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Knowledge, Ability and Motivation for the Practice of Checking Mud Content in Sand on Learning Outcomes of Concrete Specifications and Characteristics

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ABSTRACT

Sand mining in Mojokerto City and Regency significantly impacts the local economy. This study investigated the silt content in sand from mining areas and its application in concrete specifications, focusing on students' knowledge, abilities, and motivation in understanding this concept. The research used an ex post facto design with path analysis, involving 100 students from class X DPIB at State Vocational High School 1 Mojokerto. The study found that knowledge and ability directly affect learning outcomes. Additionally, knowledge and ability influence student learning motivation, which in turn impacts learning outcomes. This suggests that motivated students with a strong knowledge base and practical skills are more likely to succeed in understanding concrete specifications and the role of silt content. Furthermore, the research revealed indirect effects: knowledge and ability influence learning outcomes through learning motivation. This highlights the importance of fostering motivation alongside knowledge and skills development to enhance student learning in this applied context. These findings offer valuable insights for educators and policymakers seeking to improve vocational education in the construction sector. By focusing on knowledge acquisition, skills development, and motivation enhancement, institutions can better equip students to understand and apply essential concepts like silt content in sand to real-world construction practices.

Introduction

Every day the sand mining area in the Mojokerto City and Regency area is expanding. Sand mining is a series of activities to obtain, develop, process, utilize and sell minerals, especially sand. Mojokerto Regency sand mining is used to support development around the Mojokerto Regency and City area and also the district cities around Mojokerto. In building construction, sand is used as a mixture for concrete and mortar as well as for underground and sub-floor filling. Sand used for concrete must not contain more than 5% mud. This was taken as a research problem to find out what percentage of mud content in the sand is found in the Mojokerto Regency area, especially the sample taken was the Sumber Ringin Village area. Vocational school students carry out the practice of calculating the mud content in sand and students can state that the sand meets or does not meet the requirements for concrete sand.

The background of sand mining in the area around Sumber Ringin Village, Sri Gading Village, Jati Dukuh Village, the coast of the Brantas River and many more around the Regency and City of Mojokerto is a blessing for the surrounding community. The sand mining area is limited in the Mojokerto area to more than 50 trucks every day. Mining activities in this area cannot be separated from the attention of many parties and the community. This makes researchers want to know the mud content in the sand in Sumber Ringin Village.

Sand is a material in the form of granules. The grains in sand generally measure between 0.0625 to 2 mm (PU BI. 1982 article 11). Sand is fine aggregate as a material for making concrete. Fine aggregate is fine granules that have a fineness of 2mm - 5 mm according to SNI 02-6820-2002. Sand is a fine rock material obtained from the disintegration of natural rocks or by breaking them up. As a mixture or concrete material, (Astuti, 2013:161-163).

Sand mortar is used in a mixture ratio, stone/brick masonry: 1pc: 1/4 kp: 5-7 ps, for waterproof work 1 pc: 2 ps, for plastering 2 kp: 1/4 pc: 7-8 ps . For concrete in the ratio 1 pc: 2 ps: 3 kr. Concrete sand/cast sand, namely for a mixture of reinforced and non-reinforced concrete, concrete can be used in reinforced concrete foundation structures, sloofs, floors, columns, floor plates, cast roofs, ring beams, etc. The use of sand as a backfill material / backfill sand under foundations, backfill sand under floors and backfill sand under paving block pairs.

The difficulty of students understanding and memorizing the concept of calculating silt content in sand has an impact on student learning outcomes that do not meet the standard criteria for teaching completeness. Based on the results of an initial rating study conducted by researchers via google form to 100 students in SMK schools in the field of Building Information Modeling Design

Engineering, students regarding knowledge of silt content in sand there were 70% of students did not know. Knowledge of how to check the silt content in sand for concrete 88.9% did not know. From the results of this assessment, researchers conducted research on the ability to implement the practice of sludge content in sand. According to (Jejen, 2015), conducting research on the effect of mud on the strength of geopolymer concrete, research results showed that the higher the mud content in the aggregate, the lower the compressive strength of the concrete.

