ASSESSMENT OF REQUISITE KNOWLEDGE AND ITS IMPACT ON THE ACADEMIC PERFORMANCE OF POLITICAL SCIENCE GRADUATES OF THE UNIVERSITY OF ABUJA

Abubakar Aliyu Bafeto,

The The University of Abuja, Department of Political Science, Gwagwalada, Nigeria bafetoa@gmail.com

Abstract

The objective of the study is to make an assessment of Requisite Knowledge and its Impact on the Academic Performance of Political Science Graduates of the The University of Abuja. The main objective of the study is to examine whether academic performance of political science graduates of The University of Abuja is premised on the requisite knowledge in English Language, Government, Economics and Mathematics. Sample of 400 Political Science graduates between 2014 and 2020 were drawn through a convenient sampling procedure from the population of 1010 graduates. Secondary data were collected from the database of the Political Science Department of the University. A multivariate linear regression model using ordinary least-square (OLS) was used to analyze the data collected. Findings reveal that requisite knowledge of English Language and Government significantly influence academic performance positively at 1% level while, Mathematics is significant at 10%. However, requisite knowledge in mathematics was found to be insignificant. The study recommends that JAMB, NUC and university management should continue to concentrate more on requisite knowledge in English Language, Government and Economics as requisites knowledge for admission into political science in the The University of Abuja for an enhanced optimal performance.

Keywords: Academic Performance, Requisite Knowledge, Multivariate Regression Model.

DOI: 10.31039/jgss.v2i8.12

1. Background to the Study

Higher education research has always been concerned with the predication of academic performance to improve teaching and enhance the self-awareness of students (Keeper & Vander Flier 2012; in recent years the predication of academic performance in social science related fields in particular has gained increasing interest due to continued dropout rate and the declining numbers of students majoring in different fields (Eurostar, 2016). The identification of good predication of first year grades could lead to effective support for at-risk student by

adjusted training and course guidance. This applies even more, since 100 level students themselves has proven to be good predictor of the final year graduates. (Barron, Taller & Eliot, 2002). A variety of underlying factors has been discussed as reasons for increased social science performance or dropout such as demographic, personal and attitudinal factors (Chen & Soldner, 2013). However, one of the most powerful cognitive predictor of academic performance in general is requisite knowledge.

There is a renewed interest by stakeholders in the educational sector and the world over to understand the impact of requisite knowledge on the academic performance of university graduates in various academic disciplines. This is necessary as a result of the increasing employer's preference of graduates with high-level performance competencies, this emphasis cuts across the various disciplines (Kukreja & Al Aali, 2013). The Political Science Department of the The University of Abuja is not left out in the this quest for requisite knowledge that will prepare its graduates for the labour market so as to meet up with the NUC and University's minimum Benchmarks as well as country's employers demand of graduates with the necessary capacities to contribute meaningfully towards the attainment of the goals and objectives of organizations.

However, several studies have been carried out in different countries to examine the predictive power of requisite knowledge in relation to academic performance of graduates (Bergin & Reilly, 2006: Byrne & Flood, 2008; Kukreja & Al Aali, 2013). These studies have only investigated the impact of requisite knowledge in English Language on students' performance (Warburton, Bugarin, & Nunez 2001; Du Plessis, Müller & Prinsloo 2005) Other researchers concentrate on the influence of requisite knowledge in Mathematics or Economics or Accounting on learning outcome of accounting graduates. It is noteworthy that most of these studies have been limited to advanced economies such as the United kingdom Duff, 2004; Italy Castagnetti and Rosti, 2009; Singapore; Seow, Pan, Tay, 2014 and other developed economies. To the best of my knowledge little or no studies has been conducted on the impact of requisite knowledge in English Language, Government, Economics and Mathematics on the academic performance of political science graduates of The University of Abuja which this study is designed to accomplished.

It is in view of the importance of requisite knowledge to the performance of graduates that this study was conducted with the major objective of determining whether the academic performance of Political Science graduates is premised upon requisite knowledge in English Language, Government, Economics and Mathematics. Determining this will be of great significance to the Political Science Department, National Universities Commission, The University of Abuja Management, Students and other Stakeholders in the educational sector as the study will help in policy formulation and quality assurance measures for productive results.

