Asian Journal of Scientific Research

ISSN 1992-1454

science alert
http://www.scialert.net

ANSInet
an open access publisher
http://ansinet.com

Asian Journal of Scientific Research 3 (4): 258-266, 2010
ISSN 1992-1454

Evaluation of Non University Hospital Labs in Teaching and Training Quality of Pregraduates Students

N.M. Abdalla
Department of Microbiology, College of Medicine, King Khalid University,
Abha, P.O. Box 641, Zip 61421, Saudi Arabia

Abstract: This is students peer review study aimed to evaluate the quality of non university labs in teaching and training of pregraduates students. The laboratory has been given a central and distinctive role in science education and science then educators have suggested that rich benefits will be achieved in learning from laboratory activities. A total of 198 students; fourth year, level eight, college of Applied Medical Science have participated in evaluation of Non University Hospital Laboratories (NUHL) which include; Assir Central Hospital and Abha General Hospital as training and educational units to the pregraduate students. This evaluating study was held as a part of the quality control course included in the teaching syllabus for these students. The study was conducted during the period of 1427-1430 H equivalent to 2007-2010. Contemporary goals for science learning, current models of how students construct knowledge and information about how teachers and students engage in science laboratory activities. From this study the students have listed the activities of lab sections; microbiology, serology and blood bank. They have incorporated some tests results which they have encountered during their presence in labs, the mode of tests analysis and the outcome results. The students give direct and short evaluation statement about the knowledge they gain, training methods, space and time allotted to these practical sessions beside they comment on other related matters such as the safety and infection control measures. A special questionnaire have been used and the outcome showed that variable activities have been encountered, equivocal assessment of learning outcome and local staff cooperation.

Key words: Non University Hospital Laboratories (NUHL), pregraduate students, education quality, peer review

INTRODUCTION

Although, some forecasters say that they are on the way out, lectures still appear to play a significant role in the academic teaching of most disciplines. The academic stands before a large group of students and talks to them, aided perhaps by a board, a slide presentation, or a choice of other props. Educators adopted a policy; show in lecture, do in practical and apply in assignment (Akerlind, 2004). We are living in an era of dramatic new technology resources such as computer programs and network sites that led educators to use a special term digitalized students (Roy, 2009; Chen, 2009). The new standards in science education in which learning by inquiry has been given renewed central status. Methodologies for research and assessment that have developed recently can help researchers seeking to understand how science laboratory resources are used, how students' work in the laboratory

is assessed and how science laboratory activities can be used by teachers to enhance intended learning outcomes. An approach where lab practicals and lectures are combined within a computing course was described (De Raadt *et al*., 2006). This approach yielded positive feedback from students and faster learning was observed, although it cost significantly greater effort and finance from instructors.

When university teachers were able to discern critical aspects of variation within differing teaching strategies, they moved to more student focused ways of experiencing their teaching (McKenzie, 2002). Therefore, an awareness of the different categories of practical class will better inform academics who are designing courses; which category is suitable for their work objectives and their students. He reflected that university teachers should aspire to using approaches focused on student learning since these experiences encourage students to take deeper approaches to their learning, approaches that are often associated with higher-quality learning outcomes. In an earlier qualitative study of teaching and learning. Four personal theories of teaching (Dennis, 1983), which have been paralleled by more recent study (Prosser *et al*., 1994). At Fox's lowest level, which he calls transfer, the student is seen as a container into which the discipline knowledge is to be poured. A teaching morel in which the students are taught new skills that are independent of lecture material, seems reasonably similar to the transfer level of Fox's theory. At the next level, *shaping*, the student is viewed as a raw material to be shaped into a finished product whose specification is couched in terms of the discipline knowledge. It is tempting to relate this to the lab practicals, where students acquire and practice skills they have been shown in other classes such as lectures; but the link is perhaps a little tenuous. In the third level Fox moves the focus from the content to the student. At this level, travelling, the discipline knowledge moves somewhat into the background, as the countryside of a journey; the teacher's task is to guide the student through this countryside, pointing out features of interest along the way. This ties in well with the status, in which students already have much of the knowledge, but are still being guided in its correct use. At the fourth level, growing, the student is seen as already full of knowledge, the teacher's task being to cultivate that knowledge in the student, weeding and fertilizing as appropriate. This mimic the condition, in which students already have the knowledge and skills and seek help only in occasional aspects of their application. To relies if the students were mastering the laboratory skills as well as the concepts used in the labs, as the laboratory provides a unique medium for teaching and learning in science, researchers have not comprehensively examined the effects of laboratory instruction on student learning and growth in contrast to other modes of instruction and there is insufficient data to confirm or reject convincingly many of the statements that have been made about the importance and the effects of laboratory teaching (Pitkin, 2003). Thus, aspects of professionalism can be introduced, monitored and evaluated as early as the first semester of the college or school (Swartz, 2006). Many researches haves failed to show simplistic relationships between experiences in the laboratory and student learning. Active involvement of students in teaching will help prepare students to be continual and independent self-learners throughout their professional careers (Krych *et al*., 2005).

