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JOB CHARACTERISTICS AND ORGANIZATIONAL COMMITMENT OF SECONDARY PUBLIC SCHOOL TEACHERS

[1]Aileen Gaburo, [2]Salahudin D. Solaiman

[1][2] Cotabato Foundation College of Science and Technology (CFCST) Arakan, Cotabato, Philippines

ABSTRACT :

The study looked into the relationship and influence of job characteristics on organizational commitment of elementary public-school teachers in the Cotabato Division. Especially determining the extent of their job characteristics (skill variety, task identity, task significance, task autonomy, and feedback); and the level of their perceived organizational commitment.

The study used validated and Cronbach's reliability tested (0.966) questionnaire to gather data from totally-enumerated elementary school teachers. Descriptive Statistics (Mean) determined the extent of job characteristics, and level of organizational commitment; Pearson Product Moment Correlation Coefficient (Pearson r) described the relationship between the job characteristics and organizational commitment; and Multiple Linear Regression Analysis expounded the influence of the independent on the dependent variables.

Indeed, the teachers possess outstanding job characteristic (skill variety, task identity, task significance, task autonomy, and feedback); showed commitment to the organization where they belong (affective, continuance, and normative).

Furthermore, the higher the job characteristics of the teachers, the higher is the level of their organizational commitment. The teachers' skill variety, task identity, task significance, and job feedback factors are positive contributors to their organizational commitment The administrators must continuously support and help teachers improve their organizational commitment by giving constructive feedback (job feedback) regarding teaching performance.

Introduction

Elementary public-school teachers play a critical role in shaping the foundation of students' academic and social development. Their commitment to their profession is influenced by various factors, including job characteristics such as skill variety, task identity, task significance, task autonomy, and feedback.

These job characteristics determine the extent to which teachers find their work meaningful, challenging, and fulfilling. Meanwhile, organizational commitment, defined as an employee's emotional attachment, involvement, and loyalty to an organization (Meyer & Allen, 2016), is essential for ensuring teacher retention, motivation, and overall school effectiveness. Despite the growing interest in these concepts, gaps remain in understanding how specific job characteristics influence elementary school teachers' organizational commitment.

Despite extensive research on job characteristics and organizational commitment, there remains a gap in understanding how specific job characteristics—namely skill variety, task identity, task significance, task autonomy, and feedback—impact the organizational commitment of elementary public-school teachers. While studies have explored general teacher job characteristics, much of the existing literature focuses on secondary school educators, leaving elementary teachers underrepresented (Hackman & Oldham, 1976; Meyer & Allen, 2016).

Additionally, prior research has primarily examined job characteristics in isolation rather than investigating how these five dimensions collectively influence organizational commitment. The strength and nature of the relationship between job characteristics and commitment remain unclear, particularly in different educational settings, such as urban and rural public schools (Ingersoll, 2016).

Despite extensive research on the Job Characteristics Model (Hackman & Oldham, 2015) and organizational commitment (Meyer & Allen, 2015), there remains a significant gap in understanding how job characteristics influence organizational commitment in remote and hybrid work environments. Traditional studies primarily focus on in-office settings, where job characteristics such as autonomy, feedback, and task identity are experienced differently compared to virtual or flexible work arrangements (Parker et al., 2020). With the rise of remote work, factors like digital communication, virtual teamwork, and work-life balance may act as new moderators in the relationship between job characteristics and organizational commitment (Wang et al., 2021).

However, empirical research on how these evolving job characteristics impact employees' affective, continuance, and normative commitment remains limited. Understanding this relationship is crucial for organizations seeking to enhance employee engagement, reduce turnover, and optimize job design in modern work environments. Therefore, future studies should investigate how remote-specific job characteristics influence employees' commitment levels in comparison to traditional workplaces.

Therefore, this study aims to address these gaps by focusing specifically on elementary public-school teachers and examining both the relationship and potential influence of job characteristics on their organizational commitment.

Statement of the Problem

The study determined the relationship and influence of job characteristics on organizational commitment of elementary public-school teachers in the Cotabato Division.
Specifically, answered the following research questions:

- What is the extent of job characteristics of elementary public-school teachers in terms of skill variety, task identity, task significance, task autonomy, and feedback?
- What level of organizational commitment is perceived by elementary public-school teachers?
- Is there a significant relationship between the job characteristics and the organizational commitments of the teacher?
- Is there a significant influence on the job characteristics and the organizational commitments of teachers?