As part of the limitations of the study, the findings of the study cannot be generalized, as it focuses only on the University of Abuja Political Science graduates rather than the University of Abuja as a whole or even Nigerian Universities this is in view of time and resource constraints and the lack of disclosure of important information which are considered confidential.

1.2. Research Assumptions

H₀ Requisite knowledge of English language, government, economic and mathematics des not have any significant effect on the academic performance of political science graduates of The University of Abuja.

2. Review of related literature

2.1. Requisite knowledge

Requisite knowledge is the prior knowledge students attain as qualifications for gaining admission to read a particular course in the university. Specifically, they are the knowledge acquired and gained at secondary schools in different subjects. Most studies like Gammie, Jones and Robertson-Millar (2003); Duff (2004); and Byrne and Flood, (2008) suggest that previous academic performance a significant indicator of university performance. In fact, they maintained that prior academic performance is the most significant determinant of performance throughout the students' degree studies.

2.1.2. What is Academic Performance?

Academic performance is often defined as student's grades in certain course at university or as cumulative measure (Grade point average) or pass/fail information. (Taisadier & Mintzes, 2006) For analysis, we define academic performance as a conglomeration of success in the

subject specific exams of student, because requisite knowledge test can only be valid predictors for subject-specific performance, we define students who passed all those exams as successful students.

2.2. Requisite knowledge; its pertinent relationship for academic performance

Conceptual knowledge represent facts, principles, rules, framework and basic skills acquired by students in the course of their secondary school education. Conceptual knowledge is obtained by students from the subjects school education. This studies has argued with the requisite knowledge relating to a course of the study, perform better than students without such knowledge (Ballester, 2012).

However, knowledge obtained at the secondary level is only conceptual to the extent that its clearly corresponds to university curricular.

Requisite knowledge has a positive impact in the performance of students in their various course as it serves as compendium of a student's knowledge obtained before learning account in university. Studies have been conducted linking requisite knowledge of students in tertiary institutions.

Byrne and Flood (2008) in a study of Irish University, found that prior knowledge contributes to academic performance of first year accounting students. Ballester (2012) studied the performance of students in financial accounting at the university of autonomade de Barcelona in Spain and found that previous knowledge positively and significantly influence academic productivity. Awoniyi and Awoniyi (2014) studied entry criteria as a measure of requisite knowledge on performance in Business programme in Zimbawa and found that some entry criteria predict academic performance.

Some studies however, are contradictory, such as those of Adewale and Adhuze (2014) who asserts that requisite entry qualification of students has an insignificant contribution of their performance in architectural studies. Abisuga et al (2015) concluded in their study that a weak relationship between requisite requirements and performance studies of building technology programme. Yusuf et al (2016) also found that maximum requisite has insignificant impact on the performance of students in first accounting officer.

Also, metacognitive knowledge which involve students' ability and potential toward learning in a given space is a reflection of students cognitive potentials, enthusiasm and personality that enhance academic performance (Ballester, 2012). A proof ha also been established that metacognitive knowledge impact on academic performance on students performance.

Sorge, Petersen and Meumamn (2016) found that requisite knowledge in Physics test out to perform the higher school GPA and the higher school physics grade as a predictor for physics achievement at the university. Therefore, higher school grades in specific subject is a useful predictor of academic performance at different subjects. However, it is rather subject – unspecific and combine knowledge of subject with genera knowledge and cognitive potentialities. This suggest that prediction studies should consider secondary school grades as a control variable in order to find more precise and specific predictors for performance.

In addition to secondary school grades, a variety of indicators for subject-specific knowledge have been used for the prognosis of performance in social sciences and science. For science, (biology, physics and chemistry) for social science (Government, Economics, English), indicators of subject-specific requisite knowledge seem to enhance performance of students in these field.

Nevertheless, findings also indicated that certain types of requisite knowledge (e.g deep understanding) could be better predictors for academic performance than other type (e.g memorized factor) Therefore, a systematic comparison of different requisite knowledge types, based on theoretical knowledge, as predictors for performance seems beneficial to student. (Loehr et al 2012).

