the teachers felt that they teach better from writing notes. Through classroom observation and filed notes, the researcher noted that the teacher did not shift from one style to other. Tactile learning style is considered to be one of the best styles of learning science, apart from the "hands on" activity, whereby the activities assist in the retention of facts, findings and concepts. The researcher's observations also showed that the teaching of Biology in the Faculty of Science did not involve doing experiments and carrying out investigations by students themselves, although the basic principles must have already been taught to them. The students are taught the theoretical aspects of the scientific concepts and disciplines but they do not get to follow up with the practical application of the theory. Application of knowledge should be in the form of investigations of some real-life problems that science students are involved in, and which have to be conducted with the guidance of their teachers. This has been pointed out as a necessary scaffolding process (Raymond 2000).

CONCLUSION

This study aimed to investigate the teaching styles of teachers in the Faculty of Science, Sana'a University, Yemen. The results from the questionnaire and observation showed that teachers strongly favoured the auditory, visual, kinesthetic, and group teaching styles, but were less inclined to use the tactile and individual teaching styles. The findings revealed that tactile styles such as role-play, handling materials or taking notes are ignored in the teaching of science. It is

suggested that tactile, kinesthetic, and group teaching styles are very important styles for science students because there are lots of opportunities for students in a group as they move about and manipulate materials to discover concepts from handling objects or substances. Furthermore, the tactile learning style is considered to be one of the best styles for learning science apart from the “hands on” part of it, the activities assist in the retention of facts, findings and concepts (Angela Abu-Asba, Hazita Azman, Rosniah Mustaffa, 2012).

It is clear that there needs to be a change in the teaching and learning process in Yemeni institutions of higher learning. In this paper, it is suggested that a more effective approach would be a balanced teaching style that does not strongly favour any one learning style but rather accommodates multiple learning styles. Different activities should be employed that will meet students’ respective learning styles. However, it is necessary to first find out what students’ preferred ways of learning are in order to determine better teaching strategies inside the classroom and to motivate students’ participation in class by creating activities related to their learning styles (Juris, Ramos, & Castaneda, 2009).

The pedagogical implications of this study should be taken into consideration by both science instructors and syllabus designers at Sana’a University. It is hoped that these findings will move policy makers, course designers and developers and classroom teachers at the University of Sana’a as well other Universities in Yemen to review and plan the entire science teaching programme in a more effective and realistic manner. Without a solid science teaching programme, the state of scientific knowledge would continue to stagnate and the country would not be able to participate in the scientific endeavours that the rest of the world is actively involved in.

REFERENCES

- Alain Quiazade, A., Mugny. G. & Falomir-Pichastor, J. M. (2009). Epistemic constraint and teaching style. *European Journal of Psychology of Education*, XXIV (2), 181-190.
- Angela Abu-Asba, Hazita Azman & Rosniah Mustaffa. (2012). Learning styles of Yemeni undergraduate science students. *GEMA: Online Journal of Language Studies*, 12 (2), 571-591. ISSN 1675-8021
- Artvinli, E. (2010). Cografya öğretmenlerinin öğretim stilleri. *Electronic Journal of Social Sciences*, 9 (33), 387- 408.
- Badran, A. (2003). The Status of Science Teaching in the Gulf Countries. In UNESCO. (Ed.). *Connect International Science, Technology & Environmental Education Newsletter*, XXXIII (3-4), 1-6.
- Brown, B. L. (2003). *Teaching styles vs. Learning Style: Myths and Realities*. Eric Publications. Retrieved December 16, 2006 from <http://www.calpro-online.org/eric/textonly/docgen.asp?tbl=mr&ID=117>
- Butler, K. A. (1984). *Learning and Teaching style: In theory and Practice*. Maynard, MA: Gabriel Systems.
- Castillo, D. D. (2004). The Arab World’s Scientific Desert: Once a leader in research, the region now struggles to keep up. Retrieved December 12, 2009 from <http://chronicle.com/free/v50/i26/26a03601.htm>.
- Daniel, E. G. S, & Yusoff, M. (2003). *Teaching and Learning styles in the primary classroom. In Health and Education among the Primary School Pupils in Selangor, Malaysia* (Eds.). Centre for Economic Development and Ethics Relations (CEDER), University of Malaya, Kuala Lumpur. (Non-ISI/Non-SCOPUS Cited Publication).

