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Towards Developing Empathetic Young Engineers for Rural Road Project Management

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TOWARDS DEVELOPING EMPATHETIC ENGINEER FOR THE RURAL ROAD PROJECT MANAGEMENT: EMPATHY THROUGH ENGINEERING LITERATURE

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Abstract – The current study is an integrative and analytical recent literature review on the concept and meaning of empathy for the rural road project management. Purpose of this study is to analyse the explicit meaning of empathy when element of engineering is the centre of the study and to analyse which empathetic views influence rural project engineers the most. The literature was collected from five databases through an advanced computer search. The Guidelines for The Design of Low-Volume Rural Roads (LVRR) is used for the analysis of the empathetic view of the study. Two research questions were addressed: first, what does empathy mean when the element of engineering is the centre of the study? and; secondly which empathetic views influence engineering the most? The data were analysed by means of descriptive statistics and qualitative content analysis. Factors contributing to project failure can be categorised into three major factors namely physical and financial constraint, empathy and other minor issues. Empathy issues are the combination of empathy keywords and empathetic views could be developed and inculcated in the management of rural road during desk study, planning, design and construction stage of the project. In order to reduce project failures, intervention through empathy training is a viable option to be given to engineers for the enhancement of emotional intelligent and project management skill.

Keywords: Empathy, Engineer, Low-Volume Rural Road (LVRR), Project Management, Training

1 Introduction

Empathy—the ability for one person (a perceiver) to share and understand the internal states of someone else (a target) is a social bridge that allows people to connect to one another [1]. It is a core strategy for engaging with controversial situations [2]. There are factors that negatively influence the development of empathy not only because of the high number of projects that engineers have to manage within inadequate timeframe given, but also the lack of education in empathy [3].

Engineers somewhat lessened empathy and tendency to downplay the perspectives of other people, likely reduces their ability to engage with, and fully grasp, the value of another person's perspective and often grapple with how to deal with issues that "involve emotions and apparently irrational beliefs and opinions [4]. Traditionally, engineering as a profession has only focused on a technical skill such as design, modelling and problem solving. For young engineers especially, these skills are undeniably important but if engineers were to become more empathetic and caring, diversity may increase and solving people's problems would become more prudent [5].

Advancements in technology, the drastic transformation in societal needs and a knowledge-based economy are creating a strong need for engineers to continuously improve their skills and competencies [6]. To remain competitive, it is particularly important that engineers practice lifelong learning and exhibit outstanding leadership qualities. In this context, learning is not restricted to the ability to sharpen and enhance technical knowledge and skills.

2 Problem Background

Each year, the government has been funding infrastructure projects such as low-volume rural road program to improve economic growth for the population in the remote area. The infrastructure project is integral to the development of rural areas as the conditions of roads and modes of transportation are not in a well-developed state, which are imposing problems for individuals transferring from one place to another [7]. In Malaysia, Public Works Department (PWD) is the executing agency in managing the development of the Low Volume Rural Road (LVRR) and the program is under the purview of the Ministry of Rural Development Malaysia.

Rural roads are the last critical link of the transport network and building good quality rural roads require skill, proper planning, experienced supervision, good workmanship and the selection of the correct technology and work methods. The construction of roads will facilitate access to other development of rural areas and it is crucial for

engineers to understand the requirements for proper managing the rural road projects.

Unfortunately, Abandonment of Construction Projects (ACP) is considered one of the most common and serious problems plaguing the Malaysian construction industry given the number and the value of the projects involved[8]. Prior research in project management has found that empathy issues, among other reasons, is the major factor contributing to the project failure.

The engineer can prevent future disputes and failed engineering projects by employing a design strategy that incorporates empathy in all professional matters. The empathetic view can prevent disputes by considering the possible harm suffered as the result of engineering decisions [9]. Furthermore, to date, there was no prior study on empathy of engineer dealing with rural road projects.