The importance of English has been of interest to accounting researchers because of the global usage of the language. For instance, Gul and Fong (1993) studied a first-year university accounting course that was taught in both English and Chinese, they found that students who attended English secondary school outperformed those who attended a Chinese secondary school. Scores from high school have been found to be a strong predictor of college glades. About 9 of 10 (87 percent) students who complete 4 years of English in high school stay on track to graduate from college compared with a 62 percent persistence rate among those who do not complete their coursework. However, in a study of Australian university, the study of Jackling and Anderson (1998) revealed that English language did not significantly affect results. Du Plessis, Müller and Prinsloo (2005) concur with this in a study involving first-year

accounting course at a South African distance education university. In the light of these, we proposed the first hypothesis.

Adelman (1999) maintained that students with 'A' level mathematics perform better statistically, in the computational and quantitative courses. Also, Koh and Koh (1999) found background in mathematics as one of the six variables that impact student performance. More so, Evans and Farley (1998) showed that grades in high school mathematics are positively and significantly related to student performance.

The studies of Dolado and Morales (2009), Pozo and Stull (2006) revealed that students' prior knowledge is one of the most important variables enhancing learning outcomes. This is a conceptual knowledge which includes facts, principles and basic skills among others which students are expected to have acquired during secondary education.

2.3. Theoretical Framework

The theoretical base for this study is the Constructivism theory of knowledge. The theory argues that humans generate knowledge and meaning from an interaction between their requisite knowledge and their experiences (Piaget, 1967). It has influenced a number of disciplines, including psychology, sociology, education and the history of science. According to Tamir (1996), the correlation between clystallised intelligence and achievement goes a long way to explain the link between requisite knowledge and academic achievement. Although it is true that the extent to which students will learn new content is dependent on a number of factors, research has confirmed that what students already know about the content is one of the strongest indicators of how well they will learn the new information Marzano, 2004).

3.1. Research Design

The population of the study is composed of all political science graduates from The University of Abuja for the periods of six academic sessions from 2014-2020. This period is considered appropriate because the needed data for this study are available between these periods. More so, student's information are expected to be kept for a minimum period of five years. Also, only students who graduated within the normal allowable period of four years throughout the period of study were considered for the study.

The study only used secondary data. The was sourced specifically from the department of political science database. This database gives the full profiles of students. Apart from the demographic data of students, the database give the actual grades students have in their requisite subjects. Also, data relating to academic performance of graduates in form of Cumulative Grade Point Average (CGPA) of sampled observations for all the period under review were equally collected from the department.

3.2. Variables measured and model

To determine the predictive power of requisite knowledge of Government, English, mathematics and Economics on the academic performance of political science graduates, the study employed a multivariate regression analysis. The ordinary least square regression was performed with CGP as the dependent variable, while the explanatory variables include grades in Government, English, mathematics and Economics The model is provided below:

$$AA \alpha + \beta BEng + \delta B.Govt + \gamma B.Eco + \Delta B.Math + eit$$

AA Represents academic achievement, While azit are the intercept and the error term respectively. While g, d, Y, and a are the coefficients of variables under consideration. Academic performance is the students' academic performance over the whole degree programme which is measured by the final cumulative grade point average (CGPA) score. The CGPA is the quotient of total grade points divided by total courses attempted. The CGPA is classified into five. First Class (4.50-5.00), Second Class Upper (3.50-4.49), Second Class Lower (2.40-3.49), Third Class (1.50 — 2.39) and Pass (1.00—1.49). First Class was given a value of 5. Second Class Upper and Second Class Lower were given values of 4 and 3 respectively. The remaining classifications were given values of 2 and 1 respectively.

Requisite knowledge in Government, English, and Economics were measured by student grades in WAEC or NECO or equivalent. The standard scaling of 5 point for Al, 4 point for B I-B3, 3 point for C4-C6 was used for analysis. Where a student has dual results with different grades, the higher grade was considered. A dummy variable is used as measurement of requisite knowledge in accounting. One (l) was used for candidates with requisite knowledge in mathematics and 0 for candidates without requisite knowledge in political science. This coding was employed because requisite knowledge in mathematics is not a prerequisite entrance qualification.

4. Discussions of Results

The results of this study are presented in three sub-sections. The first sub-section displays the descriptive statistics. The second sub-section presents the correlation variables used in the regression analysis and the third sub-section discusses the regression results.

In Table 1, report of the summary statistics of the variables used in the econometric analysis for the whole sample is displayed. The table shows the mean values of about 3.30, 3.90, 4.20, 4.12 and 0.80 for academic achievement, requisite knowledge in English language, Government, Economics and Mathematics respectively. These results indicate that on average, the graduates under consideration graduated with second class lower. On average 80% of the sampled considered have requisite knowledge in Mathematics.

