

Reliability Test, Homoscedasticity, and Heteroscedasticity Scatter Plot for Housemanship Instruments for Research Development

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Abstract

The development of research instruments is extremely important. The research indicated the construction of instruments among house officers during their housemanship. The independent variable and the dependent variable were both investigated as components of the research. Experience, conceptualization, experimentation, and competence are the items in both variables. In the initial phase, the researcher performed a study dependability analysis. The obtained alpha value indicates that all items have been accepted. The researcher then executes an analysis to generate a scatter plot of homoscedasticity and heteroscedasticity. The generated distribution must represent regression, with the data plot featuring regression-standardised residuals and regression-standardised projected value. The drawn representation should be oval for proof that the data is normal and distributed equally. An adequate distribution demonstrates that the research instruments are acceptable and trustworthy. The study's findings demonstrate that the distribution is oval. Therefore, both research objectives succeeded, including determining the trustworthiness of instrument development and recognising the commonality of homoscedasticity and heteroscedasticity scatter plots during instrument creation. A reliable instrument is essential for ensuring accuracy and research data.

1. Introduction

To ensure the viability and durability of human resources, organisational learning is critical. It is the application and maintenance of organisational development theory based on training and learning (Barnett et al., 2012). Cognitive theory and behaviourism theory are the two most important principles in learning. This study, on the other hand, focuses on the behaviourism of house officers (Gurm et al., 2020). Experience and experimentation are explored in relation to behaviourism. Meanwhile, cognitive, and conceptual are linked. These two factors, when combined and synergized, form a competency achievement path for effectiveness. Cognitive variables have a role in the concepts of learning by doing and learning by thinking (Bleakley, 2020). Individuals tend to actively act in carrying out activities during learning because of their knowledge and skills. Jarvis (2004) discovered a link between task ability and confidence. If information and skills are continuously and sustainably added, this confidence will continue (Moses, 2012). However, if knowledge is misused, confidence is required, followed by

accuracy in knowledge and skill selection, which can have either a detrimental or good impact (Engestrom & Pyorala, 2020).

According to the preceding research debate, learning is complex and necessitates variance to establish a stable foundation. It also refers to a person's skill and level of competency. As a result, some of the elements, such as the three stressed by the researcher, are linked to knowledge and abilities. Experience, according to Warhurst (2013), is the accumulation of knowledge and skills from previous learning. It cultivates contributors and adds value to the mastery of skill levels. Knowledge and familiarity are linked to conceptual. It is separated into two categories: current knowledge and future knowledge. Individual maturity is indicated through conceptual alteration (Bullock, 2014). Then there's the ability to play around with terminology. It necessitates self-reliance as well as the ability to appraise situations objectively (Engestrom & Pyorala, 2020).

The researcher asserts that three components of housemanship learning requirements are similar based on the elements presented. Housemanship is defined as the organisational learning of trained doctors who have graduated from a government or other accredited institution. Regularity and deliberate planning, according to Skipper et al. (2016), are critical techniques for housemanship learning efficiency. Housemanship is structured in such a way that it produces holistic, flexible house officers who follow the university's medical curriculum. The first step in ensuring efficacy is to ensure that medical schools provide house officers with the necessary information and skills (Brennan et al., 2010). As a result, Malaysia is one of the most cautious countries when it comes to approving prospective medical graduates. Efficacious students are in jeopardy of being selected. The reason for this is that skilled doctors require competent and good house officers.

2. Issue and Problem

Organizational learning theories and models are vital for connecting the many learning areas. Three domains of concentration are addressed in the study: experience, conceptualization, and experimentation (Worley & Dorlen, 2015; Van Assen & J. De Mast, 2019). The environment serves as both a motivation and a trigger for successful learning (Iris, 2003). It is also influenced by comfort and conducive settings, such as the employee-employee relationship as well as the employee-manager interaction (Kim, Watkins & Lu, 2017). The context of this study looks at the relevance of Senge's views on housemanship learning principles in human resource clusters specializing in medicine. Previous studies have focused on organizational management principles, but the context of this study looks at the relevance of Senge's views on housemanship learning principles in human resource clusters specializing in medicine. Senge's viewpoint can be linked to housemanship, according to researchers, because learning is focused on increasing potential and competencies. Building quality and collaborative learning requires collaboration and collaboration between supervisors and trainee physicians.

