

# Success profiling: A methodological perspective on the interactive nature of success predictors on student performance at an open and distance learning institution<sup>1</sup>

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*The drive to improve the academic performance of students at an open and distance learning (ODL) institution has resulted in the incorporation of a blended learning component, namely satellite classes, in the learning strategy to enhance the academic performance of first year diploma students in Business Management and Management. Monitoring this intervention to justify implementation costs (Mathur & Oliver, 2007:3) and effectiveness in relation to student performance is essential. Whereas an initial study confirmed a statistically significant relationship between satellite class attendance and academic performance, this study evaluated the interaction effect of satellite classes and additional, potential success predictors on academic performance by applying the Chi-square Automatic Interaction Detector (CHAID) methodology. This decision tree methodology described the interactive driving forces that impacted on student success. Satellite class intervention and biographical student attributes constituted the driving forces. The CHAID analysis enabled the profiling of successful and at-risk students. The decision tree algorithm mimics true life situations where various effects interactively and jointly influence and predict an outcome. The results showed that satellite class intervention as such was an effective and significant predictor of performance, but that the critical interacting nature of satellite class attendance and additional co-predictors, such as population group and type of matriculation certificate, considerably strengthened performance prediction.*

**Keywords:** ODL, blended learning intervention, Business Management, success profile, satellite class attendance, student performance, throughput, decision trees, data partitioning, CHAID analysis, population group, matriculation certificate, age, at-risk profile

## Introduction

The success rate of first year diploma students in some courses in the Department of Business Management at the University of South Africa (Unisa), an open and distance learning institution (ODL), is of great concern. An unacceptably low pass rate of between 40 and 50 percent in the courses Business Management I and Management I was reported between 2003 and 2007 (Swanepoel, De Beer & Müller, 2009:2). Student failure is costly to both the institution (in terms of eventual throughput rate and associated subsidy quotas) and the students (in terms of time and accumulated study expenses). Overburdened parents, sponsors or the students themselves often carry the added financial burden, incurring escalating study loans. The

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financial implications for South Africa, as a developing country in need of a skilled workforce, are thus pertinent.

Student academic performance at ODL institutions, as at residential universities, is linked to student-lecturer knowledge, communication and interaction (Ansari, 2002:225). In an attempt to increase students' academic performance, satellite classes, as a blended learning component (Marx, 2007:169), were investigated and implemented by the relevant department in 2006. Satellite classes mimic physical face-to-face student-lecturer tutoring and interaction by means of a series of networked, virtual real-time verbal communication and tutoring sessions. Satellite classes are costly to Unisa and return on the investment therefore has to be continually evaluated.

Success-indicator measures had to be defined in the evaluation process. Improvement in students' examination or year marks or the pass/fail ratio of students attending and not attending satellite classes could act as success indicators.

The effectiveness of the satellite class intervention can furthermore be evaluated by using different analysis methods. For example, in an initial analysis strategy, the research objective could focus solely on determining whether satellite class attendance significantly improves student performance. The authors of this paper (Swanepoel et al) conducted research to this effect in 2009. The rationale followed in this approach is that research into intervention effectiveness should not continue if the intervention per se does not prove to be effective. Once the effectiveness of the intervention has been established, a subsequent analysis strategy regarding the joint interactive effect of intervention and other success indicators should be followed. An in-depth analysis strategy should then recognise that no single intervention or attribute influences an outcome (such as performance), in isolation, and a combination of interacting forces usually affects an outcome. The research discussed in this article focuses on the analysis methodology applied during the second phase of the research project.

In the initial research by the same authors (Swanepoel et al, 2009), determination of a pass rate and satellite class intervention dependency was formulated as the research objective. The analysis results of the initial study identified a statistically significant relationship between the attendance of satellite classes and the pass rate of students.

In the subsequent study, on which this article reports, the statistical significance of the contribution of satellite classes in relation to the magnitude of the contributions of other predictors in jointly and interactively predicting performance success was explored. The joint and interactive nature of predictors (which include satellite class attendance) modulating a success/failure prediction model became the main focus of the study. Student biographical information on population group, age, type of formerly traditional South African (SA) matriculation board certificate obtained, and language properties describe these predictors.

If the contribution of satellite class attendance in the joint/interactive prediction model proved to be substantial, initial research would be validated. Favourable results would furthermore strengthen research and justify tutoring expenses for satellite class implementation. The interactive nature of the analysis strategy has the added advantage of incorporating the effect of satellite class attendance into profiles of successful and at-risk first year Business Management and Management diploma students.

