

Inclination of the Australian Indigenous Students in Obtaining Tertiary Education in Australian Universities

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The indigenous group of people in Australia comprises of Aboriginal and Torres Straits Island citizens. The government of Australia has a poor record when it comes to treating the indigenous group of people. There is a wide diversity among the different communities and societies in indigenous Australians which combines with a mixture of cultures, customs and languages. This indigenous group of population makes up of much younger generation compared to the non-indigenous group due to a high rate of births and deaths. The indigenous group of students generally leave school at an earlier age or live with a lower standard of education compared to their other cohorts. The performance of students have been found to be much inferior in the national literacy and numeracy in primary and secondary schools. Overall the indigenous group of Australian students choosing higher education only make up of a very small percent of the total student population in Australia. The literature probes into concepts and conceptualisation of the theories and has proposed a theoretical framework identifying the research issues and the research gap. The research design consists of developing a hypothetical with tertiary education as the independent variables to test the dependent variable of attitudes of indigenous students and the moderating variable being cultural and government support. The methodology employed is purely quantitative which includes random sample of students from first year university indigenous Australian students in the state of New South Wales, Australia. Data collection is proposed using a questionnaire survey and analysed through SPSS version 22.0, SmartPLS 3.0 and Moderated Structural Equation Modeling, Amos version 22.0.

Keywords: Tertiary education, Indigenous students, cultural factors, government support, attitudes.

1. Introduction

Australia has a multicultural society with 2.5% of Indigenous group of people (ABS 2012). Having sound literacy and numeracy skills to succeed academically and gaining desirable employment is a prerequisite for all groups of people worldwide. Indigenous group of people in Australia comprises of two communities; the Aboriginal and the Torres Islanders. The education system in Australia has not been able to accommodate many values, attitudes, codes and institutions of the Aboriginal and Torres Islander society. The participation of the indigenous Australians in achieving a good education system, as defined by the wider Australian Society has been limited and this has restricted the choices available to them for a viable education in the Australian society (Johnston 1991). The Australian government has introduced a multiplicity of approaches and policies for the education of the indigenous group to seize the gap in educational opportunities and outcomes for this group.

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The approaches and policies have to be embedded into the education system for the Indigenous group, which would facilitate a more critical understanding of the educational needs of this group of highly disadvantaged students and the efforts of the official responses that is adequate to improve the outcomes (Beresford and Gray 2006).

Higher education prepares educated people not only for employment and leadership roles, but plays a vital role in health, education and economic outcomes for the indigenous community (Hunter and Schwab 2003). The increasing indigenous participation in higher education are seen as crucial factors in reducing indigenous disadvantage (IHEAC 2006). Without higher education it is impossible to overcome social issues such as substance abuse, overrepresentation in goals, and health problems that have occurred as a result of the displacement of Indigenous people (CSHE 2008). Though many efforts have been made by Australian universities to combat the issues of low participation rates of the Indigenous Australians, the current state of indigenous education is still in crisis. The institutional outcomes are categorised into two categories: those with high enrolment and low completions and low enrolment but with high completions (Pechenkina Kowal et al., 2011). The pattern of indigenous outcomes also reflects a system-wide issue which is relatively a small pool of indigenous Australians, with adequate preparation for tertiary education. Indigenous students attrition, retention and completion rates remain as areas of concern (Asmar et. al., 2015).

Recent trends have indicated that the number of indigenous students in higher education has declined. The IHEAC (2006) report stated that only 3% of the indigenous Australian students complete a university degree, with only 0.5% completing a PhD degree. The number of the indigenous graduates in Australia did not increase from 1996 to 2001. Though the number of indigenous students participating in higher studies increased by 20.8% from 2001 to 2011, but compared to the rates of non-indigenous students which also increased, it made up of 1.3% of the overall group (IHEAC 2006), leaving a gap in the literature. The research focuses on determining the factors contributing to the low rates of Australian indigenous students in higher education in universities.

Research findings from previous studies stated that indigenous Australian students were dissatisfied over the higher education due to insensitivity towards culture, discrimination, racism and lack of content in the university curriculum. (Australian Survey of Student Engagement 2011). Other factors relate to low socio-economic status and poor health (Wilson et al. 2011). The preliminary findings of this research identifies pathways to higher education focusing on indigenous culture in the educational curricula, academic support and university management with cultural factors embedded and financial support through scholarship programs and assistance to students from remote and rural areas (IHEAC 2011).

The paper is organised into six sections. Section one provides introduction to the topic. Section two discusses the literature review that explores the attitudes of indigenous Australian students for tertiary education and five models related to the theories are described. The contingency theory is used in this model where socio-cultural or personal factors act as moderating factors to test the low levels of entry into tertiary education (Jones 2002), and government support. A theoretical framework is proposed to test the model developed for the study. Five hypotheses (educational programs, academic support, university management, cultural factors and government support factors) were developed to test the dependent variable of Australian indigenous students' attitudes towards higher education. Section three discusses the research methodology involving a hypo-deductive approach employing quantitative measurement using statistical analysis is described. A survey method is used to test the questionnaire sample survey analysed through SPSS version 23.0, and Structural

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Equation Modeling techniques using Smart PLS version 3.0 and AMOS version 23.0. Section four describes the research design investigates the research questions and research problems explaining how the questionnaire was designed to test the hypotheses developed for the study. Section five describes the data analysis which explains the analysis proposed to analyse the respondents demographic characteristics; reliability and validity tests and Structural Equation Modeling (SEM) techniques. Lastly, section six provides the preliminary conclusion and findings including the limitations of the study.