Alternative actions to achieve basic competencies and abilities that have been determined, the learning scenario chosen by the method of field practice techniques. The field practice method is used in examining the silt content in sand. This method is used for students' understanding of analyzing the results of physical and mechanical examinations in real terms then concluding the results of the examination.

Indicators taken in practical knowledge of mud content in sand are remembering, understanding, applying, analyzing, evaluating, creating, collecting data using a multiple choice written test. How to measure using a score interval scale of 1 - 100.

The indicators taken are the practical ability to check the mud content in sand: a) practicing (P1) planning tools, materials, time, and making practical methods for testing the percentage of mud content in sand, b) operating (P2) sieving dry sand in a furnace using sieve 4, 57 mm or number 4, c) operate (P2) weigh the remaining sand weighing 500 grams with a scale, d) operate (P2) wash the sifted sand to separate the sand from the mud and weigh it with a size of 0.07 mm, do this repeatedly until there is no mud e) operate (P2) oven the washed sand for 4 hours, remove from the oven, remove the hot steam and weigh the dry sand in the oven, f) adapt (P4) draw conclusions from the practical results, g) make (P3) makes a report collaboratively on a practice report sheet.

Basic competency learning outcomes understand the specifications and characteristics of concrete. Indicators taken in the knowledge domain: Data taken from basic competency learning outcomes understand concrete specifications and characteristics using a multiple choice written test.

With theoretical and practical methods students understand a teaching and learning process that prepares students to be able to work professionally, have provisions and experience. In the end, every student who has completed education in technology and vocational fields can immediately enter the world of work without doubting his abilities. Philosophy of Vocational Education that views existentialism and essentialism. Existentialism is a view

Vocational education must develop human existence to survive life, not deprive it. And essentialism holds that vocational education must link itself with other systems such as economic,

political, social, employment, religion and morals. We can conclude that the philosophy of vocational education must adapt to regional or institutional conditions, social conditions and specific competencies (Suyitno, 2020: 6).

According to (Suyitno, 2020) there are three dimensions that must exist in vocational education, including: 1) Vocations are the result of a historical and cultural process of social construction and institutionalization, 2) Vocations are established as individuals perform work-based activities and „ do" specific things, i.e. concrete work tasks that respond to social needs, 3) Vocations establish demarcations between and internal coherence within different areas of working life.

Practice includes something that is used in the teaching and learning process to stimulate the thoughts, feelings, interests, and attention of students so that the process of interaction, communication, and education between educators and students takes place effectively and efficiently. The learning media that can be used in a lesson and can be an alternative to increase the effectiveness of learning presented in practice. Theory and Practice of Online Learning sector, this practice is not yet widespread but the number of institutions and individuals turning to this innovation seems to be increasing exponentially (Anderson, 2008:1).

From previous studies (Candra et al. 2012) the application of high-grade Sidoarjo mud to mortar and concrete. Among the levels of 50% -60% replacing cement with Sidoarjo mud, the content of 50% is the most effective. In concrete with Sidoarjo mud it produces a slump test of 8.5 cm with a compressive strength of 34.07 MPa at 37 days of age. Research (Maywati et al., 2019), concluded that there was an effect of the knowledge and practices of handler hygiene on snack food vendors around the Tasikmalaya City Elementary School. Research (Fauziah et al., 2022) examines the effectiveness of whatsapp-based counseling on knowledge and practice during the corona pandemic. Research (Saleh et al., 2014) identified that there was an effect of health education with a modeling approach on the knowledge, practice skills and confidence of mothers in stimulating the growth and development of babies 0-6 months in Maros District. Research (Nasution, 2018), there is an effect of using learning methods in improving student learning outcomes.

From some of these studies, the authors developed learning media based on theory and practice. 21st century education integrates knowledge, skills and attitudes, as well as mastery of information and communication technology. This skill is developed with several learning models that put more emphasis on student learning activities in accordance with the characteristics of competence and learning materials. research entitled "The Influence of Knowledge and Ability to Carry out Field Practices for Examination of Mud Content in Sand and Learning Motivation on Learning Outcomes of Competence in Understanding the Specifications and Characteristics of Maple

Concrete Basics of DPIB" as an effort to increase students' knowledge, understanding and skills when facing the world of work as well as for the general public who need information.