In terms of the organizational setting, academics consider housemanship as a structured organizational learning programmed. This is also evident in the broader context of workplace groups serving as a platform for professional and personal development (Hager, 2003). However, due to the challenges, barriers, and opportunities experienced to attain optimal organizational learning, the path may be constrained (Pedler, Burgoyne & Boydell, 1991). Organizational learning concepts, according to Chapman (2013) and Tortorella et al. (2015a), must include an individual's background or space in human resource knowledge and skills. This is since human resources are the primary focus of learning. Human resources are the driving force behind and determinant of learning effectiveness. Human resource commitment has an impact on the organization's quality and productivity, as well as the scope of career growth (Lauckner, Doucet and Wells, 2012).

The coach or instructor will find the scope of the study that describes organizational learning to be highly relevant. Transparency and seamless learning are also aided by activities such as communication and interaction. Thus, before hiring a supervisor or coach, it is necessary to examine the model's foundation and framework to guarantee that the learning programmed runs smoothly (Pedler, Burgoyne & Boydell, 1991; Ponnuswamy & Manohar, 2016). The cognitive theory is viewed as relevant to housemanship because the study touches on conceptual aspects. This is because cognitive theory affects thought, knowledge space, ideology, and perception (Fosnot, 2005). Furthermore, behaviorism's theory is linked to a focus on one area of study, especially experimentation. The ability, confidence, competence, and willingness to accomplish activities efficiently and competently are all examined in this theory (Geran & Tate, 1995). When it came to the respondents' backgrounds, the researcher perceived the age component as being linked to the adult element. Adult learning theory, according to Merriam and Brockett (2007) and Knowles (1976), contains features of student ready since it entails commitment and does not involve force. This is related to the research, since house officers are people who have been emotionally, physically, and cognitively prepared to handle housemanship.

In addition to the respondents' backgrounds, the direction and extent of learning necessitate a solid theoretical foundation. Researchers believe that problem-based learning theory should be pioneered in the field of housemanship. This is because trainee physicians are taught to solve difficulties with caution and precision when executing jobs (Jarvis, 2006; Mezirow, 2009; Palos et al., 2016). The primary elements of housemanship learning are accuracy and neatness in task execution. Assignments can also be tied to specific occupations. Because

work is a component of what a career entails. Transition and success are two important characteristics of a career. This approach is in line with the Kurt Lewin Model and the application of transformative theory, which sees job change as a means of improving performance (Coghlan & Jacobs, 2005). The compatibility of Kolb's theoretical model is more relevant since the researcher focuses on the experiential, conceptual, and experimental parts, and these three elements are similar in Kolb's (1984) theory. Kolb's theory, on the other hand, is a learning cycle that examines four phases: experience, observation, conceptualization, and experimentation. Only three factors were highlighted in the authoring of this paper.

As a result, learning criteria must be identified because they have an impact on the organisation (Mezirow, 1991). The domain and foundation of the conceptual is the degree of thinking. Active thinking is required for conceptual learning to take place (Markwell & Wainer, 2009). To achieve new conceptualities, change and innovation must be mobilised rapidly and creatively (Henriksen & Ringsted, 2014). Meanwhile, experimentation was used to evaluate outputs and learning results. It is not only evaluated in terms of quantity, but also in terms of experimental learning attainment (Homborgh, Wit & Balen, 2009). Experimentation, for example, is concerned with the quality of house officers' work in treating patients in accordance with optimal time and accurate diagnostic results, as well as addressing therapeutic needs. All these factors come into play when it comes to achieving competences.

3. Research Objective

- I. Investigating the reliability of instrument development
- II. Identify the pattern of homoscedasticity and heteroscedasticity scatter plots during instrument development.

4. Methodology

The present investigation uses quantitative methods. The research's primary objective is to explore a set of study instruments utilised to evaluate reliability, homoskedasticity, and heteroskedasticity scatter plots among house officers. There are two analyses that were obtained by the researcher using SPSS software.

5. Findings

The research instruments that had been created were put to the test in a pilot study. It also seeks to make sure that the items in the questionnaire are relevant and that the respondents understand them. The features of the chosen respondents are identical to those of the actual respondents. Cronbach's alpha values were calculated using data from the pilot study. The study questionnaire's reliability and validity were determined using alpha values. If the alpha value falls between 0.6 and 0.99, the instrument has a high level of validity and reliability (Chua, 2006). Tables 1 and 2 show the findings of a pilot study that was undertaken. Cronbach's alpha values for all elements examined ranged from 0.7 to 0.9. This data shows that all the products are steady and have a high level of dependability.