1.2. Theoretical Framework

The study was anchored on Job Characteristics Model (JCM) by Hackman and Oldham (1976) integrated with Meyer and Allen's (2015) Three-Component Model of Organizational Commitment. Job Characteristics Model (JCM) – This model proposes that five core job characteristics impact employee motivation, satisfaction, and performance: First, Skill Variety – Using different skills makes work more engaging. Second, Task Identity – Seeing a job through from start to finish increase's purpose. Third, Task Significance – Knowing work has a meaningful impact fosters motivation. Fourth, Autonomy – Having control over work enhances ownership and responsibility and fifth Feedback – Receiving performance-related information encourages improvement.
These characteristics influence three psychological states (experienced meaningfulness, responsibility, and knowledge of results), leading to higher job satisfaction and motivation.
It refers to employees' emotional attachment to their employer. In order to maintain organizational membership, Al-Jabari and Ghazzawi (2019) defined affective commitment as "belief in and acceptance of the organization's goals and values; desire to focus effort on helping the organization achieve its goals.

2. Methods

This chapter presents the research design, locale of the study. respondents of the study, sampling procedure, research instrument, data gathering procedure, and statistical analysis of data.

2.1 Research Design

This study utilized a descriptive survey and correlational research design to determine whether there is a significant relationship and influence between the job characteristics and organizational commitment of elementary public-school teachers in the Cotabato division. The degree to which a link exists between two or more variables is studied utilizing a quantitative method of analysis in this sort of research. Thus, this design determines whether an increase or decrease in one variable is associated with an increase or decrease in the other variable (Boucaud, 2017).
The descriptive survey used to determine the breadth of respondents' job characteristics and their level of organizational commitment in this study. Simultaneously, the correlational design described the relationship between public school teachers' job characteristics and organizational commitment.

2.3. Research Procedure

The study used the total enumeration sampling method, wherein all elementary public-school teachers Matalam South, Kabacan South and Matalam South District would be considered. The entire population of   interest (i.e.; a group whose members share a common trait) is research in   a single setting in comprehensive enumeration sampling. It is most useful   when the entire population can be managed, such as when a well-defined segment of a larger population is being addressed (Molenberghs,   2021).

2.4. Research Instrument

This study utilized an adapted survey questionnaire, Mowday & Steers (2015) stated that more significant changes are required to adapt an instrument than for a tool to be adopted. Depending on the situation, the researcher usually follows the brood design of another instrument but adds or removes elements and dramatically modifies the content of each item.
In this study, the adapted survey questionnaire consists of two parts. Part I   determined their job characteristics in terms of skill variety, task Identity, task significance, autonomy, and feedback. This survey questionnaire was adapted from the study of Bernabe & Burns (2006): Sims, Szilagyi & Keller (2017): and Millette & Gagné (2018).

Table 2. a Likert Scale on the Job Characteristics of the teachers

Scale	Range	Descriptive Equivalent	Descriptive Interpretation	Percentage
5	4.21-5.00	Strongly Agree	Performance exceeds expectations. The condition is manifested by	
				91-100%
4	3.41-4.20	Somewhat Agree	Performances meet expectations. The condition is manifested by	
				81-90%
3	2.61-3.40	Neutral	Performance failed to meet expectations. The condition is manifested by	
				71-80%
2	1.81-2.60	Somewhat Disagree	Performance is consistently below expectations. The condition is manifested by	
				61-70%
1	1.00-1.80	Strongly Disagree	Performance is consistently below expectations. The condition is manifested by	
				60% below

2.5. Data Gathering Procedure

The researcher prepared a letter addressed (Tuhoy. 2018) to the office of the Schools Division Superintendent requesting permission to conduct the study in the Municipality of Carmen, Kabacan and Matalam. A parallel letter was formulated that addressed to the schools' district supervisor requesting also to conduct the study in different schools. The granted permission is the passport of the researcher to coordinate with the principals to facilitate the conduct of the survey. The researcher immediately proceeded in administering the survey questionnaire. The researcher gave enough time to the respondents to think, and analyze every item in the questionnaire. After the data were completely gathered, these were tallied and tabulated properly in preparation for statistical analysis and interpretation.