Although ODL and the impact of satellite classes (not necessarily at ODL institutions) have been researched internationally (Albright, 2007; Collins, 2002; Zawacki-Richter 2009), limited research has been conducted in the field of Business Management at ODL institutions in SA in this regard, except for previous research by the authors Swanepoel et al., (2009). This research therefore aims to fill the knowledge gap on the effect of the satellite class intervention on improved academic performance, while simultaneously eliciting biographical profiles of successful and at-risk first year students. From these at-risk profiles, in particular, it should be possible to develop student support strategies to ensure an increased student pass rate. The importance of psychographic and other possible contributing factors (such as student motivation, persistence, drive and other forms of support) was, however, not negated by this approach. These factors will be researched in the third stage of this continuing research project.

## Theoretical background

Unisa is the fifth largest ODL institution in the world, with approximately 280 000 registered students for the first semester of 2009 (Subotzky, 2009). ODL approaches focus on opening access and flexibility to education and training, freeing learners from restrictions imposed by time, geographical disposition, socio-economic and other constraints, and offering flexible learning opportunities (Louw, 2007:1). These approaches imply that someone removed in time and space from the learner facilitates learning and support, and that student-lecturer knowledge communication occurs through an artificial medium (such as interactive satellite classes) (Moore, Perlow, Judge & Koh, 2006:217). The approach further implies that new patterns of virtual teaching and learning evolve when technology and traditional tutoring methods are intermingled in the learning process (Unesco, 2002:2, 9, 10, 22). Effective blended learning approaches that facilitate the pass rate and reduce tuition costs are vital to the sustainable growth of universities (Unisa, 2009) following this tuition model. Satellite class intervention, the focal learning approach of the research under discussion, constitutes a blended learning technique.

The element of an artificial communication and support medium underlies the concept of blended learning and forms the essence of most authors' definition of blended learning. The Royer Center for Learning and Academic Technologies (2004), for example, defines blended learning as an "intermingling of multiple learning strategies or methods with a variety of (communication) media". Markus (2008) agrees. Strategies or media would typically include aspects of face-to-face instruction and online (or distance) learning. Marx (2007) echoes Driscoll's (2002) opinion that blended learning combines any form of instructional technology with face-to-face instructor-led training. Blended learning strategies have several distinct advantages that are conducive to performance, such as a sense of community among student learners (Garrison & Kanuka, 2004), exposure to open dialogue, critical debate, reflection and broadening the learning experience. In developing countries such as South Africa, certain blended learning techniques, such as satellite classes, have the added advantage that the implementation cost of the strategy, in relation to the proportion of students who can be serviced by the teaching approach, is relatively low (Mathur & Oliver, 2007).

Although Oliver and Tigwell (2005) claim that blended learning increases student performance, Prinsloo and Van Rooyen (2007) point out that the successful introduction of a specific blended learning approach at one institution does not necessarily guarantee the effectiveness of the strategy at another institution. In selecting blended learning options, cognisance should be taken of the accessibility of the proposed strategy to students. A large proportion of the Unisa students come from historically disadvantaged backgrounds and often from remote rural areas with poor infrastructure (Visser & Hall, 2006). These logistic realities require serious consideration when the various types of technologies that are available to facilitate learning are evaluated.

External indicators and biographical characteristics (and combinations of these factors) that affect or predict academic performance translate into profiles of successful and at-risk students (Wojciechowski & Palmer, 2005:1). Influential characteristics, the way they interact and their "influence priority" on performance have been widely researched from various analytical perspectives. Du Plessis, Prinsloo and Muller (2005:686-690) compiled an overview of research trends to this effect. Numerous potentially influential success predictors are mentioned, such as cultural background as expressed via the population group, age, gender, English language proficiency, tutoring language of the institution, home language, admission policy, type of matriculation exemption, repeaters, comprehension and reading skills, to name but a few.

The importance of a sound decision on the type of applicable blended learning intervention is far reaching. The primary aim of intervention is to improve performance, but this comes at a price in terms of the financial survival of the ODL institution, the academic standing of the institution and the financial, mental and physical input of the student. The efficiency of the intervention therefore needs to be determined.

## Research methodology

### Research objectives

The initial research by the authors established that first year students' attendance of satellite classes in first year Business Management and Management courses was significantly related to academic performance and markedly improved performance (Swanepoel et al, 2009).

In this research the research objectives aim to:

- validate the significance of the identified relationship in the initial research via an alternative analysis methodology;
- create an exploratory prediction model (expressed as a student success profile) for the success rate of students, which takes cognisance of the interactive nature of predictor variables and evaluates the contribution of satellite class attendance in conjunction with other possible biographic predictors in the model; and
- present the prediction model as a provisional profile for successful and unsuccessful first year Business Management and Management students at Unisa.