Requisite Statistics

We begin our analysis with an examination of some of the summary statistics and present some basic features of the sample.

Table 1: Summary of Sample Statistics

	Descriptive Statistics					
Variables	N	Minimum	Maximum	Mean	Std Deviation	
Academic performance(AA)	400	3.00	5.00	3.30	0.47012	
Requisite knowledge in English Language (BEng)	400	3.00	5.00	3.90	0.52579	
Requisite knowledge in Government (B.Govt)	400	3.00	5.00	4.20	0.67511	
Requisite knowledge in Economics (BEco)	400	3.00	5.00	4.12	0.75786	
Requisite knowledge in Mathematics (BMat)	400	0.00	1.00	0.80	0.46409	

Source: SPSS Output Result.

4.2. Correlation Statistics

In Table 2, we present the correlation matrix of our variables of interest. A correlation matrix permits the measurement of the strength of the linear relationship between variables.

Table 2: Correlation Matrix

Variable	AA	B.Eng	B. Govt	B.Eco	B. Maths
AA	1				
B.Eng	0.761*	1			
B.Govt	0.601*	0.832* *	1		
B.Eco	0. 853*	0.721 **	0.661*	1	
BMat	0.322	0.652*	0.532	0.453	1

Source: SPSS Output Result * and ** indicate that values are significant at 1% and 5% respectively (1-tailed).

The correlation between requisite knowledge in Mathematics, English Language and Economics is strongly related to academic performance at I percent significance level. This signifies that requisite knowledge in Mathematics, English Language and Economics engender academic performance positively. English langua.ge has the highest coefficient of about 85% accounting for more relationship with academic achievement. However, the requisite knowledge in Mathematics is not significant at any acceptable level.

4.3 Empirical Result

In this section, we present and analyze the relationship between academic performance and requisite knowledge using the methodology earlier specified. Table 3 shows the regression result for the model.

Table 3: Regression Result^a

Varia ble	Intercept	BEng	BGovt	BEco	B.Math	Adj R ²	F- Statics
	0.0121	0.1847*	0.0754**	0.2403*	0.0024		119.0*
	(1.4563)	(5222)	(4.4760)	(2.7142)	(0.3453)	0.6565	

Source: SPSS output Result

a T- Statistics are in parentheses.

and ** indicate that values are significant at 1% and 5% respectively (1-tailed).

The above table shows the summary of regression result for the effects of requisite knowledge on academic performance of political science graduate. The estimated linear relationship of the model is AA 0.0121 + 0.1847BEng + 0.0754BGovt + 0.2403BEco + 0.0024BMath. The results indicate that all the requisite knowledge considered, significantly determine academic performance positively at 1% percent level except Mathematics which is significant 10%. However, requisite knowledge in mathematics is not statistically significant at any acceptable significance level. This indicates that requisite knowledge in mathematics does not influence academic performance of political science graduates.

Furthermore, the results also show the coefficient of determination for the model. This coefficient measures the proportion of the total variation in the academic performance that is explained by requisite knowledge. Precisely, the adjusted R-squared for the model is about 66%. This coefficient evidenced that the model is well fitted, as 66% of the total variation in academic performance has been explained by the variation in the variables considered.

The regression result as explained above provides evidence for the rejection of the hypotheses formulated. The result clearly shows that requisite knowledge in English Language, Government and Economics significantly determine academic performance of political science graduates with English Language having the higher impact. The implication of this result is in two folds. First, the result suggests that there is a direct relationship between academic performance and this three requisite knowledge. This suggests that the level of academic performance in political science - largely depends on requisite knowledge in English Language, Government and Economics. Second, the coefficient of requisite knowledge in Economics is higher with a value of about 24% followed by English Language with a value of about 18%.

Possible explanation for this is that political science emanates from Economics as the mother of all social courses. Also, the possible reason while English Language followed is because it is the Language of instruction which students used as medium of communication throughout the period of their study. Finally, Government has the least value among the three significance variables because not all courses required political economic ideas especially the borrowed ones.

