Analytical Chemistry: An Indian Journal

Analytical Chemistry
ISSN: 0974-7419

Research Article|Vol 21 Iss 1

# Comparison Between Teacher's Observations and Student's Perceptions about Practical Skills in Chromatography Experiment

**Naseer Ahmed[1*], Tri Joko Raharjo[1], Khandil Badshah[2], Sajad[1] , Sundas Ejaz[1] and Sadiq[1]**

[1]Gadjah Mada University, Yogyakarta, Indonesia

[2]Government Postgraduate College, Haripur, Khyber Pakhtunkhwa, Pakistan

[*]**Corresponding author**: Naseer Ahmed, Gadjah Mada University, Yogyakarta, Indonesia. E-Mail: naseerahmed1992@gmail.com

**Received:** October 21, 2020; **Accepted:** November 16, 2020; **Published:** February 22, 2021

## Abstract

**Laboratory occupies central role in chemistry learning, practical work help students in clearance of concept after learning theory. Chromatography is widely used in separation process of components, and good practical skills is necessary during performing chromatography practical, this research is based on comparison of observation and students' perspectives about their practical skills in chromatography practical. Observations sheet is used for observing students' practical skills and questionnaire is used to know students' perspectives about their practical skills in practical. Instruments were validated by three experts and population was 75 students, independent t-test were used for data analysis. Results show that there is no significant difference between teachers' observations and students' perspectives about practical skills during performing chromatography experiment. Mean score of both is almost similar which is teachers' observations 50.0400 and students' perspectives 48.4000 meanwhile sig value is also 0.050 which is equal to 0.05 indicates that there is no significant difference among both opinions. Further research can be improved by using different aspects of practical skills.**

***Keywords: Chromatographic techniques; Practical skills; Students perspectives; Teachers observations; Undergraduate students***

## Introduction

Laboratory is a place where experiment can perform, and laboratory occupies a central role in a curriculum of chemistry in comprehensive universities [1]. Laboratories in chemistry are considered a medium not only for the science process improving skills but also improving conceptual understanding by making abstract more concrete and visual [2]. When students get a chance to perform, by this, they can clear their scientific concept. Students familiar with practical work and with innovative equipment and modern techniques and working in a group and to know the effectiveness of laboratory and to achieve the academic goals by performing in the laboratory [3]. Meaningful learning is possible if students are allowed in the laboratory to manipulate materials and equipment in a suitable environment where they construct their knowledge about scientific concepts [4]. Most important point in active learning and additional skills development, before the laboratory session, students need to plan and design detailed laboratory steps. During the laboratory session, the first step is they need to check their plan and design and revise the laboratory project, and after the laboratory session. They need to analyse the data and experimental phenomenon and write the experiment reports and interpret it well [5].

Practical work is so important in chemistry, and there is no straightforward positive correlation between practical work and learning [6]. Skills in handling and manipulating materials and apparatus in the context of scientific investigations in the lab, as well as the ability to follow instructions and make accurate observations how students using the instrument in the laboratory [7]. Most teachers don't measure practicum skills of students reason explain by [8] to develop manual skills step by step. Recent test results showed that the efficacy of technical skill approaches how is it necessary, which is paid attention throughout laboratory applications [9].

The term chromatography came from words chromo means color and graphy means writing its mean color separation on chromatographic sheet a family which is closely related in separation methods which are based on Tswett work which is explained

**Citation:** Ahmed N, Raharjo TJ, Badshah K, et al. Comparison between teacher's observations and student's perceptions about practical skills in Chromatography Experiment. Anal Chem Ind J. 2020;21(1):1-4

in (1903-1906). The importance of chromatography have important role in chemistry for separation of different type of components from one one natural compound [10]. It serves as a means of high resolution of mixtures and for the isolation and partial description of the components which are present in natural copounds. Natural compounds have a lot of componesnts which can separated by using chromatography.