Reviewing several methodological shortcomings in the science education research, that inhibited our ability to present a clear picture regarding the utility of the science laboratory in promoting understanding for students (Bentley and Hill, 2009). Identification of these shortcomings which included; insufficient control over procedures (including expectations delivered by the laboratory guide, the teacher and the assessment system); insufficient reporting of the instructional and assessment procedures that were used; assessment measures of students' learning outcomes inconsistent with stated goals of the teaching and

the research and insufficient sample size in many studies, especially in quantitative studies (Blosser, 1983; Bryce and Robertson, 1985; Hodson, 1993).

This study based on students peer review aimed to evaluate the benefits and outcomes from the NUHL and trying to identify the useful methods that help students to gain the best knowledge and skills from lab practical sessions and to pinpoint areas of failure.

MATERIALS AND METHODS

The study area was the laboratories of the non-university hospitals; Abha General Hospital (AGH) and Assir Central Hospital (ACH). The study was conducted over the period of three years (Jan 2007- Jan 2010). A total number of 198 students were involved. Each year 66 students have taken this course during which they have been divided in three groups; 11 students allocated to each laboratory section (Microbiology, Serology and Blood bank). A special questionnaire was used to collect the student's feedback mainly towards the activities, analysis methodologies, tests results, new techniques, advanced machines and general comments with emphasis on the time allotted to each training and teaching sessions which was the period from 8-10 am. The value of the local staff assistance was included in this study. The students have comment on the safety measures available in each sections and the final outcome of training and teaching evaluation of each sections; microbiology, serology and blood bank. There are no specified answers or assessment scale in this questionnaire, the students should respond freely towards each parts in the questionnaire.

RESULTS

The results were obtained from data analysis of the questionnaires forwarded by the students undergone this course over a period of three years. The percentage of students number in response to each data field is reflected by the frequency shown in tables and graphs. In fact the students were non obligatory to respond to all parts of the questionnaire and they were not restricted by specific answers.

The activities practiced in microbiology section were; catalase test, haemolysis, lancifield test, coagulase test, Dnase, lactose fermentation, blood enriched agar, sabroud dextrose agar, cultures, germ tube test, staining, API, biochemical tests and MIC (Fig. 1). The activities done in AGH were predominant which reflect the more work load compared to the section in ACH.