2. Literature Review

2.1 Underlying Theories

Review has been made in the past two decades with multiple approaches and policies for the higher education of the indigeneous Australians whereby the country tried to manoeuvre with the gap in educational opportunities and outcomes for this group. These approaches and policies has been drawn into models due to lack of official and academic literature on indigeneous education. This effort facilitates a critical understanding of the the educational needs of the indigeneous group of highly disadvantaged students and the adequacy of the government's efforts to improve the outcomes. The Department of Education, Science and Training (DEST 2004a) sponsored several research projects of aspects of indigeneous education (Beresford and Gray 2006). Several models were identified in indigeneous Australian education and are discussed below:

2.1.1 The Social Justice Model

The social justice model refers to the need to address the structural disadvantages that relate to the progression of students at schools. A range of theoretical perspectives are discussed in relation to the relationship between education and social differentiation (Welch 1996) and the over-representation of indigeneous group as an underclass in Australian society. The latter is common among the urban indigeneous youth (Beresford and Omaji 1996). The model is exemplified by the parallel theories of resistance and alienation, because of the marginalisation status in the Australian society and felt that education is more inclined to the non-indigenous Australian society and passively showed resistance to participation in the processes (Beresford and Partington 2003). The social justice perspective is relevant to the indigenous Australian education needs and studies have highlighted that the group experiences lower incomes, higher rates of unemployment, lower rates of home ownership and have overcrowded living conditions compared to non-indigeneous group of people (Gordon 2002). The social justice model has strong theoretical foundations but it is poorly represented in the official discourse of Australian indigenous education and has not been examined with the context of broader government policy in the Australian indigenous affairs despite many attempts for doing so and has a poorly conceptualised view between the role and operation of education-specific social justice approaches.

2.1.2 The Community Development Model

Indigenous Australian education has been investigated and a consensus obtained that partnerships with the community are crucial for effective improvements. The community development model focused on the needs for partnership between educational institutions and the indigenous communities. Compared to all the states, Queensland education department has a wider community dimension of partnerships. It showed interest for community

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development to achieve a greater progress in indigenous Australian education. In a theoretical statement, (Iffe 2002) noted that there has been a growing interest in community-based programs as an alternative mode for the delivery of human services and meeting human needs. A potential problem which was reduced commitment by the government to the welfare, an increased burden on women and the rise in inequality. Parental Awareness and Indigenous Student Support Programs are introduced to formalise the indigenous Australian parents in school decision-making through the provision of funds to the school committees but there were some difficulties in operating community development projects as the funds were used with little involvement of Indigenous committee members.

2.1.3 Enhanced Coordination Model

The need to improve the coordination between government and non-government services and schools was a major challenge facing the indigenous Australian education. In 2000, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA, 2009a) stated the case strategically for a community development model in indigenous Australian education. The model stated the policy theory that modern governments' are networked as loose-linked organisations with their own strategies, goals and cultures rather than a single hierarchy to command and control (Bridgeman and Davis 2004). The Ministerial Council developed a 'partnership' cube for better coordination and to focus on developing stronger partnerships between the government, communities and education systems to overcome the deficiencies in the delivery of services to the indigenous Australian communities. There was a need for better coordination with the implementation of the National Indigenous English Literacy and Numeracy Strategy, which was then the Government's major initiative in indigenous Australian education. This strategy was a good effort between the Commonwealth states and the territories, as well as non-governmental education providers and the indigenous communities, parents and families (DEST 2004a). Despite all these efforts there were major obstacles facing the government and non-government agencies to meet the needs of indigenous Australian youths. Even the MCEETYA (2009a), with its well-developed framework failed to fully articulate the problems highlighted in studies.

2.1.4 Cultural Recognition Model

To improve the educational outcomes of the indigenous Australian students, there is a need for these students to have access to their own language, learning styles and cultural identity. This understanding is based on the interaction theory which states that through language and symbols, people develop a shared meaning of the world (Beresford and Partington 2003). Official disclosure on indigenous Australian education has a strong focus on this issue which was reviewed by the senate. The central curriculum issue in indigenous education over the past decade has been how to provide a curriculum that is suited academically and culturally relevant to the indigenous Australian students. The review noted the benefits of addressing this core issue: 'Teaching a culturally appropriate curriculum, which recognises and builds upon the cultural and linguistic background of indigenous Australian students, that helps learning across the curriculum. The review's findings reflected many criticisms, such as 'many teachers and curricula have still moved far in these directions' (Senate Employment, Workplace Relations, Small Business and Educational References Committee, 2000). A review from Queensland education departments on indigenous Australian education stated a lack of progress in cultural recognition. It stated that there is lack of support for cross-cultural pedagogy, teachers lack cultural awareness, and that the distribution of education advisers is inequitable (Education Queensland 2000). Similar criticisms were found in the indigenous education in the Northern Territory (Collins 1999).

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2.1.5 School Responsive Model

There is no development of positive relationships between the indigenous Australian students and schools. It was found that the extremely low figures of Indigenous Australian students completing their certificate in education highlighted the crisis factor in the indigenous education and confirmed that low support from schools. The challenges faced by schools in responding the needs of indigenous Australian youths has been the attention of researchers for several decades. (Ogbu 1978) stated that there were lack of clear goals and strategies, lack of prior preparation of local school officials. The 2002 New South Wales Public Education inquiry argued that the strategic problem is how to change the social relations around teaching and learning within the mainstream schooling to engage the indigenous students, strengthen their identity and increase their level of success. A study by Gray and Beresford (2006), noted that teachers lack awareness of social and cultural contexts of indigenous Australian students' lives, their lack of appreciation of equity in their dealings with these students and lack of recognition of their culture and preferred learning styles. The school responsive model takes into account the socioeconomic context of indigenous Australian students, the importance of recognising culture and adapting curricular to suit the indigenous learning needs with the meeting of opportunities and requirements of community participation. These are the key challenges for indigenous Australian education, but little consideration of progress is made at achieving it or the obstacles being experienced. Moreover, there is no qualitative data on the effectiveness of cross-cultural training on the indigenous Australian youths, cultural issues and the effectiveness of the indigenous involvement in school decision-making.

2.1.6 Contingency Theory

This theory is reflected as a class of behavioural theory in this research which claims that there is no best way to lead an organisation or to make a decision. It is a situational approach and the optimal course of action is contingent upon the interest and the external situation. The best way to organise depends on the nature of the environment in which the organisation relates (www.changingminds.org/disciplines/leadership/theories/contingency-theory.htm).

The organisation that can adapt to the environment can survive. The contingency theory model is used for the socio-cultural factors. The indigenous Australian students experience different concepts and barriers from those encountered by non-indigenous students as they come from disadvantaged socio-economic backgrounds, have low personal incomes and lack of family and other network support with tertiary studies (Barney 2013).