The author presented the initial draft of the adapted survey questionnaire to the experts for further comments and suggestions. The researcher also made some revisions of the survey questionnaires based on their comments and suggestions. The author subjected the corrected draft to formal validation. Then, the researcher distributed the final draft of the adapted survey questionnaire to the respondents upon the approval of the concerned authorities.

The researcher gathered, checked, collated, and encoded the data in Microsoft excel and analyzed the same using SPSS software.

2.6. Data Analysis

Descriptive Statistics (Mean) determined the extent of job characteristics and level of organizational commitment:

Pearson Product Moment Correlation Coefficient (Pearson r) described the relationship between the respondents' job characteristics and organizational commitment. The scale formulated by Garrett in 1975 (Edulsa, 2020) interpreted Multiple Linear Regression Analysis will be determined the influence of the independent on the dependent variables of the study.

The researcher interpreted the statistical findings using the two- tailed test at a 5% significance level.

Results

Based on the findings, the researcher draws the following:

The elementary public-school teachers show an outstanding jobcharacteristic in terms of skill variety, task identity, task significance, task autonomy, and feedback: they also committed to the normative commitments.

Furthermore, the higher the job characteristics, the more organizational commitment elementary public-school teachers have. Finally, the organizational commitment level of elementary public school teachers was influenced by elements such as skill diversity, work identity. task relevance, and job feedback.

Recommendation

- Based on the conclusion of the study, the following are the recommendations:
- The administrators must continuously support and help teachers improve their organizational commitment by giving constructive feedback (job feedback) regarding teaching performance.
- School administration should consider giving light workloads to teachers if possible to give teachers time to relax within a day.
- Administrators should also try to advocate autonomy in performing some tasks to give teachers the freedom to learn independently.

- Administrators must also look into other factors that affect their level of organizational commitment.
- A similar study with a broader scope and more variables is recommended to be conducted to validate the present study results.
- The study's Modified Framework is shown in Figure 3. The image depicts how job qualities (skill diversity, task identity, task significance. autonomy, and job feedback) have a significant impact on public secondary school teachers' organizational commitment (affective commitment, continuance commitment, and normative commitment).

Affective commitment is heavily influenced by skill diversity, task identity, task relevance, and feedback. In addition, skill variety, task identity, task relevance, and job autonomy all have a significant impact on teachers' long-term commitment. Finally, the impact of skill diversity, task identity, and task relevance on instructors' normative commitment. In general, the organizational commitment of public school teachers is influenced by skill variety, work identity, and task relevance.

- . The intervention Plan,

(Table 15) skill variety shows a low relationship concerning the teachers' affective commitment. It means that the teacher's job provides a variety of work and a diverse set of skills provides little impact on the teacher's positive sense of attachment to the organization.

Moreover, these skill types moderately affect the second and third dimensions termed continuance and normative commitments, respectively, which means that teachers feel committed to their organizations due to the feeling of association and a commitment to stay with the organization.

The skill variety has a negative coefficient. It means that as the range of skills rises, the teachers' affective commitment to the organization declines. Therefore, growing opportunities provided to the teachers by showcasing their skills, genuine affective commitment to the organization could not be attained even though teachers used a wide range of skills, talents, and activities in performing their job. It might be because teachers were overloaded with the tasks entrusted to them without being recognized.

REFERENCES

1. Adebayo, S. (2017). Task Identity and Job Autonomy as Correlates of Burnout among Doctors in Jos. Journal of Basic and Applied Scientific Research.

2. Agu, O. (2015). Work Engagement. Organizational Commitment. Self-Efficacy and Organizational Growth: A Literature Review. Journal of Information and Knowledge Management. 6(1).

3. Allan, A., Duffy, R., & Collisson, R. (2016). Task Significance and Performance: Meaningfulness as a Mediator. Journal of Career Assessment.Allen, R., Lambert, A., Pasupuleti, S., Tolar, T. & Ventura, S. (2004). The impact of job characteristics on social and human service workers. Journal of Social Work and Society, 2, 173-188

4. AL-Jabari, B. & Ghazzawi, I. (2019). Organizational Commitment: A Review of the Conceptual and Empirical Literature and a Research Agenda. International Leadership Journal. 11.78-119.