### Research design

The data were retrieved from first year Department of Business Management student records for 2007. Data fields extracted include information on examination marks (continuous data), satellite class attendance figures (categorical data) and biographical attributes (categorical data). For the purpose of this research and analysis strategy, examination marks were categorised into 'pass' and 'fail' categories (categorical data) according to whether a pass rate of 50 percent had been attained in the 2007 examinations. The nature of the collected data therefore required a quantitative research design (De Vos, Strydom, Fouché & Delport, 2005).

The non-parametric and categorical analysis technique applied as part of the analysis methodology, namely a decision tree data partitioning analysis approach (described in the analysis strategy section), aligned with the data type and data structure and also satisfied the underlying analysis assumptions set by the statistical analysis technique (Kass, 1980).

In the planning stage of the research, it was decided to base the evaluation of the effectiveness of satellite class attendance on student records that indicated full participation in the relevant modules. Records indicating outstanding results, or re-admission to supplementary examinations, non-attendance, withdrawals, cancellations and other exemptions, were excluded from the database. This design decision could possibly inflate the actual pass-fail ratio if it is argued that all students not participating in the examinations actually 'failed', but the reasoning is founded on inclusions of 'true' pass and fail cases in the analysis. In this way, a pure database was established without ambiguous cases.

### Sampling

The examination results of first year students in two Business Management and two Management modules for 2007 were extracted from the official Unisa Student Database. Age, population group, home language, tuition language (Afrikaans or English), type of matriculation certificate and satellite class attendance furthermore constituted the biographical components.

To contextualise the inclusion of the type of matriculation certificate as a possible influential effect in the research, the following background information seems relevant: under the previous government (prior to 1994) various matriculation certificates were issued in South Africa until 2007. The certificates were issued according to provincial, private, homeland and population group classifications. In addition, study admission is currently granted to older students (+23 category exemption), to foreign students and to Senate-approved cases. As an ODL institution Unisa policy grants open admission to all matriculation certificate holders. Against this background it is argued that the type of matriculation certificate held by students could, in conjunction with the effect of satellite class attendance, impact on student performance.

For this research certificates were therefore classified according to the Unisa 2008 Student System Codes Guideline (Wilson & Du Toit, 2008):

- category 1: formerly traditionally white, private and Indian schools;
- category 2: previously traditionally black or coloured schools; and
- category 3: special exemption, 23+, Senate-granted exemption, foreign, etc.

Compared to South African residential universities with a very young student population, student-age distribution at Unisa shows a larger proportion of older students, which implies that older types of matriculation certificates impact on the student population over a more extended period than at residential universities.

A total of 5 740 records of students who had written exams were sampled out of a total of 12 321 registered students in 2007. Slightly fewer records than the 5 864 records included in the initial research by Swanepoel et al (2009:14) are analysed in the current research. The biographical characteristics of the respondents were not included in the initial research and in this research, incomplete records of biographical attributes had to be excluded, thereby reducing the sample size to 5 740 records.

## Satellite classes as blended learning intervention

Satellite classes were presented simultaneously at 25 auditoriums across South Africa and Namibia. These venues were linked to one another and to the recording studios of the Department of Communication at Unisa via a network. At the studio, the lecturer presented subject content matter and students could communicate live with the lecturer via telephones at the venues. Presentations were also recorded on DVD and made available to students on request. Five satellite classes were presented during the semester. In total, 4 608 module attendance entries were recorded (some students attended more than one satellite class – up to five classes – and others more than one of the modules, as reflected in the attendance figures: MNG1M14 950; MNG1M25 480; BSM1M1P 1 653 and BSM1M2P 1 535 attendees). The authors should indicate the full names of the modules here with the abbreviations in brackets afterward.

## Ethical considerations

The Unisa Ethical Guidelines were approved by Council in September 2007 (Unisa, 2007), but research into satellite attendance commenced before the ethical guidelines were formally introduced. The research was, however, approved by the Research Committee of the Department of Business Management and was in alignment with the Unisa Guidelines when these were formalised. Privacy of information was adhered to since examination and biographical information was used solely to categorise the sample according to various subsets, which did not involve the disclosure or use of personal information.

Survey data were collected once the final examination marks had been recorded. This implied that no student was subjected to any ‘treatment’ that could have been to the advantage or detriment of any student or subgroup of students. Data were collected from Unisa’s official databases, which ensured data integrity.

## Findings

Analysis strategy and the CHAID analysis methodology

As a first step in the analysis strategy, frequency distributions on all variables were calculated. This was followed by a decision tree data partitioning analysis methodology referred to as Chi-square Automatic Interaction Detection (CHAID) technique (AnswerTree 3.0 User’s Guide, 2001).

