Implementation of PCT (*Paper Chromatography Techniques)* Practicum Media on Student Learning Outcomes on Mixed Separation Materials

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Abstract. This study aims to see the effect of implementing PCT (Paper Chromatography Techniques) practicum media on student learning outcomes on mixed separation materials. This research is a type of research and development (Research and Development). Based on the results of the study, it is known that there has been an increase in student learning outcomes after using PCT (Paper Chromatography Techniques) Practicum Media, this can be seen from the comparison of students' pretest and posttest scores. The average pretest score of students before using PCT practicum media was 50.84 while the average posttest score of students after using PCT media was 81.79. The results of the students' pretest and posttest were tested for gain or gain score by comparing the students' average pretest and posttest scores. The gain score obtained is 0.62 with the "medium" category.

Keywords: PCT · Practicum Media · Student Learning Outcomes · Mixed Seperation Materials

1 Introduction

One of the determinants of the quality of human resources is education [1]. Therefore, schools or universities must be able to keep up with the times in the 21st century. The presence of the industrial revolution 4.0 has required students to be more skilled in applying technology for their daily activities and also in the world of education. One way to apply technology in education is to use technology as a medium of learning/practicum for students [2].

One method that can be used to support the learning process is the practicum method. Practicum is one part of the learning process that equips students with experience to test and prove what they have learned from the theory they have learned in class. In addition, practicum can also be used as a means to guide students to find new concepts or theories based on pre-existing concepts or theories. In practice, practicum requires adequate facilities and infrastructure so that practicum activities can run smoothly. One of the factors that support the implementation of good practicum is the availability of practical and easy-to-use practicum media by utilizing technology [3].

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Practical media is a tool used as an intermediary for teachers or lecturers in guiding learning/practice activities. The use of practicum media is expected to increase the motivation and attention of students because the methods of delivering material are varied and innovative [4]. One of the practicum media that can be used is android-based practicum media. This is intentionally done by considering that the majority of students already have an Android-based smartphone and are very close to their smartphone. The implementation of learning and practicum using an Android-based tablet and smartphone can have a positive impact on the cognitive, metacognitive, socio-cultural and affective dimensions because the practicum media Android-based and tablets can transform the learning experience [5].

Making good practicum media should not only take into account the level of practicality that can be used anywhere and anytime but also should be distributed easily from one student's cellphone to another. Therefore, it takes a practicum media that can be distributed easily and is compatible with all types of Android phones. QR code technology is one way that can be used to assist the distribution of practicum media. The use of QR code technology allows practicum media to be distributed quickly and with almost no problems. The use of QR code technology is also quite practical by simply scanning the QR code and the application can already be installed on the student's cellphone. QR Code is a two-dimensional image that represents data, especially data in the form of text. QR Code is an evolution of barcode which was originally one-dimensional to two-dimensional [6].

PCT (Paper Chromatography Techniques) practicum media is one of the practicum media developed in the general chemistry practicum course for first semester students of the Science Education Study Program, FKIP Bengkulu University. This PCT practicum media focuses on the material for separating mixtures, especially on paper chromatography. This PCT practicum media was developed with various features ranging from CPL and CPMK, materials, practicum simulation videos, about me, to easy and practical application distribution methods using QR code technology.

The difference in the level of students' understanding of general chemistry practicum courses, especially on the material for separating mixtures, is one of the reasons for conducting a practicum using PCT practicum media. The role of the use of instructional media that is arranged in a planned and programmed manner greatly influences the achievement of the targeted learning objectives [7].

Learning outcomes are an output of a learning activity [8]. Learning outcomes are changes in abilities and behavior obtained by students after participating in the learning process activities. These changes include changes in cognitive, affective, and psychomotor abilities [9]. Cognitive aspects include knowledge, application, understanding, analysis, synthesis, and assessment. The affective aspect relates to five levels of ability, namely receiving, responding or reacting, judging, organization and characterization with a value complex or a value. Furthermore, the psychomotor aspect is related to skills and ability to act [10].

This study was conducted to determine the effect of implementing PCT practicum media on student learning outcomes based on the comparison of students' pretest and posttest scores after carrying out practical activities with PCT practicum media.

2 Method

2.1 Time and Place of Research

This research was conducted in August 2021-December 2021 on science education students in semester 1 who took general chemistry courses.

2.2 Research Method

The method used in this study is a quasi-experimental design with One Group Pretest-Posttest Design. Quasi-experimental (quasi-experimental) is a study that provides treatment and measures the effects of treatment but does not use a random sample to conclude the changes caused by the treatment [11].

2.3 Data Collection Techniques

The data collection technique was carried out using evaluation questions in the form of pretest and posttest questions which were used to see the difference in student learning outcomes before using practicum media and after using PCT practicum media.

2.4 Data Analysis Techniques

The data analysis technique was carried out by doing a gain score test to see the difference between the students' pretest and posttest scores after using PCT practicum media.

3 Result and Discussion

The effect of using PCT learning media on student learning outcomes can be known by comparing the pretest and posttest scores of students. The pretest was carried out before the use of the PCT learning media, while the posttest was given after the students used the PCT learning media. The data from the students' pretest and posttest results can be seen in Figs. 1 and 2.

The student's average pretest score is 50.84 and the student's average post-test score is 81.79. The results of the students' pretest and posttest were tested for gain or gain score by comparing the students' average pretest and posttest scores. The gain score obtained is 0.62 with the "medium" category.

This increase in student learning outcomes is thought to be due to the very high curiosity of students towards the practicum media they use, thereby spurring interest in the media. Another factor that is suspected to be the cause of the increase in student learning outcomes is the nature of the practicum media which is very practical and easy to understand so that students can read and understand it first at their respective homes before doing real practicum in the laboratory with PCT application media and practical assistant guidance. The practicum media is also equipped with a simulation video that can provide an overview to the practitioners of how the process of practicum activities takes place before they are actually carried out in the laboratory.