Tang, X. [10] suggested two alternative conceptions of empathy in engineering: 1) empathy as a commitment to communicating and understanding across different cultural and epistemic communities; and 2) empathy as a professional excellence for engineers. Empathy describes both the skillset and the outlook of an excellent engineer, and like other virtues, it can be cultivated through education.

2.1 Problem Statement

An online survey on awareness of empathy among engineers for the management of rural road projects was conducted and had received 14 respondents. Based on the survey as in Figure 1, 21.4% strongly agree, 42.9% agree, 7.1% neutral, while another 28.6% disagree that analytical skills are more important than the emotional aspect of empathy as a practiced engineer. As of Figure 2, 50% strongly agree and 42.9% agree while another 7.1% disagree that the rural community involvement in designing LVRR is significance. Figure 3, 28.6% strongly agree, 50% agree 14.3% neutral, while another 7.1% disagree that engineer can prevent future disputes and failed engineering projects by employing a design strategy that incorporates empathy in all professional matters. Figure 4, 35.7% strongly agree, 57.1% agree and 7.1% neutral that intervention through empathy training can enhance "emotional intelligent" and "project management skill".

These responses indicate the believe of cultivating empathy through education would enhance engineers project management skill. Hence, the finding of this paper is vital for the development of empathetic engineer's rural road project management education.

2.2 Research Objectives

The objective of the present paper is to analyse the concept of empathy and emphasizes its importance to the engineers involved in project management of rural roads development. The research questions under consideration are as follows: 1. What does empathy mean when the element of engineering is the centre of the study? and; 2. Which empathetic views influence engineering the most?

2.3 Scope and Key Assumptions

The boundary of the research are engineers involved in managing LVRR Program under the Ministry of Rural Development Malaysia. The study conceptualised literature review from databases of Emerald, IEEEXplore Digital Library, Proquest Dissertations and Thesis Global, Scopus and Taylor Francis Online and the Guidelines for The Design of Low Volume Rural Roads (LVRR). The keyword use for the search in the online database is Empathy and after that further select only papers in Engineering areas.

The key assumption is that the analysis of empathy explicit meaning from papers where the element of engineering is the centre of the study can be used to further conceptualized the LVRR Guideline for further development of empathetic engineer training guideline.

3 Research Methodology

The research methodology is divided into data collection and data analysis.

3.1 Data collection

The literature review was conducted by searching through an advanced computer search on the databases of Emerald, IEEEXplore Digital Library, Proquest Dissertations and Thesis Global, Scopus and Taylor Francis Online.

By using the keyword 'Empathy' and paper publish from October 2016 until October 2021, 1,077 papers were found (with open access) in Engineering, Psychology, Nursing, Health and Rehabilitation, Art, Education, Museology, Social, Hospitality and many other various disciplines. Out of the search, 63 papers were identified where element of engineering is the centre of the study.

3.2 Data analysis

Conceptual analysis is used for this research where by papers with explicit meaning were compile, discussed and analysed. Findings from the examination and analysis of the study lead to the formulation of empathy alternative keywords and views in engineering that influence empathy the most.

4 Finding

Through the literature review, 15 alternative keywords were found and further analysed its empathetic views as conceptualized in the LVRR guideline:

Table 1. Empathy Alternative Keywords and Empathetic Views

Alternative Keywords	Empathetic Views
As if it were	Desk Study/Planning/Design/Construction
Feels With	Desk Study/Planning/Construction
Compassion	Desk Study/Planning/Design
Behaviours reflective	Desk Study/Planning/Design
Mindful	Desk Study/Planning/Design/Construction
Ethical thinking	Planning/Construction
Mindset Understanding Behaviour	Desk Study/Planning/Design
Mindset Understanding Method	Planning/Design/Construction
Community involvement	Planning/Design
Understand Perspective	Planning/Design
Understanding and without bonding	Planning/Construction
Understanding and communicate	Desk Study/Planning/Design
Emotional reaction	Planning/Design
Experience sharing	Planning/Design/Construction
Experiencing emotions	Planning/Construction