The literature discussed some models or theories related to the research on indigenous Australian education. Social justice model addressed the structural disadvantages of students at schools related to social differentiation in the Australian society (Welch 1996). The community development model focused on interest for community development but the projects were a failure due to lack of usage of funds for indigenous involvement, the coordination model stated that there was a lack of coordination between governmental and non-governmental services related to the delivery of services to the Indigenous Australian community (MCEETYA 2009a). Lastly, cultural differences in language, learning styles with cultural identity in the content of curricula and lack of support in pedagogy and cultural awareness were the key challenges for Indigenous Australian education.

The research questions were not addressed by past studies. The present study focuses on educational variables of educational programs, academic or pedagogical support, university

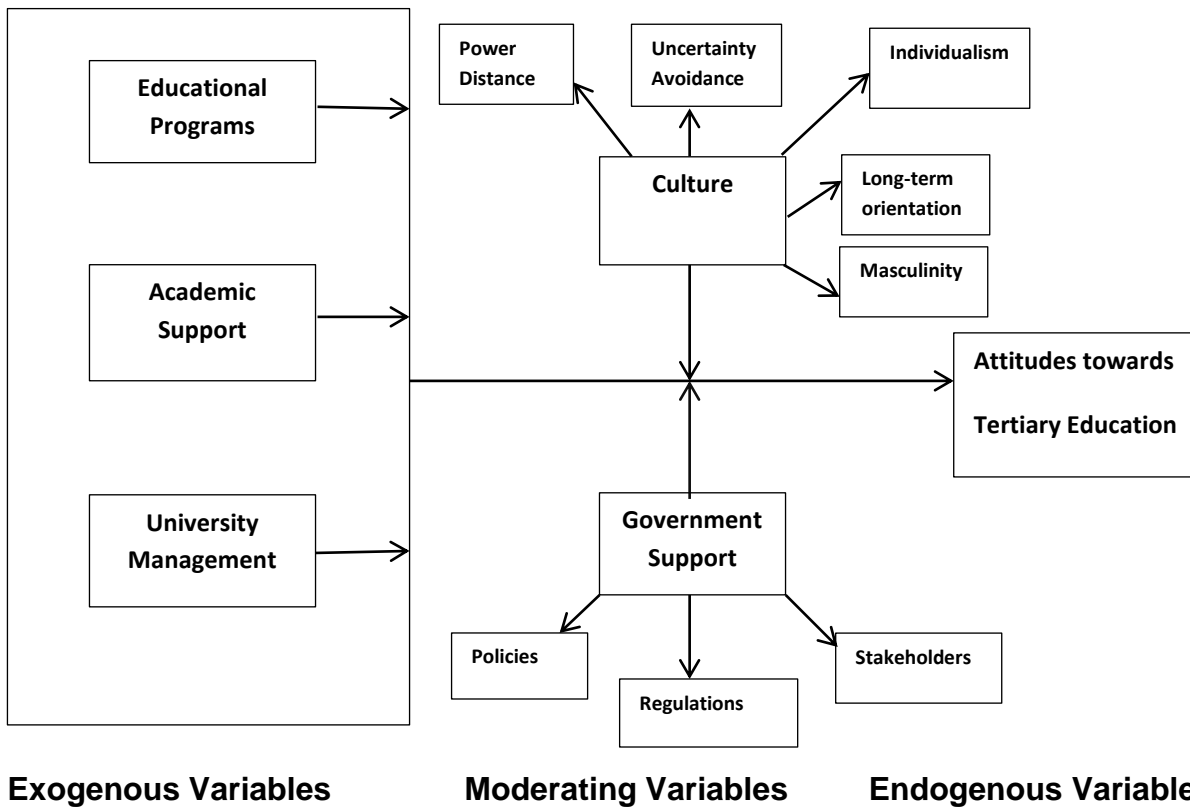
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management with cultural factors relating to the behavioural aspect of the contingency model and the support from the Australian government with regard to policies, regulations and stakeholders to test attitudes of the Indigenous Australian students.

2.2 Conceptual Development to the Hypothetical Model

Higher education is a fundamentally significant contribution to the knowledge and human capabilities and if strategically orientated, it makes a pivotal contribution to the indigenous Australian development. The new paradigm needs successful elements of focusing on educational programs, teaching methodologies employed and the development of institutional strategies within the universities. The requirements fare to develop wide strategy where the indigenous educational strategy is integrated with the core business of the higher institutions (IHEAC 2006). To enhance the indigenous students' aspirations and confidence improving the levels of undergraduate and postgraduate enrolments and overall success rates. The inclusion of social avenues to address the indigenous disadvantage (Skene and Evamy 2009), such as policies drawn by the Australian government to increase the student percentage from low socio economic backgrounds to 20% by 2020. Cultural issues also play a role in indigenous education and clashes are seen between the indigenous and non-indigenous socio-cultural contents and levels of support. Though some of the indigenous Australian students succeed in higher education, some experience feelings of exclusion from the mainstream academic environments (Pechenkina Kowal et al., 2011). Lastly the indigenous students performance in universities is enhanced through the need of access to effective support (Tinto 2008). Ensuring support networks from stakeholders are needed to be centred on the issue of how the indigenous Australian students can be successful in participation towards completion of their programs in universities. The identification and review of the literature led to analysing the research problems and studying the relevant theories and models. A theoretical framework was proposed to test the model developed for the research topic. Five hypotheses were developed in the model with the following variables. The exogenous variables were classified as educational programs, academic support and university management in promoting tertiary education for the indigenous Australian students. The moderating variables included as cultural and government support factors. The endogenous variable is attitude towards tertiary education. Refer Figure 1.