In chromatography, the components that have to be separated into many many components are mostly chromatographic sheet put in stationary phase will components start to separate during mobile phase [11]. Samples which is transfer between the mobile phase and the stationary phase exist either mixture is absorbed on particle surfaces or absorbed into particle pores which is used as a sample. If mobile phase is in liquid form then they partition into pools of liquid which is held on surfaces or within the pores of samples or stationary phase. In chromatography there are also many skills to observe, like how to prepare samples, which things are required to make a sample, there is also stationary, and mobile phase, preparation of mobile and stationary phase is compulsory, and here student's skills are observable [12]. The right way to put samples in the chromatographic tank is also necessary if it's not put in the right way it can affect results.

## Materials and Methods

The method of this research was a quantitative descriptive. The aim of this research was to check students' perspectives and teachers' observations about practical skills during performing chromatography experiment. Descriptive studies involves describing the characteristics of a particular situation, case or event during research.

### Sample of research

This research was conducted in one of state university in special Region of Yogyakarta Indonesia. The samples consist of 75 undergraduate chemistry students from 3 different classes chemistry. All students are from undergraduate chemistry class, they were informed about the confidentiality of their responses for filling of questionnaire to show their perspectives about their practical skills. The questionnaires were completed voluntarily by students and they were not offered any kind of reward for participation in this research. On the other hand, teachers also observed students' practical skills with the help of observations sheet during practical.

### Research setting

This research was completed in five meetings, in each meeting day, all three classes were covered in morning, noon and afternoon sessions, in each meeting students were observed by teachers and on the last day questionnaires were distributed among students for the purpose to know their perspectives about their practical skills. Questionnaire and observations sheets covered almost all aspects of practical skills that are needed to be observed.

### Research instrument

A questionnaire was used know about students. Items in questionnaire were written in English language. After distribution to students, they were instructed in Indonesian language by this they can understand well, and there were 15 items in questionnaire which almost covered all required practical skills in chromatography practical. Points Likert-scales ranging from (1) strongly agree, (2) agree, (3) disagree, (4) strongly disagree, sample of used questionnaire is given below in **TABLE 1.**

TABLE 1**. Sample of questionnaire.**

| No. | Self-assessment Statement | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| 1 | I used chromatography apparatus appropriately | | | | |
| 2 | I performed chromatography experiment accurately. | | | | |
| 3 | I choose chemicals for chromatography experiment in appropriate amount | | | | |

On the other hand, observation sheet used as a second research instruments, which contains 15 items to observe students' practical skills during performing chromatography experiment in chemistry lab, the language that used in observation sheets was English; sample of observation sheet is given below in **TABLE 2.**

TABLE 2. **Sample of observation sheet.**

| No. | Name of undergraduate students | Statement | | | | | | | | | | | | | | | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 1 | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | |

**Validity and reliability of the instrument**

Instruments that were used in this research validated by three experts and experts mentioned mistakes that were mostly grammatically and need change some items and replace with other items. In order to check reliability of instruments, instruments were used on trial bases in one class and after needed corrections instruments used in research. Data analysis technique that were used in this research was independent sample t-test, it will give mean value that will help researcher to compare teachers' observations and students' perspectives about practical skills.

## Results and Discussion

Results that got from observation, and from student's perspectives shows mostly students' skills in chromatographic techniques is good and both teachers' observations and students perspectives show same opinion.

**Results on the base of mean score**

There is N which means number of samples which is observed so during observations and at the time of knowing students' perspectives both have (N=75) students. Mean score shows that teacher's observations mean score is 50.0400 while student's perspectives about their practical skills mean score is 48.400 which indicates that both teachers' observations and students' perspectives almost have similarities and both have same opinions. Standard deviation value for teacher's observation is 4.25993 while for students' perspectives about their practical is 5.80540 which is less and it's also proved that both teachers' observations and students' perspectives was same about practical skills during performing chromatography practical. Details are given in **TABLE 3.**

TABLE 3**. Results on the base of mean score.**

| | Group | N | Mean | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Practical skills | Teacher observations | 75 | 50.04 | 4.25993 | 0.49189 |
| | Students perspectives | 75 | 48.4 | 5.8054 | 0.67035 |