5. Anttila, E. (2014). Components of Organization Commitment - A case study consisting managers from Finnish industrial company. School of Education, University of Tampere

6. Bremner. N. & Cariere. J. (2020). The Effects of skill variety, task significance, task identity and autonomy on occupational burnout in a hospital setting and the mediating effect of work meaningfulness. Telfer school of Management, University of Ottowa

7. Boucaud, A. (2017). A Correlational Study Examining the Relationship Between Restorative Practices and School Climate in Selected Elementary Schools in a Large Mid-Atlantic Urban School District. Concordia University. St. Paul

8. Edulsa, V. (2020). Conceptual Understanding and Academic Performance of Students in Mathematics.

9. Bentein, K. & Stinglhamber, F. (2004). Affective Commitment to the Organization, Supervisor, and Work Group: Antecedents and Outcomes. Journal of Vocational Behavior.

10. Bergman, M. (2006). The relationship between affective and normative Commitment. Review and research agenda. Journal of organizational behavior, 27(5), 645-663.

11. Bernabe, C. & Burns, M. (2006) Teachers' job characteristics and motivation, Educational Research, 36:2, 171-185

12. Bhuidan, S. N., & Mengu. B (2002). An extension and evaluation of job characteristics, organizational commitment and job satisfaction. Journal of Personal Selling & Sales Management, 22, 1-11.

13. Bon, A. T., & Shire, A. M. (2017). The role of job resources on work engagement: A study on telecommunication sector. International Journal of Scientific and Research Publications, 7(5), 400-405.

14. Bondar, I.. Trofimov. P., Miliutina, M., Trofimiva, T. & Riabchych. R. (2017). Organizational commitment factors: role of employee work engagement.The Journal of Industrial Relations and Human   Resources

15. Buys, M., Olckers, C. & Schaap, P. (2017). The construct validity of revised job characteristics in survey. South African journal of Business management. 38 (2), 33-40

16. Chen. Z. & Aryee, S. (2007). Delegation and Employee Work Outcomes:An Examination of the Cultural Context of Mediating Processes in China. Academy of Management Journal, pp. 226-238.

17. Chen, Z., Zhang, X., & Vogel, D. (2011). Exploring the underlying processes between conflict and knowledge sharing: A work engagement perspective. Journal of Applied Social Psychology.

18. Crawford. E. R., LePine, J. A., & Rich. B. L. (2010). Job engagement: Antecedents and effects on job performance. Academy of Management Journal

19. Dixit.V. & Bhatti M., (2012). A study about employee commitment and its impact on sustained productivity in Indian auto component industry.European Industry of Business and Social Sciences

20. Evelyne. N.. Kilika, J. & Muathe, S. (2018). Job Characteristics and   Employee rformance in Private Equity firms in Kenya, Journal of Business Management, 20(1), 60-70

21. Faraji, O., Ramazani, A., Hedaiati, P., Aliabadi, A., Elhamirad, S. & Valiee, S. (2015). Relationship Between Job Characteristics and Organizational Commitment: A Descriptive Analytical Study. Iran Red Crescent Med Journal. 2015 November; 17(11)

22. Folorunso, O., Andewale, A. & Abodunde, S. (2014). Exploring the effect of organizational commitment dimensions on employee performances. An empirical evidence from academic staff of Oyo State Owned Tertiary institution. Nigeria Journal of Business and Social Sciences

23. George, R., Victoria, J & Florianna, M. (2020). The Relationship between Task Characteristics and Employee Engagement. Trends in Undergraduate Research, 3, 1-6

24. Gilbert, E. & Konya, K. (2020). Continuance Commitment and Organizational Performance of Manufacturing Firms in Port Harcourt, Nigeria. International Journal of Innovative Social Sciences & Humanities Research.

25. Grant. A. (2008). The Significance of Task Significance: Job Performance Effects, Relational Mechanisms, and Boundary Conditions, Journal of Applied Psychology, 93(1), 108-124

26. Grego-Planer, D. (2019). The Relationship between Organizational Commitment and Organizational Citizenship Behaviors in the Public and Private Sectors College of Economic Sciences and Management, Nicolaus Copernicus University

27. Gunlock, D. (2014). The effects of feedback on teacher's performance. Masters of Arts in Education Action Research Papers. St. Catherine University.