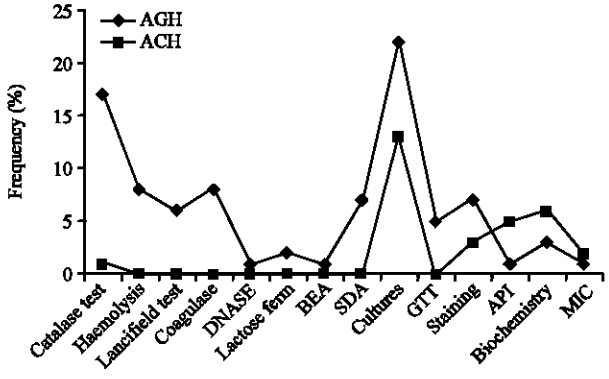

Fig. 1: Microbiology activity between AGH and ACH

Table 1: Microbiology new knowledge and skills among AGH and ACH

Item	AGH	ACH
Lance field	1	1
New media	2	0
New machine	2	8
New technique	2	4

AGH: Abha general hospital ACH: Assir central hospital

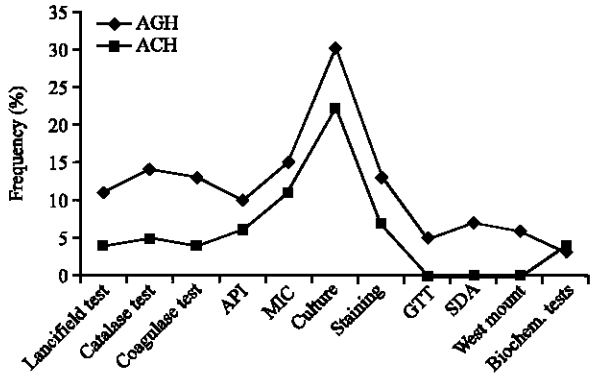

Fig. 2: Test result of micobiology among AGH and ACH

The methods adopted in reading tests results in microbiology were; naked eyes (visual observation) applied by 16% in AGH and 12% in ACH while computerized facilities in 3 and 9%, respectively.

New knowledge and skills were gained from advanced tests, high tech machines and instruments which were clearly found in ACH 13% and AGH 7% of students notification (Table 1).

Students have observed some tests results in microbiology section in which cultures were the most observed activity in the other hand mycology tests; direct microscopy (wet mount), culture (SDA) and candida specific test (GTT) were observed in AGH only, indicating that mycology investigations were only encountered in this hospital (Fig. 2).

The activities in serology section in both hospitals were; direct agglutination tests (AGH 33% and ACH 18%) and Enzyme Linked Immunosorbent Assay (ELISA) (AGH 32% and ACH 21%). The serology section is more busy in AGH than in ACH this can be explained by the fact that AGH is responsible to run the residential tests for all non national working contracts which comprises serological tests to hepatitis and HIV.

As the serology section in AGH is responsible to run the residential tests for all non national working contracts, the investigations results (Direct agglutination and ELISA) are usually confidential this might explain the less tests results observed by student in AGH (14 and 11%, respectively) compared with ACH (14% for both test types). The results of serological tests were done by visual inspection for qualitative tests or by titre calculation using computers in quantitative tests. The investigations reading methods (Direct agglutination and ELISA) are observed by student in AGH (20 and 14%, respectively) compared with ACH (14% for both test types).

As the serology section in AGH is more busy than in ACH, the new knowledge, skills and attitude gained by the students were obtained only from AGH which include; sample preparation techniques (2%), results reading methods (5%), working regulation system (10%) and uses of new sophisticated machines (1%).