The approach taken in the realm of knowledge according to (Marzano & Kendal, 2001). Practical knowledge of examining silt content in sand is a collection that is arranged systematically and knowledge that is collected through objective observation techniques. So that the content of science consists of regular collections of data that will have a positive impact on human life. According to (Hiola & Puspaningrum, 2019) knowledge gained from practical actions will later stick in a person's mind. And it can be concluded that scientific knowledge is a collection through observation techniques. What influences the practice of implementing land conservation in ilengi agroforestry. Likewise, in this research, there is a significant influence of the knowledge of carrying out the practice of checking mud content in sand on the learning outcomes of basic competencies in understanding the specifications and characteristics of DPIB basic maple concrete.

Ability (ability) is the skill or potential to master a skill that is innate or is the result of training or practice and is used to do something that is manifested through action. Psychomotor is a knowledge process that is based more on the development of mental processes through aspects of the muscles and forms students' skills according to (Kusuma, 2016: 102-106). According to (Pelipa et al., 2019) Edupreneurship and Work Practices partially have a significant influence on student life skills. Content knowledge is an important part of developing a teaching and learning process that aims to provide a complete understanding to students according to (Purwoko, 2017). Likewise, in this research there is a significant influence on the ability to carry out the practice of checking mud content in sand on the learning outcomes of basic competencies in understanding the specifications and characteristics of DPIB basic maple concrete.

Motivation according to Suryabrata (2004) is a condition that exists within a person that encourages him to carry out certain activities in order to achieve certain goals. Motivation can also be in the form of efforts that can cause a person or certain group of people to be moved to do something because they want to achieve the desired goal or get satisfaction. Motivation is a psychological symptom in the form of encouragement that arises in a person consciously to perform an action with a specific purpose. According to (Rike & Rasto, 2019) student learning outcomes can be improved through increasing student learning motivation. The learning process will be successful if students have motivation in learning (Suharni, 2021). Student learning motivation has a positive effect on students' mathematical problem solving abilities (Hasanah & Firmansyah, 2022). Likewise, this research concludes that learning motivation can improve student learning outcomes, there is a significant influence of student learning motivation on learning outcomes in basic

competencies in understanding the specifications and characteristics of DPIB basic maple concrete.

The conclusion of the learning outcomes of learning basic competencies in understanding the specifications and characteristics of the concrete maple of the basics of DPIB can be achieved in three areas or cognitive domains, affective domains and psychomotor domains. In simple terms, each relates to goals related to knowledge, goals related to attitudes and goals related to motor skills. Palov in (Hunaepi et al., 2014) argues that learning is a complex activity. It produces laws of learning, the law of respondent conditioning, namely the law of habituation and the law of respondent extinction, namely the law of respondent extinction. Bandura in (Hunaepi et al., 2014) argues that in individual learning there is imitation, presentation of examples of behavior (modelling), giving rewards and punishments. According to (De Palo et al., 2018) that intrinsic motivation, metacognition, and self-regulated learning and learning strategies will interact in influencing learning outcomes. The existence of learning media improves student learning outcomes according to (Nurita & Misykat, 2018). Likewise, the results of this research indicate that indirectly, practical knowledge of checking mud content in sand through learning motivation has an influence on learning outcomes in competency in understanding the specifications and characteristics of DPIB basic maple concrete.

This study aims to determine the effect of: 1) practical knowledge of examining silt content in sand on learning outcomes competence in understanding the specifications and characteristics of maple concrete on the basics of DPIB, 2) practical ability of checking silt content in sand on learning outcomes competency in understanding the specifications and characteristics of maple concrete on DPIB basics, 3) practical knowledge on learning motivation, 4) practical ability on motivation, 5) student learning motivation on learning outcomes, 6) practical knowledge on learning outcomes through learning motivation, 7) practical ability on learning outcomes through learning motivation.