28. Hackman, J. R., & Oldham, G. (2015). Development of the job diagnostic survey. Journal of Applied Psychology. 60, 159-170.

29. Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. Journal of Applied Psychology.

30. Hussein, A. (2020). Effect of Job Characteristics on Job Performance among Employees in the General TV Channels. International Journal of Academic Research in Business and Social Sciences. 10(9), 333- 344.

31. Ingersoll, L. (2016) Theorizing school leadership as a profession: a qualitative exploration of the work of school leaders.Iqbal, A. (2010). An Empirical Assessment of Demographic Factors. Organizational Ranks and Organizational Commitment.   International Journal of Business and Management. 5(3)

32. Katsikea, E., Perdikis, A., Theodosiou, T. & Kehagias, S. (2011). The effects of organizational structure and job characteristics on export salesmanagers' job satisfaction and organizational commitment. Journal of World Business. 46. 221-233. 10.1016/j.jwb.2010.11.003.

33. Kanning, U. & Hill, A. (2013). Validation of the Organizational Commitment Questionnaire (OCQ) in six Languages. Journal of Business and Media Psychology 2 (4), 11-20

34. Kaur, P. & Mittal, A. (2020). Meaningfulness of Work and Employee Engagement: The Role of Affective Commitment. The Open Psychology Journal (Vol. 13). https://10.2174/1874350102013010115

35. Khan, M., Jam, F. & Ramay, M. (2016). The Impacts of Organizational Commitment on Employee Job Performance. European Journal of Social Sciences

36. Kwon. I., & Banks. D. (2004). Factors Related to the Organizational and Professional Commitment of Intemal Auditors, Managerial Auditing Journal, 19(5), 606-622

37. Lam, T. & Zhang. H. (2003). Job Satisfaction and Organizational Commitment in the HongKong fast Food Industry. International journal of contemporary hospitality management, 15(4), 214-220

38. Lew. T. (2012). Perceived organizational support: Linking Human Resource Management Practices with affective commitment. Professional commitment and Turnover intention. Journal of International management studies.

39. Mathews, B. P., & Shepherd. J. (2002). Dimensionality of Cook and Wall's (1980). British Organizational Commitment Scale Revisited. Journal of Occupational and Organizational Psychology. pp.369-375.

40. Maric, M.. Samsudin. P. & Mamat, A. (2019). Job Characteristics and Organizational Citizenship Behavior. A Multisource Study on the Role of Work Engagement. Journal of Applied Social Psychology

41. Meyer, J. and Allen, N. (2015). The impact of workplace spirituality on Organizational commitment at schools: the moderating effect of gender.

42. Mowday. R. & Steers, M. (2004). The measurement of organizational commitment. Journal of Vocational Behavior. 14 (2). 224-247

43. Millette, V. & Gagne. M. (2008). Designing volunteers' tasks to maximize motivation, satisfaction and performance: The impact of job characteristicsonvolunteer engagement. Motiv Emot 32, 11-22. https://doi.org/10.1007/s11031-007-9079-4

44. Molenberghs, G. (2020). Survey Methods and Sampling Techniques. Interuniversity Institute for Biometrics and Statistical Bioinformatics. Belgium

45. Naqvi, S. (2013). Impact of Job Autonomy on Organizational Commitment and Job Satisfaction: The Moderating Role of Organizational Culture in Fast Food Sector of Pakistan. International Journal of Business and Management, 8, 92-102.

46. Nasser, R. (2005). A Method for Social Scientists to Adapt Instruments From One Culture to Another: The Case of the Job Descriptive Index. Journal of Social Sciences. 1. 10.3844/jssp.2005.232.237.

47. Nawaz, A., Rehman, K., Naveed, S. & Sattar. A. (2013). Impacts of JobSatisfaction on Organizational Commitment: A Theoretical Model for Academicians in HEI of Developing Countries like Pakistan. International Journal of Academic Research in Economics and Management and Sciences

48. Malik, B. (2015). A study on the impact of job Characteristics on key attitudes of Faculty members in professional Educational institutes. European Scientific Journal, 11(16), 1857-7431

49. Orlando. E., Brown, P., Wilson, C., Forcheh, A., Linn, L. & Foko, A. (2019). For example. Bentein and Stinglhamber (2019). The affective commitment in a University in Botswana. International Journal of Education Administration and Policy Studies.