Table 2: Subject: Blood bank1(activities) compared with AGH and ACH

Item	AGH	ACH
ABO and Rhesus	25	40
SCREENING TESTS	12	25
CROSS MATCHING	22	32
BLOOD SEPARATION	4	10

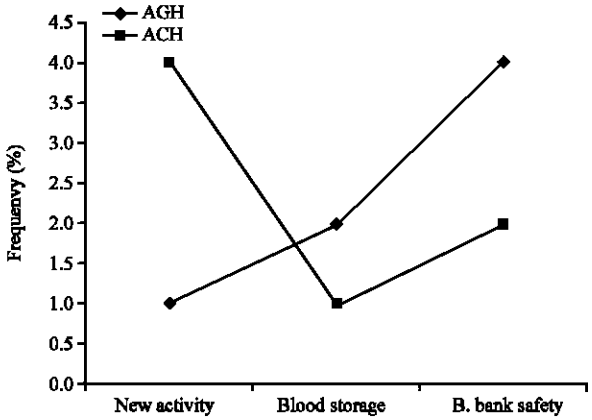

Fig. 3: Blood bank new knowledge and skills

The activities run in the blood bank in both hospitals were; blood grouping predominantly, cross matching, blood derivatives (plasma) and screening tests. In ACH blood bank; 40, 25, 32 and 10%, respectively while these activities in AGH blood bank were 25, 12, 22 and 4%, respectively, overall ACH blood bank is busier in all activities compared with AGH blood bank (Table 2).

The results observed by the student in the blood bank were; the blood grouping in both hospitals (24% in AGH and 34% ACH) and few cross matching results in AGH only (3%).

The only method applied in the blood grouping was by naked eye (22% in AGH and 37% in ACH) no machines for reading results were used in both hospitals.

Although, AGH blood bank have more advanced measures in blood storage and safety methods than ACH blood bank but the later have advent new activities and machines mainly in blood screening, this is can be explained by establishing molecular analysis (Polymerase Chain Reaction) used in blood screening mainly for hepatitis and HIV (Fig. 3).

Overall students comments about the microbiology section, clearly notified the short time which was allotted to them in this section. Minority of students comments about the local staff assistance to them, their comments was equivocal between helpful and helpless attitude of the hospitals staff towards them. Safety measures were more noticed in AGH. Small space was more observed in AGH in which university hospital lab was suggested by the students. Equivocal students comments regarding the serology section in both hospitals were noticed. But the short time was clearly noticed indicating that students need more time to gain more practical benefits from this section in both hospitals.

The students general comments regarding the blood banks in both hospitals include; equivocal comments concerning the system of the work whether it is good or need adjustment. Useful training was a predominant comment. Due to the controversy comments regarding the blood bank staff assistance and the small place a suggestion of having a university hospital were raised clearly specially by students trained in ACH blood bank (Table 3).

Table 3: Students comments regarding microbiology, serology and blood bank in both hospital

	Microbiology		Serology		Blood bank	
Item	AGH	ACH	AGH	ACH	AGH	ACH
Short time	7	13	10	10	9	14
University lab	1	0	3	0	0	9
Useless training	3	0	1	1	0	1
Useful training	5	7	0	2	0	4
Staff helpful	0	1	0	1	0	1
Staff not helpful	1	1	1	0	8	4
Safety measures	4	1	0	2	1	1
No safety measures	6	1	2	2	1	1

DISCUSSION

An approach using VET (Vocational Education and Training) (Simon *et al*., 2006), it is a teaching in which a university subject will typically be taught with lectures to the full class followed by labs or tutorials for groups of 20 or so students.

The laboratory had been given a central and distinctive role in science education and science educators have suggested that there are rich benefits in learning that accrue from using laboratory activities. But the role of the Laboratory in science teaching is considered as a neglected aspects of research (Hofstein and Lunetta, 1982).

Both the content and pedagogy of science learning and teaching are being scrutinized and new standards intended to shape meaningful science education are emerging. The National Science Education Standards National Research Council (1996) and other science education literature like Bybee (2000) and Lunetta (1998) emphasized on the importance of rethinking of the role and practice of laboratory work in science teaching. This is especially appropriate because in recent decades we have learned much about human cognition and learning (Bransford *et al*., 2000). In addition, learning by inquiry National Research Council. (2000) is posing challenges for teachers and learners (Krajcik *et al*., 2001). Inquiry refers to diverse ways in which scientists study the natural world, propose ideas and explain and justify assertions based upon evidence derived from scientific work. It also refers to more authentic ways in which learners can investigate the natural world, propose ideas and explain and justify assertions based upon evidence and, in the process, sense the spirit of science. The course under study is mainly aimed to give students the experience of the first exposure to the laboratories working atmosphere which they are going to face after graduation.