Based on the research results, we can answer the hypothesis: 1) There is an influence of practical knowledge of checking mud content in sand on the learning outcomes of competence in understanding the specifications and characteristics of DPIB basic maple concrete, 2) There is an influence of practical ability to check mud content in sand on learning outcomes of competency in understanding specifications. and characteristics of maple concrete on the basics of DPIB, 3) There is an influence of practical knowledge of checking mud content in sand on student learning motivation, 4) There is an influence of practical ability to check mud content in sand on student learning motivation, 5) There is an influence of student learning motivation on basic competency learning outcomes of understanding the specifications and characteristics of DPIB basic maple concrete, 6) There is an influence of practical knowledge of checking mud content in sand on

competency learning outcomes of understanding the specifications and characteristics of DPIB basic maple concrete through learning motivation, 7) There is an influence of practical inspection ability Mud content in sand on competency learning outcomes in understanding the specifications and characteristics of DPIB basic maple concrete through learning motivation.

This research on examining the silt content in sand was developed to improve student learning outcomes, field practice techniques could be used by students in understanding the material for examining silt content in sand, and increasing the enthusiasm of students' interest in learning the basics of DPIB subjects.

Method

This type of research is included in ex post facto research, namely research that focuses on finding or establishing relationships that exist between variables in research data (Ary, Jakobs, Sorensen & Raxavich, 2010: 331-348). This study used four variables, namely practical knowledge of silt content in sand (X1), ability to practice silt content in sand (X2), learning motivation (X3) and KD learning outcomes. Understand the specifications and characteristics of concrete (Y).

Measuring student learning outcomes of competence in understanding the specifications and characteristics of concrete uses a score interval scale of 1 - 100. Data taken is the ability to practice checking mud content in sand using performance tests. Measurements use a score interval scale of 1 - 100. Data taken on motivation to practice learning about mud content in sand using a questionnaire. How to measure using a Likert scale score of 1 - 5.

The test results regarding the validity and reliability of the instrument were analyzed using the Rasch Model. The data were collected through a practical knowledge test for silt content in sand, a performance test for practical ability for silt content in sand, a motivational questionnaire and a KD learning outcomes test. Understanding Concrete Specifications and Characteristics will be analyzed in this study. And from the results of the Rasch Model analysis, the question items were declared valid and can be used for evaluation.

The question item on practical knowledge of mud content in sand shows a raw variance explained by measures value of 33.4%, close to more than 30%, so it can be said that the question item given is appropriate for measuring practical knowledge of mud content in sand and the Unexplained variance in 1 st contrast result is 35.2% indicated that the instrument was valid.

The learning motivation question items show a raw variance explained by measures value of 34%, which is close to more than 30%, so it can be said that the question items given are appropriate for measuring learning motivation for the basics of DPIB. and the Unexplained variance in 1st

contrast result of 22.7% shows that the instrument is valid. More than 15% read as valid and suitable for use.

From the test results, the data normality test was carried out using the chi square test. The homogeneity test used the F test. From the results of this test it can be seen the relationship between variables based on the path design.

Result and Discussion

From the results of data collection will be used to answer the existing problem formulation. In calculating the normal distribution of Chi – Square accept Ho because X2 count = 10.757 <X2 table = 11.070. Because X2 count < X2 table then Ho is accepted. The conclusion is that the normal Chi-Square distribution is accepted, the data is normally distributed.

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Another term for a regression test with intervening variables is path analysis or path analysis. Path analysis is a further part of the regression analysis. Regression analysis is usually used to test whether there is a direct effect exerted by the independent variables on the dependent variable. While the analysis does not only test the direct effect, but also explains the indirect effect that the independent variable has through the intervening variable on the dependent variable. The path path diagram design is illustrated below.