50. Ozturk. A.B., Hancer, H. & Im. A. (2014). Job characteristics, job satisfaction, and organizational commitment for hotel workers in Turkey. Journal of Hospitality and Management.

51. Rajak, B. & Pandey, M. (2017). Exploring the relationship between job commitment and job satisfaction through a review of literature. Journal of Vocational Behavior

52. Rainayee, R. (2013). Exploring a Common Theme of Organizational Commitment: A Way to Consesusness. Pacific Business Review International. 6(1).

53. Raihan, T. (2020). Role of Job Characteristics Model on Employee Job Satisfaction- An Empirical Study.

54. Sheng W. L. (2007). Personal Characteristics, Job Characteristics, Job Satisfaction, and Organizational Commitment of Taiwanese Expatriates Working in Mainland China. Lynn University

55. Salami, O. S. (2008). Demographic and psychological factors predicting   organizational commitment among industrial workers. Journal for Educational and Anthropologist, 10(1) 31 38.

56. Samsudin & Mamat (2019) Implementasi framework cobit 2019 terhadap tata kelola teknologi informasi pada balai penelitian sungei putih.

57. Saud, T. (2020). The Effect of Job Characteristics on Organizational Commitment:The Role of Growth Need Strength in Nepali IT Companies. Journal of Business and Management Research, 3(1-2)

58. Sharma, P. & Sinha, V. (2015). The Influence of Accupational Rankon Organizational Commitment of Faculty Members. Management Journal

59. Sheng (2017) Correction: Synthesis of a monodisperse well-defined core-shell magnetic molecularly-imprented polymer prior to LC-MS/MS for fast and sensitive determination of mycotoxin residues in rice (Analytical Methods) 9

60. Sims, H., Szilagyi, E. & Keller, R. (2017). The Measurement of JobCharacteristics. Academy of Management Journal. 19(2). https://doi.org/10.5465/255772

61. Slattery, J. (2010). Relationship Between Job Characteristics and Attitudes: A Study of Temporary Employees. Journal of Applied Social Psychology.

62. Sonnentag, S. (2017). A task-level perspective on work engagement: A new approach that helps to differentiate the concepts of engagement and burnout. Burnout Research, 5, 12-20.

63. Tarik, R. (2020). Role of Job Characteristics Model on Employee Job Satisfaction- An Empirical Study.

64. Wadhwa, S., et al. (2021). Organizational Commitment: A Study on Faculty Members of Technical Institutes in Bhilai and Durg Region. International Joumal of Management Research and Development (IJMRD).1 (2), https://ssrn.com/abstract=3537426

65. Williams. D. (2009). The Relationship of Principal Leadership Behaviors with   School limate, Teacher Job Satisfaction, and Student Achievement. Published Dissertation. The University of Southern Mississippi

66. Yao, X. & Wang. L. (2006). The predictability of normative organizational commitment for turnover in Chinese companies: A cultural perspective. International Management. 17. 1058-1075 Journal of   Human Resource

67. Yen. B., (2020). The significance of task significance: job performance effects, relational mechanisms, and boundary conditions. Journal of Applied Psychology, 93(1), 108-124

68. Yen, B., Cheng, Y. & Hung, W. (2007). The Influence of Job Characteristics on Job Outcomes of Pharmacists in Hospital, Clinic, and Community Pharmacies. Journal of medical systems. 31. 224-9. 10.1007/s10916- 007-9059-y.

69. Yen, L., Yeh, C., & Lin, H. (2018). The Influence of Job Characteristics on Job Outcomes. Journal of medical systems, 31, 224-9

70. Youyan, N. (2013). Extending antecedents of achievement goals: The double-edged sword effect of social-oriented achievement motive and gender differences. Learning and Individual Differences. 23. 249-255

71. Vanderberghe, C., Mignonac, K. & Manville, C. (2014). When normative commitment leads to lower well-being and reduced performance. SAGE Journals

72. Volini, E., Schwartz, J., et al. (2019). Leading the social interprise: Reinvent the social forms. Deloitte Global Human Cspital Trend.

73. Zhang, Y. L. (2016) Establishment of the mixed linear model method for genome-wide association studies. Journal of International Students.117