- Dinçol, D., Temel, S., Oskayc, O. O., Erdogan, U. I. & Yilmaz, A. (2011). The effect of matching learning styles with teaching styles on success. *Procedia Social and Behavioral Sciences*, 15, 854–858.
- Dunn, R. & Dunn, K. (1993). Learning Styles/Teaching Styles: Should They....Can they... be Matched? *Educational leadership*, 36, 21-31.
- Felder, R. M. (1993). Reaching the Second Tier: Learning and Teaching Styles in College Science Education. *J. College Science Teaching*, 23 (5), 286-290.
<http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Secondtier.html>
- Felder, R. M. & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engr. Education*, 78 (7). Retrieved July 24, 2009 from
<http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/LS-1988.pdf>
- Felder R. M. (1995). Learning and Teaching Styles in Foreign and second Language Education. *Foreign language Annals*, 28 (1), 21-31.
- Gilakjani, A. P. & Ahmadi, S. M. (2011). The Effect of Visual, Auditory, and Kinaesthetic Learning Styles on Language Teaching. *International Conference on Social Science and Humanity*, 5, 469-472.
- Grasha, A. F. (2002). The dynamics of one-on-one teaching. *College Teaching*, 50 (4), 139-146.
- Hill, C., Loch, K., Straub, D. & El-Sheshai, K. (1998). A Qualitative Assessment of Arab Culture and Information Technology Transfer. *Journal of Global Information Management*, 29-38.
- Hofstede. G. (1980). *Culture's Consequences: international Differences in Work- Related Values*. Beverly Hills CA: Sage Publications.
- Hsieh, S. W., Jang, Y. R., Hwang, G. & Chen, J. S. (2011). Effects of teaching and learning styles on students' reflection levels for ubiquitous learning. *Computers & Education*, 57, 1194–1201.
- Juris, M. F., Ramos, V. V. & Castaneda, M. G. G. (2009). Learning and Teaching Crossroads. *Institute for Learning Style Journal*, 1, 1-19.
- Kuchinskas, G. (1979). Whose cognitive style makes the difference? *Educational Leadership*, 36 (4), 269-271.
- Mahyoub, A. A. (1996). *Approaches to study process and university classroom environment: the case of pre-service science teachers at the college of education in Sana'a University*. Unpublished PhD thesis, University of Pittsburgh, USA.
- Maziak, W. (2005). Science in the Arab World: Vision of Glories Beyond. *Global Voices of Science*, 308 (5727), 1416 – 1418.
- Merifield, J. (1996). *Examining the language learning strategies used by French adult learners*. Birmingham, UK: Aston.
- Moore, E. L. S. (1993). *An analysis of learning styles, instructional styles and culture among selected accounting students and instructors at the university level*. Unpublished PhD thesis, University of Pittsburgh, USA.
- Naimie, Z., Siraj, S., Piaw, C. Y., Shagholi, R. & Abuzaid, R. A. (2010). Do you think your match is made in heaven? Teaching styles/learning styles match and mismatch revisited. *Procedia Social and Behavioral Sciences*, 2, 349–353.
- Peacock, M. (2001). Match or mismatch? Learning styles and teaching styles in EFL. *International Journal of Applied Linguistic*, 11 (1), 1-20.
- Portar, S. (2007). *Learning styles and science labs*. Retrieved April 10, 2011 from
http://scienceblogs.com/digitalbio/2007/03/learning_styles_and_science_la.php

- Quiamzade, A., Mugny G., Chatard, A. (2009). When teaching style matches students' epistemic (in) dependence: The moderating effect of perceived epistemic gap. *European Journal of Psychology of Education*, XXIV (3), 361-371.
- Raymond, E. (2000). *Cognitive Characteristics. Learners with Mild Disabilities*. Needham Heights, MA: Allyn & Bacon, A Pearson Education Company.
- Razak, A. A. & Abdul Majeed, A. (1998) *Islam: Science and Technology*. Malaysia: Institute of Islamic Understanding Malaysia.
- Reid, J. M. (1995). *Learning styles in the ESL/EFL classroom*. Boston: Heinle & Heinle Publishers.
- Rowe, D. (2004). How Islam has kept us out of the 'Dark Ages'. *Science and Society*. Retrieved July 27, 2006 from <http://turntoislam.com/community/threads/c4-how-islam-has-kept-us-out-of-the-dark-ages.8524/>
- Salem, G. R. (2001). *Instructors' and Students' Antecedents and Contexts: Their Influence on the English Proficiency of College Freshmen*. Unpublished Ph.D thesis. Saint Mary's University, Bayombong, Nueva Vizcaya.
- Segal, A. (1996). Why Does the Muslim World Lag in Science? *The Middle East Foru.*, 3 (2), 1-8. Retrieved September 6, 2006 from <http://www.meforum.org/article/306>.
- Soliven, S. (2003). *Teaching Styles of High School Physics Teachers*. Retrieved October 21, 2003 from www.Hiceducation.org/Edu_2003Proceedings/Samuel%20R.%20Soliven.pdf.
- Teremiz, N. (2010). Turkish and Finnish trainee elementary teachers' beliefs about the teaching styles of university teaching staff. *Social Behaviour and Personality*, 38 (7), 941-954.
- Tobias, S. (1993). They're Not Dumb, They're Different: Stalking the Second Tier. Tuscon Research Corporation. In R. Felder (Eds.). Reading the Second Tier: Learning and teaching styles in College Science Education. *J. College Science Teaching*, 23 (5), 286-290.
- Vaughn, L. M & Baker, R. C. (2008). Do Different Pairings of Teaching Styles and Learning Styles Make a Difference? Preceptor and Resident Perceptions. *Teaching and Learning in Medicine*, 20 (3), 239-247.
- Vygotsky, L. (1978). *Mind in Society: The development of higher psychological process*. Cambridge: Harvard University Press.
- Woods. M. (2004). *Islam, once at forefront of science, fell by wayside: For centuries, Arabic was the language of science and medicine, as English is today*. Retrieved June 5, 2010 from <http://www.post-gazette.com/pg/04102/299292.stm>.
- Yüksel, G. (2008). Critical thinking and learning /teaching styles. *Akademik Arastirmalar Dergisi*, 38, 54 – 73.
- Zhang, L. (2007). From career personality types to preferences for teachers' teaching styles: A new perspective on style match. *Personality and Individual Differences*, 43, 1863-1874.
- Zhenhu, R. (2001). Matching teaching styles for ESL/EFL instruction. *The internet TESL Journal*, 7 (3).