Figure 1: Proposed Hypothesised Model



Source: Developed for the research

2.2.1 Exogenous Variables

2.2.1.1 Educational Programs

The Australian government outlined key strategies to promote a world-class curriculum and strengthening educational accountability and transparency for providing good quality data on student performance and improve student outcomes, (MCEECDYA 2009) cited in (Dempsey and Davies 2013). Education and health were the most popular areas, and less students were found pursuing studies and research in law, business-related studies, architecture, science and other areas. The dominant theme is the need to value and embed indigenous knowledge and perspectives for all levels of the university. Indigenous education through valuing and recognition of indigenous knowledge is the main aim that could benefit the nation as a whole (Australian Council for Educational Research 2011). One of the government’s successful approaches is to address the substantial inequities that exist between indigenous and non-indigenous Australians in higher education. Higher education courses are designed to equip students to work effectively with indigenous people through teaching about racism and inequality but they often encounter resistance (Hollinsworth 2014). The factors that have been well-documented across different institutions, disciplines and programme levels where less consideration of the processes by which indigenous students persist or desist in higher education (Day et al., 2014).

H1: Educational programs has a direct positive effect on the attitudes of Indigenous Australian students towards tertiary education.

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2.2.1.2 Academic Support

More staff in Australian universities are now employed to develop the indigenous Australian education policies and implementing the plans. Nearly all the Australian universities have dedicated indigenous centres now ensuring a conducive learning environment for the indigenous students and staff (Trudgett 2009, Penchienkina Kowal et al., 2011). These centres provide academic and personal support, service, facilities, mentoring, tutoring as well as academic study programs and research skill development for indigenous students. Though there is a valuable support for the indigenous education, some commentators indicate the need for increased support. (Trugett 2009), highlighted that there is a requirement for more indigenous staff members to have tertiary qualifications and academic experience. Researchers commented that the units are too comfortable, not encouraging high achievement and they tend not to attract high quality staff with professional expertise. Limitations on subject areas which degrees can be undertaken and access to online learning and practical classes are some of the barriers.

H2: Teaching methodologies have a direct positive effect on attitudes of Indigenous Australian students' towards tertiary education.

2.2.1.3 University Management

The main aim of Australian universities for indigenous education is to achieve improved retention through 'culturally affirmative' and supportive learning environment for indigenous students (Herbert 2005). The designated support for indigenous students including indigenous centres, contribute to the student well-being and success. But the universities do not have sufficient support to these services and the existence of centres is a disincentive to the appropriate policies for indigenous students (Gunstone 2008). The university needs are to support indigenous students in terms of curriculum development, acknowledge development, values placed on indigenous knowledge and contribution and this support is not on equity issue but core university business (Andersen et al., 2008). Four main strategies to support indigenous Australian education were suggested as: recruitment and highly dedicated academic support staff, strong focus on assisting students beginning the courses, strengthening the role of indigenous centres, ongoing review of the support mechanisms to help the indigenous students (Andersen et al., 2008).

H3: Universitys management has a direct positive effect on inclination of Indigenous Australian students' tertiary education.

2.2.2 Moderating Variables

2.2.2.1 Cultural Factors

Culture plays an important role in many aspects of the business organisations through people, such as customers, employees, suppliers and stakeholders. Cross-cultural values provide substance to modern management practices and techniques. Culture is not something that is easily acquired, but a slow process of growing into the society. It includes learning values, partaking of rituals, understanding myths and role models. The ingredients of culture are acquired from birth and are influenced by family, school, religion, workplace, friends and media.

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Among the cross-cultural researchers is Hofstede who provides an equivocal definition which states that it is a collective programming of the mind which distinguishes one group from another. mental programming, patterns of thinking, feeling and potential acting (Hofstede 1980, 1991a). Hofstede's findings resulted in five dimensions and is classified as power distance, uncertainty avoidance, individualism, masculinity and long-term orientation.

One of the indigenous issues in Australian universities include cross-cultural spiritualities. The cross-cultural issues are found in academic teaching and research in universities. Indigenous studies in tertiary institutions have been addressed by many researchers (Nakata 2006). The contribution by Martin Nakata (2006), on the future of indigenous studies was noted that the problematisation of the cultural interface provides a discipline based rationale for working beyond the indigenous-Western binary encouraging the on-going production of diverse, historically and politically informed scholarship while preparing the students to enter the workforce with a contemporary ethically sophisticated grasp of both indigenous and non-indigenous relations. These issues have been raised about the indigenous dilemma in western education (Carey and Prince 2015).

H4: *Cultural factors have a direct positive effect on attitudes of Indigenous Australian students' towards tertiary education.*

2.2.2.2 Government Support Factors

The government of Australia administered several programmes and initiatives to support students access and participation in higher education in Australia and this was adhered in the 2014-2015 budget. The government has reformed the higher education participation programme (HEPP) by consolidating and streamlining existing funding arrangements. One of the issues addressed by the department is working to ensure the indigenous Australian community with the desire and capability to attend universities have the opportunity to do so. Their aims were addressed as: to increase indigenous participation and success in higher education, greater collaboration with the indigenous people in higher education policy development, to work with the university leadership to ensure that indigenous perspectives and knowledge are embedded into the curriculum, teaching and graduate attributes. There are three dimensions of government support factors – policies, regulations and stake holders.

The Australian government developed its policies to address the indigenous participation in higher education through the Commonwealth Government higher education policy. The government department's work in indigenous education is shaped by key national and state policies, to meet the goals and targets in achieving through the various national and national partnership agreements to close the gap in indigenous disadvantage (www.departmentofeducation.edu.au).

The laws and regulations in the 1967 referendum have changed and improved the lives of indigenous Australians. Indigenous higher education units were located in the universities around Australia and these units provide support to indigenous students in their academic studies, through creating a network and providing an indigenous presence on university campuses ([www.skwirk.com/aboriginal/indigenous/1967 referendum](http://www.skwirk.com/aboriginal/indigenous/1967%20referendum)).

Stakeholders may be internal such as principals, teachers, support staff in the department or external including different levels of government departments, industry groups and students' parents. The education department of Australia has adapted the International Association of Public Participation (IAPP) spectrum to assist organisation select the appropriate level of

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participation required for the different stakeholder groups (Department of Education, Stakeholder Engagement Framework, 2011).

H5: Government support factors have a direct positive effect on attitudes of Indigenous Australian students' towards tertiary education..