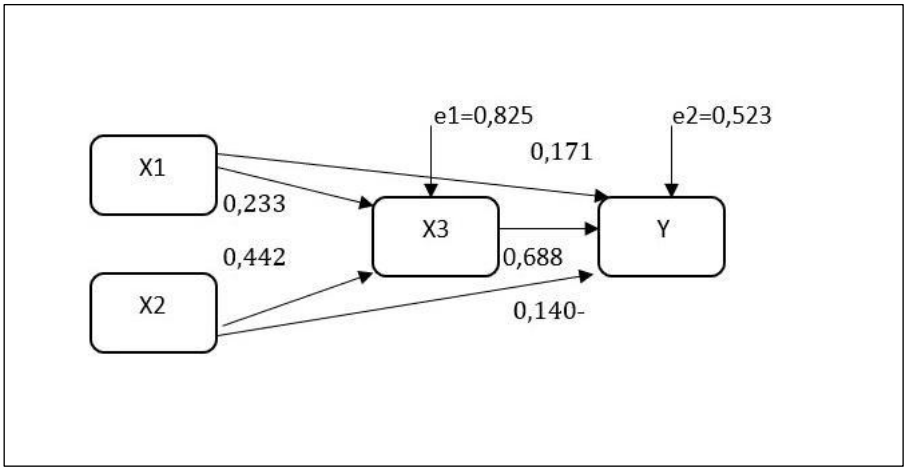

Fig 1: Path Path Diagram Design

From the picture it is explained the influence through the equations of sub structure 1 and sub structure 2:

1) Sub structure equation 1, X3 = 0,233X1 +0,442X2 + 0,825 ∈1

2) Sub structure equation 2, Y = 0,171X1 +0,14X2 + 0,688X3+0,523∈2

The relationship, significance, level of significance and explanation between variables X1, X2, X3 and Y can be seen in the following table.

Table 1. Influence between variables

Relationship	Significance Level	Significant	Information
X1 to X3	0,009	< 0,05	direct, accepted
X2 to X3	0,000	< 0,05	direct, accepted
X1 to Y	0,004	< 0,05	direct, accepted
X2 to Y	0,028	< 0,05	direct, accepted
X3 to Y	0,000	< 0,05	direct, accepted
X1 to Y through X3	0,171.	< 0,175	indirectly, accepted
X2to Y through X3	0,140	< 0,304	indirectly, accepted

Conclusion

The results of this research can be concluded that field practice techniques for checking mud content in sand can be used to obtain KD learning outcomes. Understand the specifications and characteristics of concrete. For students of field practice techniques, the material for checking mud levels in sand can be used to gain knowledge, improve skills, improve behavior, attitudes, and strengthen personality. Students in understanding increase students' enthusiasm and interest in learning in the basic subjects of DPIB. For teachers, it provides inspiration for teachers to be able to develop effective learning media and attract the attention of vocational school students in the field of modeling and building information design expertise. Implementing practical learning can guide students in building students' knowledge and understanding. For schools, the development of various learning models should be used optimally and complete with infrastructure to support the teaching and learning process.

References

Anderson,T. (2004). The Theory And Practice Of Online Learning. Canada: Published by AU Press. Athabasca University Siswa. Studia Didaktika: Jurnal Ilmiah Bidang Pendidikan, 11(01), 9–16. Retrieved from https://jurnal.uinbanten.ac.id/index.php/studiadidaktika/article/view/515

Ary, D., Jakobs, L.C., Sorensen, C. & Raxavich, A. (2010). Introduction to research in Education. edition 8. Canada: Printed Canada.

Astuti Amin Nurita Fajar. 2018. Dasar Konstruksi Bangunan. Malang: Latif Kitto Book Mahesa

Chandra, L. , Widodo, T. H. , Antoni , Hardjito, D.. (2012). Pengaplikasian Lumpur Sidoarjo Kadar Tinggi Pada Mortar Dan Beton. Jurnal Dimensi Pratama Teknik Sipil. 1(1). http: //publication.petra.ac.id/indek.php/teknik-sipil/article/view/397

De Palo, V., Limone, P., Monacis, L., Ceglie, F, Sinatra, M..(2018). Enhancing e- learning in old age. Australian Journal of Adult Learning. VOL 58 Page 88- 109

Departemen Pekerjaan Umum. 1982. Persyaratan Bahan Bangunan di Indonesia. Bandung.