5. Conclusion and Recommendations

5.1. Conclusion

The major objective of this study is to assess whether academic performance of political science graduates is predicated upon requisite knowledge identified. Our regression results show that requisite knowledge in English Language, Government and Economic engender positive statistically significant effect on academic performance of accounting graduates. Based on these results, we rejected our hypotheses and concluded that there is a significant direct relationship between requisite knowledge in English Language, Mathematics and Economic on one hand and academic performance of political science graduates on the other hand. However, the regression results show that requisite knowledge in mathematics does not determine the academic performance significantly. Based on this, we concluded that requisite knowledge in mathematics does not determine the academic performance of political science graduates of the the University of Abuja.

5.2. Recommendations

The study recommended that Students intending to study political science in the University of Abuja should take English Language, Government and Economics seriously and to enhance their potentiality in them as it have been establish to be determinant factors that influence academic performance. NUC, JAMB and university management should continue to be strict on their position on English Language, Government and Economics as a prerequisite for admitting students into political science programmes in the University of Abuja.

5.3. Suggestions for Further Studies

The study cannot be generalized as it only focused on political science of The University of Abuja. Also, the study only considered prior knowledge without considering other determining factors. Therefore, further studies are recommended by considering all universities in Nigeria and to explore the influence of other factors such as family background, social class, academic learning environmental and school facilities on academic performance of political science graduates.

REFERENCES

- Adelman, C. (1999). Answe in the toolbox: Academic Intensity, Attendance patterns and Bachelor's degree attainment. US Department of Education Washington DC: Office of Educational Research and Improvement.
- Adewale P.O. and Adhuze (2014) Entry qualification and academic performance of architecture students in Nigeria polytechnic are the admission requirement still relevant? Frontiers of Architectural Research, Vol.3, PP 69-75
- Adewale, P.O and Adhuze (2014) Entry Qualification and academic performance of Artitectur Students in Nigeria polytechnics "Are the admission requirement still relevant? Frontier of Architectural Research Vol 3 pp 69-95".
- Awoniyi, S.A. Awonoyi, T.D (2014) "Entry interior as predictor of Academic success: a case study of Solusi University Zimbawe; *European Scientific Journal, Vol. 10, No 13 PP.471-482*".
- Balaster, C.P (2012) Determinant of Student's performance in financial accounting, https://2012.economicofeducation.com/user/professions/007.pdf.
- Ballester, C. P. M. 2012, Determinants of students performance in financial accounting.

- Barrow, M., Reilly, B. & Woodfield, R.2009, The determinants of undergraduate degree perforlnance. how important is gender? British Educational Research Journal http://pempower- daphne.psy.unipd.it/userfiles/file/pdf/Barrow 2009.pdfRetrieved on 20 JanualY 2012.
- Bergin S. & Rally, R. (2006) Predicting, Introduction performances: A multi institutional multivariate study: computer science education 16(4) pp. 203-323
- Byne, M and Flood, B (2003) Examining the relationship among background variables and academic performance of first year accounting students of an Irish University; *Journal of Accounting Education vol.* 26, No 4, pp.202-2012.
- Byrne, M. & Flood B. 2008, Examining the relationships among background variables and. academic performance of first year accounting students at an Irish university. Journal of Accounting Education, 26, PP. 202-212.
- Castagnelti, C. & Rosti, L. 2009, Effort allocation in tournament: the effect of gender on Italian graduate performance. Economics of Education Review, 26, pp. 367-369.
- Charker, M. N. & Abdullah, T. A. T.2012, What accounting skills are aquiired at college? International Journal of Business and Social Science, 2(18).
- Chen X., & Soldner, M. (2013) STEM attrition: College students paths into and out of STEM field, statistical analysis report (NCES 2014-001) National Centre for education statistics, institution of Education, sciences, U.S.
- Cory, S. N. & Pruske, K. A.2012, Necessary skills for accounting graduates: An exploratory study to determine what the profession wants. Proceedings of ÅSBBS, 19(1), 208-218.
- Dolado, J. J. & Morales, E. 2009, Which factors determine academic performance ofeconomics freshers? Some Spanish evidence. Investigaciones Econâmicas, 33(2), 179-210.
- Du Plessis, A., Müller, H. & Prinsloo, P. 2005, Determining the profile of the successful first-year accounting student. SouthAfrican Journal ofHigher Education, 19(4), 684-698.