2.2.3 Endogenous Variable

2.2.3.1 Attitudes of Indigenous Australian Students Towards Tertiary Education

The Commonwealth Government's review of Australian Higher education or the Bradley Review emphasised that those from 'marginalised backgrounds' primarily, low socio-economic status and indigenous people are under-represented in higher education. In response to the review, the Government offered many financial incentives to universities to increase the enrolments of students from low socio-economic status and indigenous backgrounds. The goals of such initiatives were to enhance 'social inclusion' redressing some of the inequities that have historically characterised participation in Australian universities (Connell et al., 2010). The educational setting among the indigenous Australian students faced many challenges from early education to higher education (Andersen et al., 2008, Klenowski 2009, Foley 2010).

Many researchers in Australia and internationally investigated the processes associated with indigenous participation in higher education and found that attitudes were one of the main reasons for the high drop-out rates which resulted in a number of factors such as: discrimination and racism, lacking an indigenous friendly environment and culture (NTEU 2011:4). Some felt they were not given respect as their non-indigenous counterparts. Students experienced racism, cultural insensitivity, discrimination and discomfort within the Australian university sector. Due to these problems, many of the indigenous Australian students expressed dissatisfaction with regard to their rights to be in the Australian universities and their ability to successfully complete the university programs of study (Howlett et al., 2008, Pechenkina and Andersen 2011).

2.3 Limitations of Past Studies

There are certain limitations or problems in the past studies or research. Past studies did not take into account of the demographic situation of the Indigenous group. They were conducted many years ago where the demographic situation has changed currently. The Indigenous Australian group now makes up of younger generation compared to the non-indigenous group due to high rates of birth and death. There is a wide diversity among the different communities and societies in Indigenous Australian population with a mixture of cultures, customs and tradition which past studies did not consider. The education system in Australia were not able to address the values, attitudes and institutions of the Indigenous Australian group previously. Though the Australian government has introduced many approaches and policies for the education of the indigenous Australians, the problem was, they not embedded in the education system (Beresford and Gray 2006) and not included in past studies. Higher education is vital to overcome social issues of substance abuse, health problems which are seen in the displacement of indigenous Australian people. Overall only a small group of indigenous Australians have an adequate preparation for tertiary education, attrition, retention and completion of their studies which past studies did not address.

3. Methodology

The research methodology formulates tests and refines the hypotheses. It involves a hypo-deductive approach and employs quantitative measurement and use of statistical analysis (Neuman 2010, Cresswell 2014). The purpose of the research is to illuminate some process or problem and to suggest a way forward in what may be an ambiguous situation or where there is uncertainty (Zikmund 2013). The research is descriptive as it describes the problems involved in the inclination of the indigenous Australian students in tertiary education. It can also be classified as explanatory as it is set to confirm a hypothesised relationship between two or more variables. It is a quantitative research using a survey method to obtain the trustworthiness of the research, thus including the usage of multiple sources of evidences to test the validity and reliability of the data. The data that emerged from the questionnaire sample surveys are analysed through SPSS version 23.0 and Structural Equation Modelling (SEM) techniques using SmartPLS version 3.0 and AMOS version 23.0.

Structural equation modelling is a statistical methodology which takes a confirmatory approach, which involves hypotheses testing to analyse a structural theory bearing on some phenomenon. This structural theory is suitable for causal processes that generate observation on multiple variables (Bentler 1988). Structural equation modelling conveys two important aspects of the procedures. Firstly, causal processes under the study are represented by a series of structural (i.e. regression) equation and secondly the structural relations can be modelled in a picture to get a clearer conceptualisation of the theory under study. The hypothesised model could then be tested using statistical analysis of the entire system of variables to determine the extent to which it is consistent with the data. If the model fits adequately, it is found to be plausible of the postulated relations among the variables, it is inadequate, then the testability of the relation is rejected (Byrne 2014). SEM has three characteristics as follows: the estimation of multiple and interrelated dependence relationships, the ability to represent unobserved concepts in the relationships and account for the measurement error in the estimation process and defining a model to explain the set of relationships (Hair et. al., 2014).

The researcher has adopted structural equation modelling technique because the theoretical constructs proposed cannot be observed directly and this abstract phenomenon is called 'latent variables' or factors. The latent variable or endogenous variable in the research is attitudes of indigenous Australian students for tertiary education. As the latent variables are not observed directly, they cannot be measured directly. So, the unobserved variable is linked to one that is observable making its measurement possible. The assessment of behaviour constitutes direct measurement of the observed variables albeit the indirect measurement of an unobserved variable (i.e. the underlying construct).

The model developed for the study uses a quantitative approach and the variables are exogenous variables, endogenous variables and moderating variables. The exogenous variables consists of tertiary education with the components of educational programs, academic support, university management as the observed variables. They serve as indicators of the underlying constructs which they represent. The moderating variables are cultural factors and government support factors which act as indicators. In applying SEM, the researcher can assess the contribution of each indicator variable in representing its associated constructs and measure how well the combined set of indicator variables represent the constructs of reliability and validity. This is the measurement assessment component of SEM which is a conceptually appealing way to test the theory where the researcher can express the theory in terms of relationships among measured variables and latent constructs and how

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SEM will assess how well the theory fits as represented by the data. There are six stages in SEM analysis; defining the individual constructs, developing a measurement model, designing a study to produce empirical results, specifying the structural model and assessing the structural model validity (Byrne 2014).

The data or study period is only for a considerable period that is during the process of the research and during the time period when the research is conducted. Justification is made that the data provided will be collected from indigenous students in high schools from the Australian province of New South Wales, who are eligible to proceed their education in the Australian universities. The sample size consists of 500 students from the colleges and universities. The sample size in SEM analysis must be sufficiently big to obtain stable and meaningful parameter estimates. Guidelines are given for absolute sample sizes available for the study. Small sample size is less than 100; medium sample size is 100 to 200 and large sample size is more than 200 (Hair et. al., 2014).

The methodology used in this study is a quantitative research using structural equation modelling technique. SEM is used in this study and it has improved the previous study, model or theory, as the variables used to test the theoretical constructs proposed cannot be observed directly and this abstract phenomenon is called 'latent variables' or factors. The latent variable or endogenous variable in the research is attitudes of indigenous Australian students for tertiary education. Previous study has used regression analysis or factor analysis to test the variables, but SEM is used as the most appropriate method in this study.