Table 1 *Learning house officers' reliability values*

Learning Level for House officers	Alpha Cronbach Value
Experience	0.794
Conceptual	0.791
Experimentation	0.776

Table 2 *Reliability of competency house officers' values*

Level of Achievement for House officers	Alpha Cronbach Value
Competency	0.855

Homoskedasticity and heteroscedasticity is a type of analysis in which two variables are assumed. The variance value is determined by the connection between the independent and dependent variables. The value is used to determine the variable's form. Matrix and non-matrix independent variables are both possible. Dependent variables, on the other hand, are only allowed in matrix form. The purpose of this test is to determine whether heteroskedasticity exists. The assumption of homoskedasticity is satisfied if the residual pattern creates a uniform distribution. If the residual pattern, on the other hand, provides a long-shaped distribution, it causes heteroskedasticity issues. Figure 1 shows how the homoskedasticity test was discovered using the scatter plot results. This test demonstrated that the produced instruments and items pass the homoskedasticity test with a uniform residual display. Before the study's analysis, several phases and indicators are completed, including a

pilot study to ensure the research instrument's reliability. The pilot study's findings were good and had a high level of dependability. As a result, a follow-up study was done using the results of 102 respondents. The purposive sampling method was utilised because the researcher was primarily interested in the population and sample of second-year house officers. The selection of second-year house officers was justified to avoid bias and anomalous data findings. Because there are disparities and restrictions of the respondents to answer the questions in the study instrument, when the data findings are not normal, it contributes to the outlier's findings. As a result, the sample was designed to be clearer and more precise in the study. Wasson et al. (2016) and Dagnone et al. (2020) indicate that the study must consider the respondents' backgrounds so that the findings are not skewed and can be extrapolated to the right target respondents.