4.1 Desk Study

Engineer shall collect necessary data and information for desk study and analysis shall include but not necessarily limited to engineering data, social data, economic data and environmental studies. It is best to involve the community as early as possible in the engineering project. This can prevent misunderstanding and mis conceptual of the overall project. Community and stakeholders' involvement will provide all this necessary data that could contribute to better understanding of the unique new project areas. Communication with the local resident during the site visit will provide the required perspective of the study. Engineer shall familiarize himself with the site and the surrounding to understand better the nature of the work involved.

4.2 Planning

Engineer shall identify all possible alignments for a road project and subsequently select and determine the optimum/best route for detailed ground survey. The determination of a good alignment is dependent on experience and good judgement of the engineer with mindset understanding the possible correct method of the engineering project.

4.3 Design Specification

Engineer shall put up conceptual design report with alternative options. The design shall consider the advantages and disadvantages of each option respectively including cost comparison.

4.4 Construction

The design Engineer shall help to explain and make necessary adjustment on the methodology required best suited the site condition of the rural area.

5 Significant of the Study

Developing of empathetic skill can improve young engineers' capabilities to communicate with others, to be part of a team, and to enhance leadership skills as empathy is an emotional skill that is built through understanding others and for further career success.

6 Conclusion

Based on the finding, there are many factors contributing to project failure and these failures are categorised into three major factors namely physical and financial constraint, empathy and other minor issues. Empathy issues are the combination of empathy keywords and empathetic views could be developed and inculcated in the management of rural road during desk study, planning, design and construction stage of the project. Hence, in order to reduce project failures, intervention through empathy training is a viable option to be given to engineers for the enhancement of emotional intelligent and project management skill. The conceptual framework of the study is depicted in Figure 6.

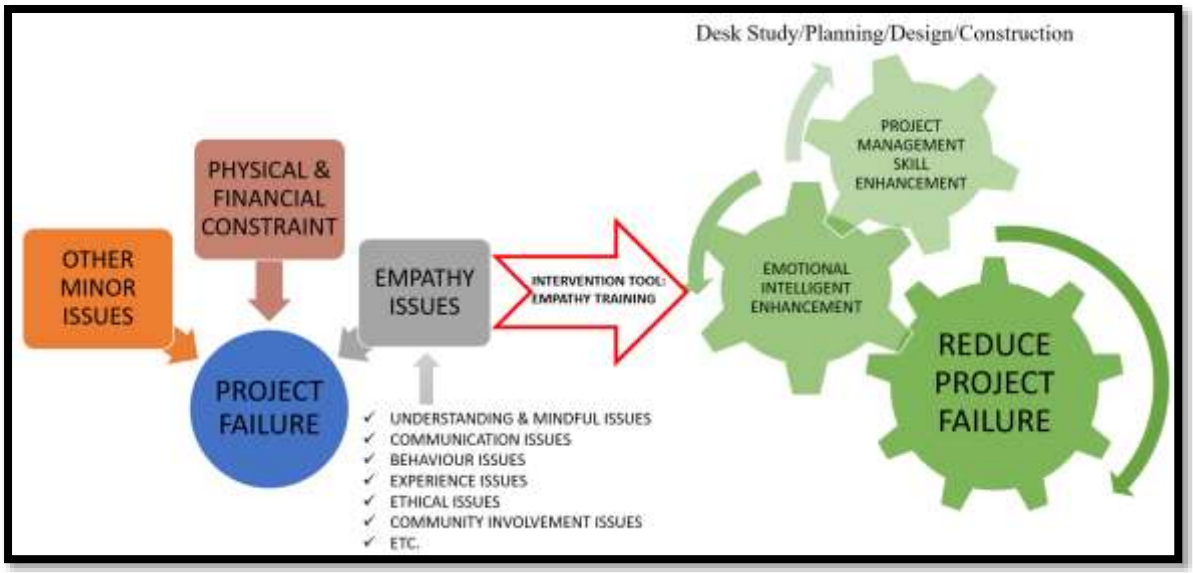

Figure 6. Theoretical Framework: Empathy Training as Tool for Project Failure Intervention

7 Acknowledgment

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8 References

[1] Erika Elizabeth Weisz, "BUILDING EMPATHY THROUGH PSYCHOLOGICAL INTERVENTIONS," 2018.