4. Research Design

The research design investigates the research questions and the research problems. The proposed model in Fig.1.1 shows the development of five hypotheses to explain the attitudes of the indigenous students towards tertiary education.. A survey questionnaire was designed from a representative sample. Before the collection of data from the sample population, a pilot study was proposed to collect data from the ultimate subject of the research projects to serve as a guide for the larger study. The pilot study is a 'small-scale exploratory research technique that uses sampling but does not apply rigorous standards' (Zikmund 2013).

The questionnaire was designed by the researcher and set out so that the respondents understand the information required for them to complete and return to the researcher. The researcher designed the self-administered questionnaire with the relevant questions according to the development of the hypothesis (Zikmund 2010). Self-administered questionnaires offer anonymity and avoid interview bias. Its effectiveness is seen with a high response rate for a target population that is well educated with a strong interest in the topic (Neuman 2006). The questions designed were simple, without much ambiguity, ensured anonymity, with the adherence of content, construct validity and reliability measures. The questionnaire was designed with questions relating to the exogenous variables of educational programs, academic support and university management, moderating variables of culture and government support to test the endogenous variable of attitudes towards tertiary education. The questionnaire was designed on a 7 point Likert scale (Burns & Bush 2000) with ten to twelve questions in each section. Reversal questions were used to test the awareness and concentration. In total the questionnaire consisted of 70 questions for the respondents to answer. The students were provided with an information consent sheet and written instructions on the first page briefly explaining the purpose of the study and ethical considerations were taken into account to maintain privacy and confidentiality of the respondents. The survey was

conducted with the approval of the college authorities and the teaching staff concerned. When the students returned their questionnaires, they were assumed to have taken part in the study and their identities were treated with strict confidentiality

5. Data Analysis

Descriptive analysis was proposed to analyse the respondents' demographic characteristics such as gender, age, ethnicity, origin of place, birth order, educational level, family history, working experience, interest in tertiary education, parents working status, motivation in higher education and skills development. The demographic variable consisted of 5 items namely gender, ethnicity, family history, personal characteristics and program study.

Reliability test was proposed to be conducted using the cronbach alpha coefficient to test the overall reliability in the questionnaire for the pilot testing. The five variables of educational programs, academic support, university management, culture and government support will be tested for the measurement of Cronbach alpha. Validity tests was also proposed to be conducted in the pilot test. Face validity to be tested for assessment and improvement of the questionnaire and content validity to be reviewed with the questionnaire on the literature review of previous studies. Construct validity was proposed with using factor analysis to measure the consistency between the questions and the theoretical constructs, and lastly confirmatory factor analysis (CFA) was proposed to be used as the researcher has some knowledge of the underlying latent variable structure (Byrne 2014).

Structural Equation Modelling (SEM) was proposed to measure the relationships among the latent and observed variables through the analysis of covariance among observable variables by forming the basis for estimating a structural relationship that describes the relationship of constructs stated in the questions. This process assisted the researcher to assess the contribution of each indicator variable in representing its associated construct and measured how well the combined set of indicator variables represented the construct in terms of reliability and validity. SEM is composed of two models, the measurement model and structural model. The measurement model consists of exogenous (independent variables) and endogenous (latent) variables.

The model explains the fluctuations because all latent variables that influence them are included in the model specification. The specified model proposed by the researcher was based on the knowledge of the related theory and empirical research in the area of study that was tested on the sample data of the respondents. The model testing procedure determined the goodness of fit between the hypothesised model and the sample data. The difference between the hypothesised model and the observed data is termed the residual. The hypothesised model used AMOS 23.0 graphics program with path diagrams depicting a structural equation (SEM) model where the observed and unobserved variables were measured and errors were reflected in the measurement of the underlying factors. When the error items were eliminated, a re-specified model emerged and that became the final competing model (Byrne 2014).

In this study, the direct and indirect effect in the relationship between the education variables (educational programs, academic support and university management), culture and government support factors and attitude towards tertiary education were proposed to measure the application of path analysis technique. Path analysis is a subset of SEM (Hair et al., 2014; Ferdinand 2000), the multivariate procedure that allows examination of a set of relationship

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between one or more independent variables, either continuous or discrete, and one or more dependent variables, either continuous or discrete (Tabachnick & Fidell 2007). Path analysis is unique from other linear equation models and is based upon a linear equation system. It is a statistical technique used to examine causal relationships between two or more variables (Tabachnick & Fidell 2007) and is used mainly in an attempt to understand comparative strengths of direct and indirect relationships among a set of variables.

The results of this study will differ from previous studies on the research questions provided as the data is analysed through the structural equation modelling methodology where the data are analysed through AMOS 23.0. The hypothesised model will be tested with the sample data of the respondents depicting a structural equation model where the variables are measured and errors reflected emerging with a re-specified model and a competing model. Previous studies have used other methods of regression and factor analysis. SEM is an accurate methodology to answer the research question provided in the study.

6. Preliminary Conclusion and Findings

The participation of indigenous Australians has emerged as a critical dimension of social equity and their struggles are voiced in major Australian higher educational institutions. There are major obstacles encountered by the indigenous Australian people in accessing and completing higher education and the Commonwealth Government Higher Education policy has improved the indigenous participation in higher education in the Australian universities and the focus is on closing the gap in educational participation and performance measures between indigenous and non-indigenous Australians (Australian Government 2011), Commonwealth of Australia 2002:8). The results and findings are preliminary as the study has not been conducted to analyse the data yet.

All Australian universities have their focus on attracting indigenous Australians to higher education by providing an 'indigenous-friendly' environment and culture. According to an Australian research conducted by the Australian National Tertiary Education Union (NTEU 2011), racism and discrimination still continue to prevail in the Australian universities. Some of the students experienced 'cultural sensitivity' and lack of awareness of indigenous issues by others. A study conducted in 2009 found that the students expressed dissatisfaction with educators' insensitivity to the indigenous students' culture and lack of indigenous content in the university curriculum (Australian Survey of Student Engagement 2011). Due to the institutional racism, that led to 'positive discrimination', indigenous students felt discomfort and self-doubt challenging their rights to be in the universities and successfully complete the tertiary programs of study (Howlett et al., 2008, Pechenkina and Andersen 2011).