**Result on the base of Levene's test for equality variance**

Results that are on the base of the Levene's test for equality of variances showed sig value of 0.556, which is sign of the equal variances assumed existence because (sig 0.556>0.05) which also shows that data is normally distributed, while F (0.349) in table talk about hypothesis. While according to value of sig (2-tailed) for the equal variance assumed that is 0.050>0.05 which shows equality and null hypothesis is accepted, which shows there is no significant difference between students' perspectives and teachers' observations in practical skills during performing chromatography experiment. Degree of freedom (148) also shows that equal variances assumed and mean difference shows that there is only (1.64000) difference between means of teacher's observations and students' perceptions which is very small in number and shows that there is less differences between both opinions. Stagnated error difference (0.83146) is a sign that and there is no significant difference between teachers' observations and students' perspectives in practical skills, almost both of them have same opinions. Details are given below in **TABLE 4**.

TABLE 4. **Result of independent T-test for student's practical skills.**

| | | Levene's test for equality of variances | | t-test for equality of means | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** | **Mean difference** | **Std. error difference** | **Result** |
| Practical skills | Equal variances assumed | 0.349 | 0.556 | 1.972 | 148 | 0.05 | 1.64 | 0.83146 | There is no significant difference |
| | Equal variances not assumed | | | 1.972 | 135.779 | 0.051 | 1.64 | 0.83146 | |

## Conclusion

This research shows comparison about practical skills between teachers' observations and students' perspectives during performing chromatography experiment and shows no significant differences between both indicators. Practical's skills during performing practical are very necessary for the learning process, and practical work in chemistry is very important to understand separations techniques practically especially chromatographic techniques. Results show that students practical skills which is observed by teacher is almost same with students' perspectives about their practical skills during performing chromatography experiment. Mean score of both teacher's observation and students' perspectives about practical skills is same, mean score of student's perspectives is 48.4000 while teachers' observations are 50.0400 both of means score almost same which shows that there is no significant difference between both opinions. On the other hand Levene's test also shows that sig value is 0.050 which is equal to 0.05 which is a sign of equal variance assumes which gives conclusion that there is no significant difference between teachers observations of practical skills of a students and students opinion about their practical skills. This research can be further improved by using different type of aspects of practical skills which will show different and unique results for each aspect.

## REFERENCES


1. Belanger F, Jordan DH. Evaluation and implementation of distance learning: technologies, tools, and techniques. Turk Online J Distance Educ. 2000;5(2):246.
2. Bybee J. Lexicalization of sound change and alternating environments. Papers in laboratory phonology V: Acquisition and the lexicon, ed. MD Broe and JB Pierrehumbert. 2000:250-68.
3. Baker N, Verran J. The future of microbiology laboratory classes-wet, dry or in combination? Nat Rev Microbiol. 2004;2(4):338-42.
4. Cakir M. Constructivist approaches to learning in science and their implications for science pedagogy: a literature review. Int J Environ Sci Educ. 2008;3(4):193-206.
5. Hagen W, Schwarz H. Analytica-EBC-precision values of wort analyses. J Inst Brew. 2000;106(3):139-46.
6. Domin D. A review of laboratory learning styles. J Chem Educ. 1999;76(4):543-7.
7. Levy Nahum T, Mamlok-Naaman R, Hofstein A, et al. Teaching and learning the concept of chemical bonding. Studies in Science Education. 2010;46(2):179-207.
8. Harman G, Cokelez A, Dal B, Alper U. Pre-Service science teachers' views on laboratory applications in science education: the effect of a two-semester course. Univers J Educ Res. 2016;4(1):12-25.
9. Pritchard A. Ways of learning: learning theories and learning styles in the classroom (2nd ed.). Routledge. 2008.
10. Ettre LS, Sakodynskii KI. MS Tswett and the discovery of chromatography I: Early work (1899-1903). Chromatographia. 1993;35(3-4):223-31.
11. Wilchek, Meir and Chaiken, Irwin. An Overview of Affinity Chromatography. Methods Mol Biol. 2000.
12. Sharma L, Desai A, Sharma A. A thin layer chromatography laboratory experiment of medical importance. Biochem Mol Biol Educ. 2016;34(1):44-8.