[2] A. Zeyer and J. Dillon, "The role of empathy for learning in complex Science|Environment|Health contexts," *International Journal of Science Education*, vol. 41, no. 3, pp. 297–315, 2019, doi: 10.1080/09500693.2018.1549371.

[3] M. Moudatsou, A. Stavropoulou, A. Philalithis, and S. Koukouli, "The role of empathy in health and social care professionals," *Healthcare (Switzerland)*, vol. 8, no. 1, pp. 7–9, 2020, doi: 10.3390/healthcare8010026.

[4] B. Goldman, D. A. Cooper, and C. Koc, "An exploration of whether engineers differ from non-engineers in their approach to negotiations," *International Journal of Conflict Management*, vol. 30, no. 4, pp. 420–440, 2019, doi: 10.1108/IJCMA-02-2019-0034.

[5] J. L. Hess, "A Multi-Phase Exploration of Conceptualizations, Perceived Importance, and the

Development of Empathy within Engineering," *ProQuest Dissertations and Theses*, p. 346, 2015, [Online]. Available: http://proxy.bc.edu/login?url=http://search.proquest.com/docview/1739012809?accountid=9673%5Cnhttp://bc-primo.hosted.exlibrisgroup.com/openurl/BCL/services_page??url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&genre=dissertations+%26+the

[6] R. Talib, "Innovate for Change," no. August, 2020.

[7] B. Johannessen, *Building rural roads*, vol. 148. International Labour Organization, 2008.

[8] Y. E. Hoe, "Causes of Abandoned Construction Projects in Malaysia," 2013. [Online]. Available: http://onlinelibrary.wiley.com/doi/10.1111/imre.12028/abstract

[9] D. A. Valero and P. A. Vesilind, "Preventing Disputes with Empathy," *Journal of Professional Issues in Engineering Education and Practice*, vol. 132, no. 3, 2006.

[10] X. Tang, "From 'empathic design' to 'empathic engineering': Toward a genealogy of empathy in engineering education," *ASEE Annual Conference and Exposition, Conference Proceedings*, vol. 2018-June, 2018, doi: 10.18260/1-2--30538.

Figure 1. Analytical skills more important than the emotional aspect of empathy as a practiced engineer.

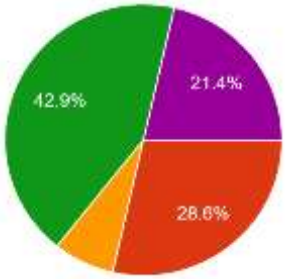

Figure 2. Engineer can prevent future disputes and failu engineering projects by employing a design strategy th incorporates empathy in all professional matters

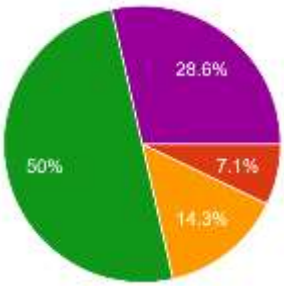

Figure 5. Legends

Figure 3. The rural community involvement in designing LVRR is significance.

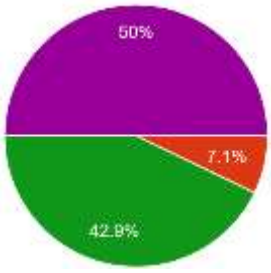

Figure 4. Intervention through empathy training can enhance "emotional intelligent" and "project management skill"