The literature of sociology of education recognises the incorporation of 'cultural difference' in engaging students and promoting their successful learning. Indigenous students face unique challenges with respect to prevailing Western knowledge framework and approaches (Andersen et. al., 2011, Pechenkina and Andersen 2011; Nakata, Nakata and Chin 2008). The Western discourse of knowledge that are privileged by university institutions have negative effects upon indigenous students experiences and perceptions of higher education (Nakata, Nakata and Chin 2008). The indigenous culture taught in the universities are taught in a way that violate indigenous law and protocol and led to stress among the indigenous students. The disregard for history, culture and tradition of indigenous Australian students affect their morale. Other factors extrinsic with regard to the university context play a significant role. The pervasiveness of low socio-economic status, poor health and the adverse educational

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experiences of earlier schooling impose severe for indigenous students to engage in university studies (Wilson et al., 2011, Barnhardt 2002).

The Commonwealth Government of Higher Education policy has become a critical driver of indigenous participation in Australian education. IHEAC 2011 identified pathways to higher education to raise student confidence and aspirations, improving the participation roles of the workforce and embedding indigenous culture in the educational curricula to improve the level of indigenous participation in higher education and research. The funding was in the form financial support in the form of indigenous scholarship programs and financial assistance to students who experience geographical access barriers such as those who live in rural and remote areas. Several years ago, at the launch of the National Centre of Student Equity in higher education, a researcher (Devlin 2009), proposed a new paradigm for research in higher education setting focusing on improving indigenous equity. The limitations to the study are the changing demographic situation, currently there are more birthrates comprising of more younger generation, changes in culture, traditions and customs. Only a certain group of represent the sample from a certain province. A longitudinal research on the experiences of indigenous students was suggested which may provide a most robust basis for a study of how the Australian universities can contribute to realising the potential of higher education for indigenous people compared to the predominantly small scale qualitative studies done.

5. References

- ABS (Australian Bureau of Statistics), 2012. 'Estimates of Aboriginal and Torres Strait Islander Australians June 2011', Catalogue No. 3238.0.55.001.
- Andersen, C, Tracy, B and Maggie, W 2008. 'Indigenous Higher Education: the role of universities in releasing the potential,' *Australian Journal of Indigenous Education Vol. 37, pp. 1-8.*
- Asmar, C, Page, S and Radloss, A 2015. 'Exploring anomalies in Indigenous student engagement: findings from a National Australian survey of undergraduates', *Higher Education Research and Development, Vol. 34, (1), pp. 15-29.*
- Australian Council for Educational Research. 2011. 'Dispelling myths: Indigenous students' engagement with university'. *AUSSE Research Briefing, 10 April:114.*
- Australian Survey of Student Engagement. 2011. 'Dispelling myths: Indigenous students engagement with university', *Research Briefing 10 April:114.*
- Australian Government 2011. 'The Aboriginal and Torres Strait Islander education action plan 2010–2014, Department of Education, Employment and Workplace Relations', <<http://deewr.gov.au/aboriginal-and-torres-strait-islander-education-action-plan-2010-2014>, accessed 16 May 2013.
- Barney, K 2013. 'Taking your mob with you, giving voice to the experience of Indigenous Australian postgraduate students,' *Higher Education Research and Development, Vol. 32 (32), pp. 515-528.*
- Barnhardt, R 2002. 'Domestication of the ivory tower: institutional adaptation to cultural distance', *Anthropology & Education Quarterly, Vol. 33 (2), pp. 239 – 249.*
- Bentler, PM 1988. 'Causal modeling via structural equation systems, in JR Nesselroade & RB Cattell (Eds), *Handbook of multivariate experimental psychology*, pp. 317- 335, 2nd edition, New York: Plenum, 1988.
- Beresford, Q and Gray, J 2006. 'Australian aborigines (Education) Education and State Analysis', *Australian Journal of Education, Vol. 50, (3).*
- Beresford, Q and Omaji, P 1996. 'Rites of passage: Aboriginal youth, crime and justice'. Fremantle: Fremantle Arts Centre Press.

Rengiah & Sentosa

- Beresford, Q and Partington, G 2003. 'Reform and resistance in Aboriginal education: 771e Australian experience'. Perth: University of Western Australia Press.
- Bridgeman, P and Davis, G 2004. *The Australian Policy Handbook*. Sydney: Allen and Unwin.
- Byrne, BM 2014. *Structural Equation Modelling, Basic Concepts, Applications, and Programming*, published by Lawrence Erlbaum Associates, Inc.
- Carey, M and Prince, M 2015. 'Designing an Australian Indigenous Studies curriculum for the twenty-first century - *Nakata's cultural interface stanpoints and working beyond binaries*,' *Vol. 34, (2), pp. 270-283*.
- CSHE 2008. 'Participation and equity: A review of the participation in higher education of people from low socioeconomic backgrounds and Indigenous people', Centre for the Study of Higher Education, University of Melbourne.
- Collins, R 1999. 'Learning the lessons: An independent review of Indigenous education in the Northern Territory'. Darwin: Northern Territory Department of Education.
- Connell, R, Campbell, C, Vickers, M, Welch, A, Foley, D, Bagnall, N and Hayes, D 2010. *Education, Change and Society*. (2nd ed.), Melbourne: Oxford University Press.
- Cresswell, JW 2014. *Research Design Qualitative, Quantitative, and Mixed Methods Approaches*, 4th edition, Sage Publications Inc., USA.
- Day, A, Nakata, V, Nakata, M and Martin, G 2014. 'Indigenous students persistence in higher education in Australia: contextualising models of change from psychology to understand and aid students' practices at a cultural interface, *Higher Education Research and Development*, pp. 1-12.
- Dempsey, I and Davies, M 2013. 'National test performance of young Australian children with additional educational needs'.
- Department of Education, Science and Training, 2004a. 'The national Indigenous English literacy and numeracy strategy'. Canberra: Commonwealth of Australia. *Australian Journal of Education Vol. 57(1), pp. 5-18*.
- Department of Education, Stakeholder Engagement Framework, 2011.
- Devlin, M 2009. 'Indigenous higher education student equity: Focusing on what works'. *Australian Journal of Indigenous Education, Vol. 38, pp. 1-8*.
- Education Queensland, 2000. 'Review of education and employment programs for Aboriginal and Torres Strait Islander peoples in Education Queensland. Brisbane: Education Queensland'.
- Foley, D 2010. 'Can we educate and train aboriginal leaders within our tertiary education systems?' *Australian Journal of Indigenous Education, Vol. 18(2), pp. 138-149*.
- Gordon, S 2002. 'Putting the picture together: Inquiry into response by government agencies to complaints of family violence and child abuse in Aboriginal communities'. Perth: State Law Publisher.
- Gunstone, A 2008. 'Australian university approaches to indigenous policy'. *Australian Journal of Indigenous Education, Vol. 37, pp. 103-108*.
- Hair, JF Jr., Black, WC, Babin, BJ and Anderson, RE 2014. *Multivariate Data Analysis, A Global Perspective* 7th edition, Pearson publications.
- Herbert, J 2005. 'Owning the discourse: Seizing the power!', *Australian Association for Research in Education*. University of Western Sydney:<http://www.aare.edu.au/05pap/her05217.pdf>.
- Hofstede, G 1980. *Culture's Consequences: International differences in work related values*. Beverly Hill, CA, Sage.
- Hofstede, G 1991a. *Culture and Organisations*. New York, McGraw-Hill.
- Hollinsworth, D 2014. 'Unsetting Australian settler supremacy: combating resistance in university of Aboriginal Studies, *Race, Ethnicity and Education*, pp. 1-21.