Education is a long process which might be long life but the utmost important part of this process is the foundation that comprises the early components. The learning modalities are variable but mainly depend on hearing, seeing and touching, three sensory modalities that give mild, moderate and strong learning, respectively. The construction of education course should varies with respect to pre and postgraduate level and college of students, accordingly the theoretical and practical course load should be determined. Laboratory test component, analytical procedure and result's clinical interpretation should be taught to students in variable degrees depending on the student profile; college and education level. Dichotomy between what is taught and the future work requirement is causing a clear drawback of the ongoing education process.

The questionnaire used by the students in evaluating the teaching output of the laboratories in non university hospital was meant to give statistical, observational and self evaluation information during the student adherence to a specific laboratory section, which are microbiology, serology and blood banks. Analysis of these data showed that all practical

sections were not similar in kind of activities, methodologies and results readings. The students feedback overall concluded that both non university hospitals (Assir Central Hospital and Abha General Hospital) are not ideal to held practical teaching sessions to students.

The variation of the daily routine investigation in Non University Hospital Laboratories (NUHL) will not ensure a specific set of investigations to be run daily, this will lead to missing of a set of these tests that needed to be learned by the students. This will make a log book of a set of investigations that required to be learned by students, more difficult and not practicable.

The staff of these (NUHL) are not prepared to teach or train students specially undergraduates. No financial or any kind of rewards are dedicated to them. In fact the members of the working staff have no commitment towards the students, their personalities are varied and they are not fixed in their jobs (annual renewal of contracts).

Education process includes knowledge, practice and attitude, that are unique to practical work in science laboratories, these parameters should be considered in constructing any education course and appropriate assessment of these outcomes must be developed and implemented continuously by teachers in their laboratory-practicals. Laboratory activities appeal as a way of allowing students to learn with understanding and, at the same time, engage in a process of constructing knowledge by doing science (Tobin, 1990). Baird (1990) suggested that these metacognitive skills are learning outcomes associated with certain actions taken consciously by the learner during a specific learning episode.

In the college of Medical Applied Sciences, the students laboratories educational courses are teaching the manual working process while the actual working laboratory process depends mostly on electronics and digitalized machines. Students need more quality assessment based on electronics; such as computers, software and spectrophotometers. Students peer review is an essential monitoring and evaluating method that should be adopted in all courses and in several occasions during the course is going on. Students enjoy laboratory work in some courses and that laboratory experiences have resulted in positive and improved student attitudes and interest in science and show a collaborated team work (Lazarowitz and Tamir, 1994). Lunetta and Hofstein (1991) noted that interacting with instructional simulations can help students understand a real system, process, or phenomenon. They suggested that within school or college settings, practical activities can enable students to confront and resolve problems, to make decisions and to observe the effects. So teachers need knowledge, skills and resources that enable them to teach effectively in practical learning environments. They need to enable students to interact intellectually as well as physically, involving hands on investigation and minds on reflection. students' perceptions and behaviors in the science laboratory are greatly influenced by teachers' expectations and assessment practices and by the orientation of the associated laboratory guide, worksheets and electronic media; and teachers need ways to find out what their students are thinking and learning in the science laboratory practical and classroom.

REFERENCES

Akerlind, G.S., 2004. A new dimension to understanding university teaching. Teaching Higher Educ., 9: 363-375.

Baird, J.R., 1990. Metacognition, Purposeful Enquiry and Conceptual Change. In: The Student Laboratory and the Science Curriculum, Hazel, E.H. (Ed.). Routledge, London, pp: 183-200.

Bentley, B.S. and R.V. Hill, 2009. Objective and subjective assessment of reciprocal peer teaching in medical gross anatomy laboratory. Anatomy Sci. Educ., 2: 143-149.

Blosser, P., 1983. The role of the laboratory in science teaching. School Sci. Math., 83: 165-169.