- Duff, A. 2004, Understanding academic performance and progression of first-year accounting and business economics undergraduate: The role of approaches to learning and prior academic achievement. Accounting Education: An International Journal, 13(4) pp. 409-430.
- Eurostat (2016) Tertiary education statistics https://e;ieuropa.eu/Eurostat/statistics.
- Evans, M. & Alan, F. 1998, Institutional characteristics and the relationship between students' first-year university and final-year secondary school academic performance.

 Retrieved from: http: GoBack_GoBacW/wwwbuseco.monash.

 edu.au/ebs/pubs/wpapers/1998/1618-98.php on 20 January2012
- Gammie, E., Jones, P., & Robertson-Millar, C. 2003, Accountancy undergraduate performance: A statistical model. Accounting Education: An Internation.al Journal, 12(1), 63-78.
- Gracia, L. & Jenkins, L. 2002, An exploration of student failure on an undergraduate accounting programme of study. Accounting Education, I), 93-107.
- Gul, F.A. & Fong, S.C.C. 1993, Predicting success for introductory accounting students: S01ne further Hong Kong evidence. Accounting Education, 2(I), 33-42.
- Jackling, B. & Anderson, A. 1998, Study mode, general ability and performance in accounting: A research An international Journal, 1, 33-42.
- Karim, R. & Ibrahim, M. 1992, The performance of male versus female accounting students. Advances in International Accounting, 5(7), 255 262.
- Kharfi, S. 2008, Economics education in the Middle East: Are the determinant of success in introductory Economics any difference? Journal of Economic Education, 39(1), 22-40
- Knight, P. & Yorke, M. 2004, Learning, curriculum and employability in Higher Education. London: Routledge Falmer.
- Kukreja, G. & Al Aali, H. M. 2013, The determinants of students' performance in introductory accounting courses: Evidence from kingdom of Bahrain. Journal of Emerging Issues in Economics, Finance and Banking, 1(3).

- Loehr, J.F Almarode, J.T, Tai R.H., & Sodler, P.M (2012) High school and College biology:

 A multilevel model of the effect of high school course on Introduction course performance journel of biological education 46, 165-172

 https://dio.ord/10/080/00219266.2011.017767
- Marzano, R. J. 2004, Building Requisite knowledge for Academic

 Achievementhttp://www.ascd.org/publications/books/104017/chapters/TheImportance-of- Background-Knowledge.aspx
- McKenzie, K. & Gow, K. 2004, Exploring first-year academic performancethrough structural equation modeling. Learning and individual Differences, 14. 107-123.
- Piaget, J. (1967). Biologieetconnaissance (Biology and knowledge), Paris: Gallimard.
- Pozo, S. & Stull, C. 2006, Requiring a math skills unit: Result of a randomized experiment. American Economic Review, 96(2).437-441.
- Ramadan, S., & Quraan, A. 1994, Determinants of students' pertbrmance in introductory accounting courses. Journal of King Saud University, Administrative Sciences, 6(2), 65-80.
- Rohde, F. H. & Kavanagh, M. 1996, Performance in first year university accounting:

 Quantifying the advantage of secondary school accounting, Accounting and Finance 3
 6, 275-285.
- Serge, S. Peterson, S. & Neumann (2016) The relevance of the study of capacity for success in introductory physics course. Journal of Natural Science 22(1), 165-180.
- Tai, R.H, Sadier, P.M, & Mintzes J.J. (2006) factors influencing college science success. Journal of college teaching 36,5-66.
- Tamir, J. 1996, Closing the Achievement Gap: A Vision for Changing Beliefs and Practices, https://books.google.com.ng.
- Warbouruton, E.C. Burgarin, R., & Nunez, A. Nunez, A., (2001) Bridging the gap: academic preparation and post secondary success of first generation students. Educational statistics quarterly, 3(3) 72-77.

Assessment of Requisite Knowledge and its Impact on the Academic Performance of Political Science ...

- Warburton, E. C., Bugarin, R., & Nuöez, A. M. 2001, Bridging the gap: Academic preparation and postsecondary success of first-generation students. Education Statistics Quarterly, 3(3), 73-77.
- Yusuf, I. Joseph S., and Okpe, J.U (2016) Entry qualification and Academic performance of First year students in Federal university Dutsin-Ma', Accounting Education, Research and practice proceeding of the NAA conference, pp.1-10.