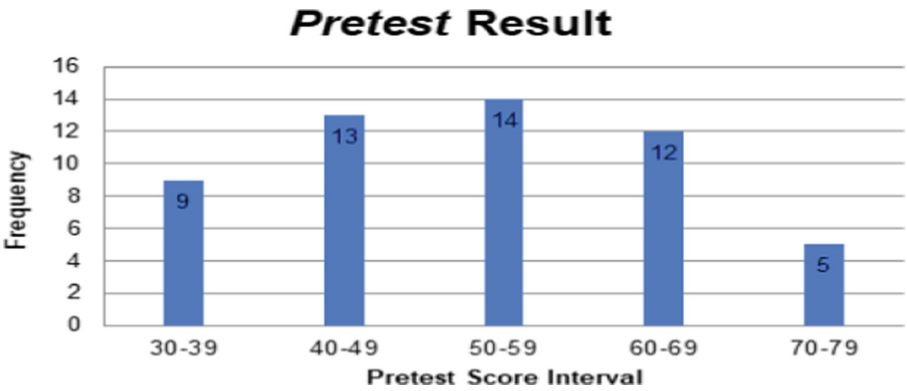

Fig. 1. Histogram of student pretest results

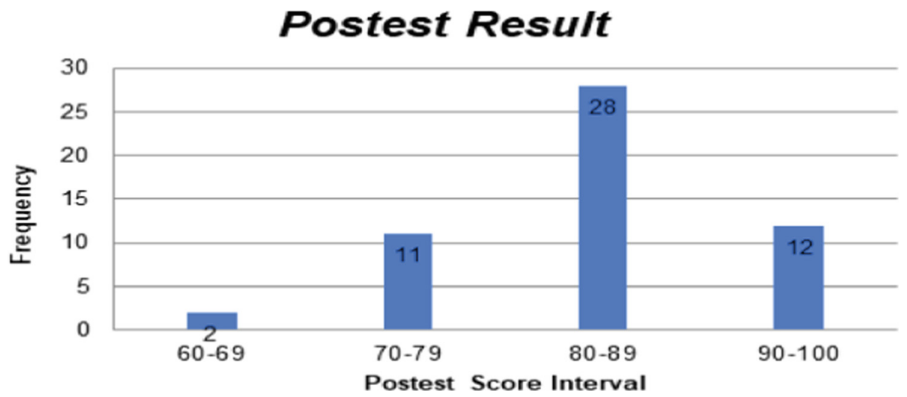

Fig. 2. Histogram of student posttest results

4 Conclusion

Student learning outcomes have increased after the PCT practicum media was implemented in the process of practicum activities in general chemistry courses. This can be seen based on the results of the average pretest and posttest scores of students. The student's pretest score before using the PCT practicum media was 50.84 while the student's post-test score after using the PCT practicum media was 81.79. The gain score also shows a score of 0.62, which is in the medium category. This shows that the use of PCT practicum media is effective in improving student learning outcomes on mixed separation materials.

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References

1. Salma D K, Susanti. Pengembangan Bahan Ajar Berbasis Kontekstual Berbantu QR Code Pada Mata Pelajaran Praktikum Akutansi Lembaga/Instansi Pemerintah Kelas XII SMK Jurnal Pendidikan Ekonomi: Jurnal Ilmiah Pendidikan, Ilmu Ekonomi, dan Ilmu Sosial **1** pp 1–8 (2021).
2. Komalasari K.: Pembelajaran Kontekstual. PT Refika Aditama, Bandung (2017).
3. Ahmad M S: Pengembangan Modul praktikum Kimia Dasar Berbasis Smart Book dengan Pemanfaatan QR code Pada Android Jurnal Penelitian Pendidikan Kimia: Kajian Hasil Penelitian Pendidikan Kimia **72** pp 71–81 (2020)
4. Alhafidz, M. R. L., and Haryono, A: Pengembangan Mobile Learning Berbasis Android Sebagai Media Pembelajaran Ekonomi Jurnal Pendidikan Ekonomi, **119** pp 118–124 (2018)
5. Chuang, Y. T.: Increasing learning motivation and student engagement through the technology-supported learning environment. Creative Education, **1968** pp 1969–1978 (2014)
6. Narayanan, A.S: QR code and security solution. International Journal of Computer Science and Telecommunications, 70 pp 69–71 (2012).
7. Uliyandari, M, Sumpono and Agus Susanta. Implementasi Modul Analisis Konsentrasi Protein Terhadap hasil Belajar dan Respon Mahasiswa pada Pembelajaran Biokimia II Jurnal of science education (Pendipa) 121 pp 120–124 (2019)
8. Yanti R A.E. and Noviyandti A: Implementasi Media Pembelajaran Auditif Terhadap Hasil Belajar Pesera Didik Jurnal Edukasi 61 pp 59–68 (2019)
9. Novita, L, Elly S, and Mahesa Y.P: Penggunaan Media Pembelajaran Video terhadap Hasil Belajar Siswa SD Jurnal Indonesia Journal of Primary Education **64** pp 64–72 (2019)
10. Audi N: Peran Media Pembelajaran Meningkatkan Hasil Belajar Peserta Didik Prosiding Seminar Nasional Pendidikan FKIP Universitas Sultan Ageng Tirtayasa **587** pp 586–595 (2019)
11. Sugiyono: Metode penelitian pendidikan pendekatan kuantitatif, kualitatif, dan R&D. Alfabeta, Bandung (2010)