Bransford, J.D., A.L. Brown and R.R. Cocking, 2000. Learning and Transfer. How People Learn: Brain, Mind, Experience and School. National Academy Press, Washington, DC., pp: 51-78.

Bryce, T.G.K. and I.J. Robertson, 1985. What can they do? A review of practical assessment in science. Stud. Sci. Educ., 12: 1-24.

Bybee, R., 2000. Teaching Science as Inquiry. In: Inquiring into Inquiry Learning and Teaching in Science, Minstrel, J. and E.H. van Zee (Eds.). American Association for the Advancement of Science, Wasington, DC., pp: 20-46.

Chen, W.K., 2009. Passive, Active and Digital Filters (Handbook of Circuits and Filters). CRC Press, Boca Raton, ISBN: 1420058851. pp: 822.

De Raadt, S.M., K. Sutton and A. Venables, 2006. The distinctive role of lab practical classes in computing education. Baltic Sea, 276: 54-60.

Dennis, F., 1983. Personal theories of teaching. Stud. Higher Educ., 8: 151-163.

Hodson, D., 1993. Re-thinking old ways: Towards a more critical approach to practical work in school science. Stud. Sci. Educ., 22: 85-142.

Hofstein, A. and V.N. Lunetta, 1982. The role of the laboratory in science teaching: neglected aspects of research. Rev. Educ. Res., 52: 201-217.

Krajcik, J., R. Mamlok and B. Hug, 2001. Modern Content and the Enterprise of Science: Science Education in the Twentieth Century. In: Education Across a Century: The Centennial Volume, Corno, L. (Ed.). University of Chicago Press, Chicago, pp: 205-238.

Krych, A.J., C.N. March, R.E. Bryan, B.J. Peake, W. Pawlina and S.W. Carmichael, 2005. Reciprocal peer teaching: students teaching students in the gross anatomy laboratory. Clin. Anatomy, 18: 296-301.

Lazarowitz, R. and P. Tamir, 1994. Research on using Laboratory Instruction in Science. In: Handbook of Research on Science Teaching and Learning, Gabel, D.L. (Ed.). Macmillan, New York, pp: 94-130.

Lunetta, V.N. and A. Hofstein, 1991. Simulations and Laboratory Practical Activity. In: Practical Science, Woolnough, B.E. (Ed.). Open University Press, Milton Keynes, pp: 125-137.

Lunetta, V.N., 1998. The School Science Laboratory: Historical Perspectives and Centers for Contemporary Teaching. In: International Handbook of Science Education, Fraser, B.J. and K.G. Tobin (Eds.). Kluwer, Dordrecht.

McKenzie, J., 2002. Variation and relevance structures for university teachers' learning: Bringing about change in ways of experiencing teaching. Res. Dev. Higher Educ., 25: 434-441.

National Research Council, 1996. National Science Education Standards. National Academy Press, Washington, DC.

National Research Council, 2000. Inquiry and the National Science Education Standards. National Academy Press, Washington, DC.

Pitkin, R.B., 2003. Lab Practicals that Test Practical Skills. In: Tested Studies for Laboratory Teaching, O'Donnell, M.A. (Ed.). Vol. 24. Association for Biology Laboratory Education, Halifax, UK., pp: 328-329.

Prosser, M., K. Trigwell and P. Taylor, 1994. A phenomenographic study of academics' conceptions of science learning and teaching. Learning Instruction, 4: 217-231.

Roy, S.C.D., 2009. Interference rejection in a UWB system: An example of LC driving point synthesis. IETE J. Educ., 50: 55-58.

Swartz, W.J., 2006. Jul. Using gross anatomy to teach and assess professionalism in the first year of medical school. Clin. Anatomy, 19: 437-441.

Tobin, K.G., 1990. Research on science laboratory activities: In pursuit of better questions and answers to improve learning. School Sci. Math., 90: 403-418.