Rengiah & Sentosa

- Howlett, Catherine, Monica Seini, Chris Matthews, Bronwyn Dillon and Vivian Hauser 2008. 'Retaining indigenous students in tertiary: lessons from the Griffith school of education', *Australian Journal of Indigenous Education Vol. 37*, pp. 18–27.
- Hunter, BH and Schwab, RG 2003. 'Practical reconciliation and continuing disadvantage in Indigenous education.' *The Drawing Board: An Australian Review of Public Affairs*, Vol. 4(2), pp. 84-98.
- Iffe, J 2002. 'Community Development'. Sydney: Pearson Educational.
- Indigenous Higher Education Advisory Council 2006. '*Improving Indigenous outcomes and enhancing Indigenous culture and knowledge in higher education*'. Canberra, ACT: Commonwealth of Australia.
- Johnston, E 1991. 'National report of the Royal Commission into Aboriginal deaths in custody', Vol. 2. Canberra: Australian Government Publishing Service.
- Jones, RG 2002. 'Education Participation and Outcomes by Geographic Location,' LSAY Research Report Number 26, *Australian Council For Educational Research (ACER)*, Victoria, viewed 30 May 2005.
- Klenowski, V 2009. 'Respecting local, cultural contexts for assessment practice in an era of globalization. In Grigorenko, Elena (Ed.) *Multicultural psychoeducational assessment*. Springer Publishing Company, LLC, United States of America, New York, pp. 77-94.
- Ministerial Council for Education, Early Childhood Development and Youth Affairs [MCEECDYA], 2009a. 'Four year plan 2009–2012'. Retrieved September 13, 2012, from:[http://www.mceecdy.edu.au/verve/_resources/MCEETYA_Four_Year_Plan_\(2009-2012\).pdf](http://www.mceecdy.edu.au/verve/_resources/MCEETYA_Four_Year_Plan_(2009-2012).pdf).
- Nakata, MN 2006. 'Australian indigenous studies: A question of discipline'. Jumbunna Indigenous House of Learning, University of Technology, Sydney.
- Nakata, M, Nakata, V and Chin, M 2008. 'Approaches to the academic preparation and support of Australian indigenous students for tertiary studies'. *Australian Journal of Indigenous Education*, Vol. 37, Supplement 137–145.
- Neuman, WL 2010. '*Social Research Methods, Qualitative and Quantitative Approaches*', 7th edition, published by Pearson Education Inc. USA, 2010.
- NTEU (National Tertiary Education Union) 2011.
- Ogbu, J 1978. 'Minority education and caste: The American system in cross-cultural perspective'. New York: Academic Press.
- Pechenkina, Ekaterina and Ian Anderson 2011. 'Background paper on Indigenous Australian higher education: trends, initiatives and policy implications: prepared for the review of higher education access and outcomes for Aboriginal and Torres Strait Islander people', Australian Government, Department of Education, Employment and Workplace Relations', Canberra.
- Pechenkina, E and Kowal, E 2011. "Indigenous Australian students' participation rates in higher education: Exploring the role of universities." *Australian Journal of Indigenous Education In Press*.
- Senate Employment, Workplace Relations, Small Business and Educational References Committee, 2000.
- Skene, J and Evamy, S 2009. 'Does access equal success? The critical role of the First Year Experience (FYE) in achieving equity in higher education'. First Year in Higher Education. Townsville, Queensland.
- Tinto, V 2008. 'Access without support is not opportunity " 36th Annual Institute for Chief Academic Officers, The Council of Independent Colleges, from <http://www.insidehighered.com/views/2008/06/09/tinto>.

Rengiah & Sentosa

- Trudgett, M 2009. 'Build it and They Will Come: Building the Capacity of Indigenous Units in Universities to Provide Better Support for Indigenous Australian Postgraduate Students.' *The Australian Journal of Indigenous Education*, Vol. 38, pp. 9-18.
- Welch, A 1996. 'Australian education: Reform or crisis?' St Leonards, NSW: Allen & Unwin.
- Wilson Marc, Maree Hunt, Liz Richardson, Hazel Phillips, Ken Richardson and Danna Challies 2011. 'Awina: a program for Maori and Pacific tertiary science graduate and postgraduate success', *Higher Education* Vol. 62, pp. 699–719.
- www.changingminds.org/disciplines/leadership/theories/contingency_theory.htm.
- www.departmentofeducation.edu.au.
- [www.skwirk.com/aboriginal/indigenous/1967 referendum](http://www.skwirk.com/aboriginal/indigenous/1967_referendum).
- Zikmund, WG 2013. 'Business Research Methods', published by Thompson South Western Publication, 9 th edition.