Fauziah, A. N., Maesaroh, S., & Suparti, S. (2022). Efektivitas Penyuluhan Berbasis Whatsapp Terhadap Pengetahuan dan Praktek SADARI Saat Pandemi Corona. Jurnal Formil (Forum Ilmiah) Kesmas Respati, 7(1), 25. https://doi.org/10.35842/formil.v7i1.417

Hunaepi, Samsuri, T.& Afrilyana. M. (2014). Model Pembelajaran Langsung Teori Dan Praktik. Mataram: Duta Pustaka Ilmu.

Hiola, A. S., & Puspaningrum, D. 2019. Pengetahuan, Sikap dan Praktek Konservasi Lahan pada Agroforestry Ilengi. Gorontalo Journal of Forestry Research, 2(1), 40. https://doi.org/10.32662/gjfr.v2i1.441

Hasanah, F.J.& Firmansyah, D. (2022). Analisis Kemampuan Pemecahan Masalah Ditinjau Dari Motivasi Belajar Siswa. Jurnal Educatio. DOI: 10.31949/educatio.v8i1.1959

Kusuma, Mochtar. (2019). Evaluasi Pendidikan.Yogyakarta: Parama Ilmu

Maywati, S., Hidayanti, L., & Lina, N. (2019). Pengetahuan Dan Praktek Hygiene Penjamah Pada Pedagang Makanan Jajanan Di Sekitar Sekolah Dasar Kota Tasikmalaya. Journal Health & Science : Gorontalo Journal Health and Science Community. (1). 8–16. https://doi.org/10.35971/gojhes.v1i1.2283

Marzano, J.R.& Kendall, S. J.(2001). Taksonomi Baru Edisi ke-2. Sumedang: Jim-Zam Studio

Nurrita, T. & Misykat. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. Jurnal Ilmu-ilmu Al-Quran. Hadist. lmsspada.kemdikbud.go.id

Nasution, M. K. (2018). Penggunaan Metode Pembelajaran Dalam Peningkatan Hasil Belajar Siswa. Studia Didaktika: Jurnal Ilmiah Bidang Pendidikan, 11(01), 9–16. Retrieved from https://jurnal.uinbanten.ac.id/index.php/studiadidaktika/article/view/515

Suryabrata, Sumadi. (2004). Psikologi Pendidikan. Jakarta: Raja Grafindo Persada

Saleh, A., Nurachmah, E., As'ad, S. & Hadju, V.. (2014). Pengaruh Pendidikan Kesehatan Dengan Pendekatan Modelling Terhadap Pengetahuan, Kemampuan Praktek dan Percaya Diri Ibu Dalam Menstimulasi Tumbuh Kembang Bayi 0-6 Bulan Di Kabupaten Maros, Jurnal Unhas. Unhas.ac.id

Sudrajat, Akhmat. (2008). Pengertian, Strategi, Metode, Teknis, dan Model Pembelajaran. Bandung: Sinar Baru Algensindo

Pelipa, E. D.& Marganingsih, A..2019. Pengaruh Edupreneurship Dan Praktek Kerja Terhadap kemampuan Life Skill Mahasiswa. Jurnal Pendidikan Ekonomi. DOI: https://doi.org/10.31932/jpe.v4i1.422

Purwoko. (2017). Analisis Kemampuan Content Knowledge Mahasiswa Calon Guru Matematika Pada Praktek Pembelajaran Mikro. Jurnal Pendidikan Surya Edukasi (JPSE). Volume: 3, Nomor: 1.

Rike, A.& Rasto. (2019). Motivasi Belajar Sebagai Determinan Hasil Belajar Siswa. Jurnal

Pendidikan Manajemen Perkantoran. doi: 10.17509/jpm.v4i1.14958

Suharni, Purwanti. (2019). Upaya guru dalam meningkatkan motivasi belajar siswa. Jurnal Bimbingan dan Konseling. https://doi.org/10.31316/g