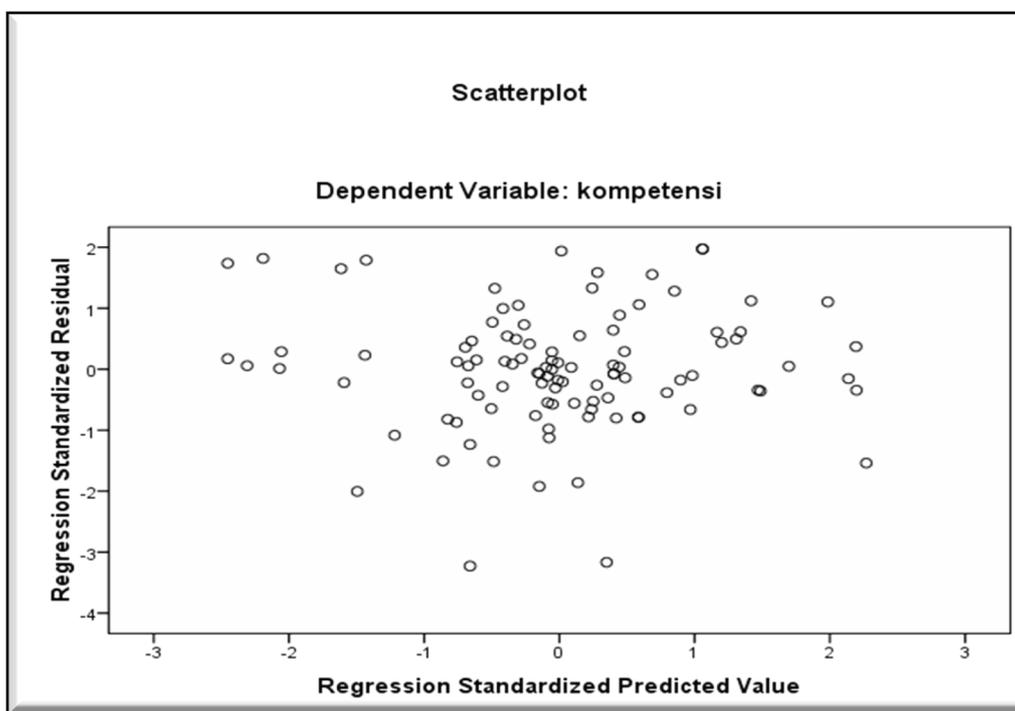


Fig. 1 Scatter plot for homoscedasticity and heteroscedasticity test

6. Discussion

According to the findings of this study, experience, knowledge, and experimenting are the three most essential factors among house officers. The researcher agrees with Kelly et al. (2019) study that knowledge is the foundation of organisational learning. Knowledge applied by the house officer might have an impact on the learning of housemanship. Similarly, Engstrom and Pyorala (2020) discovered that high knowledge is used by employees to achieve higher-quality organisational learning changes. Based on the previous study, the researcher concluded that current knowledge at the university is highly significant and adds to the house officer. This demonstrates that failing to apply knowledge during housemanship might have a negative impact on learning performance and competency. Mistakes made during housemanship learning may generate complications for the house officer if the house officer's expertise is lacking. In fact, the implications may also influence the patient since the difficulty of employing knowledge will harm the house officer's potential throughout the learning of housemanship. According to Nor Shela and Hashim Fauzy (2011) study, knowledge is employed as a source and reference for doctors during housemanship. This suggests that the house officer places a high value on knowledge. As a result, house officers must obtain and use as much knowledge as possible during their university studies to reap the benefits and make significant contributions to learning housemanship.

Experience can help house officers gain confidence and maturity. The achievement of the experience phase demonstrates that the house officer could apply intuition and optimism to make learning changes and is included in the context of the achievement of the experience phase. The achievement of the experience phase, according to Raduan, Naresh and Ong (2009), will not be reached if the individual has low innate strength. In fact, getting to the experience phase is difficult since it requires intuition and internal detection. However, the researcher discovered in this study that house officers have internal strength when the experience phase is attained to a high degree. Studies have also shown that house officers are continually engaged in new learning to obtain more

experience. In fact, earlier research has shown that strong involvement during learning emphasises the components of change and increases performance in the experience phase (Mann, 2011).

The researcher discovered that the house officer was very attentive and took into consideration any changes that occurred while studying based on the findings in the achievement of the experience phase. Meaningful learning changes are stored in memory as new findings and discoveries. House officers always try to remember everything that has been learned and save it as a new experience. This also demonstrates that house officers have the dedication and optimism to be engaged in fostering events that can be used as new learning in housemanship.

Finally, there is the element of experimentation. It is related to the ability of the house officer and his or her competence to handle chores during housemanship. The data suggest that the experimenting phase has the highest achievement of the three phases. This demonstrates that house officers understand their responsibilities. Orsino and Ng (2019) defined responsibility as "the achievement of a high experimentation phase demonstrating that individuals have an excellent level of responsibility while learning." However, accountability is influenced by other aspects, including efficiency in providing experimentation that is not only of high quality but also productive in terms of the amount generated (Cegala, Coleman & Turner, 2009; Nor Shela, Hashim Fauzy & Mohd Shafie, 2015; Shih et al., 2020).

Findings from the experimentation phase also reveal that the house officer is a competent individual during housemanship. As a result, the researcher believes that the house officer must ensure that the momentum of competence during experimental learning is kept at an active level of involvement. Active involvement not only allows you to cope with a variety of challenges and problems, but it also results in experimenting that always fulfils housemanship experimentation requirements. According to Mishra and Woreta (2020) accomplishments during the experimental phase frequently in still confidence in an individual while learning. However, this research demonstrates that the house officer is a confident and always optimistic individual because the achievement in the experimental phase is great, even the highest compared to all phases of housemanship learning.

7. Conclusion

According to the study, the organisation should guarantee that the person hired has the necessary knowledge and abilities for the job. This is a pre-requisite for organisational learning. As a result, before beginning housemanship learning, the medical organisation must monitor the degree and quality of the house officer's knowledge and skills. The level of quality of knowledge and skills must correspond to the organisation's learning requirements. For example, the researcher discovered in this study that suitable knowledge and skills can contribute to learning achievement. As a result, the researcher proposes that the substance and content of learning be used as a foundation for house officer knowledge and abilities. Weaknesses in knowledge and skill mastery should be investigated and remedied as soon as possible so that they do not have a long-term impact on the quality of housemanship learning. As a result, efforts such as updating the curriculum at the university level should be taken as frequently as possible so that trainee doctors may master the whole learning requirement of housemanship in accordance with advancements in the global medical world. As previously said, the quality of housemanship learning is dependent on trainee doctors' mastery of information and skills throughout learning (Milota, van Thiel & van Delden, 2019; Lindberg, 2020; Janetputra, Santoso & Findyartini, 2021). Learning is a process that involves changing the attitudes and behaviours of individuals within an organisation (Shih et al., 2020). In terms of developing employee competence, learning can turn negative behaviour into positive behaviour (Kolb, 1984). Assignments can be completed in a more systematic manner because of learning. Dagnone et al. (2020) discovered that continual learning in organisations improves employees' perceptions over time. Geran and Tate (1995) agree that continual learning helps to increase the quality of work. The impact of learning, however, is dependent on an individual's knowledge and skills.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

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