Frequency tables were used to validate the data and to describe the sampled population. Distributions are presented in Table 1. It was established that 55 percent of the sampled students passed their examinations, and that 31 percent attended at least one satellite class. The majority of students, nearly 70 percent, were younger than 35. Eighty-one percent were African/black students and 78 percent spoke an African language at home. The results indicated that the tutoring language was predominantly English (95%). Fifty-five percent of the students were in possession of matriculation certificates of either traditionally white, Indian, private, African/black or coloured matriculation boards. A substantial number

of students (45%) had other types of matriculation exemptions. The sampled population proved to be a good representation of Unisa students. Official Unisa statistics indicate that the majority of students are young (46.4% younger than 29 years and 50.6% older than 29 years), black/African students (64%) who speak an African language at home and are tutored in English (Subotzky, 2009).

Frequency distributions assisted in identifying and condensing category levels of potential success predictors that proved to be sparsely populated. Sparsely populated predictor variables entered into the decision tree model (very low frequencies) could add bias to the eventual prediction. The levels of categories of the age and type of matriculation certificate variables, were, for example, condensed into fewer more populous categories.

**Table 1:** Frequency distribution of performance, satellite class attendance and other potential biographical predictor variables

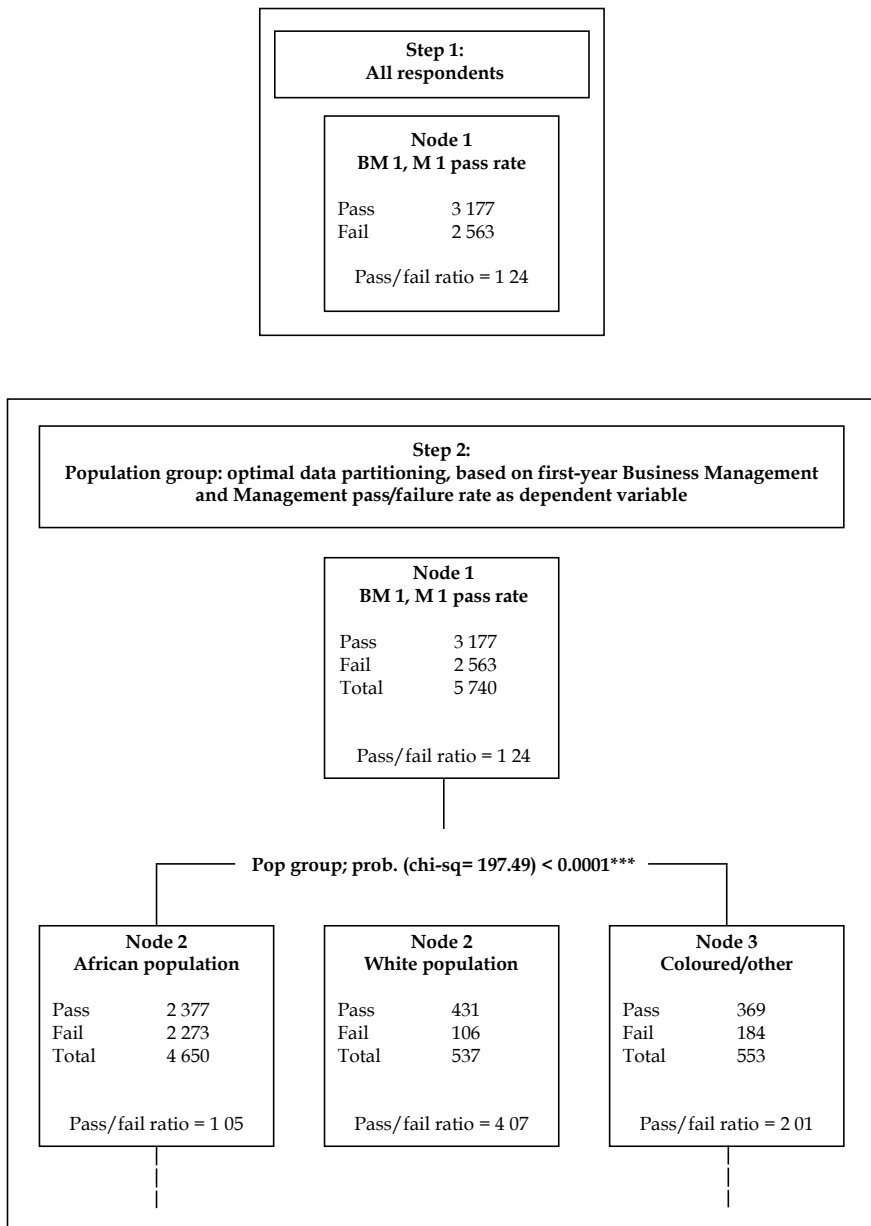
Predictor	Category	Frequency	Percentage	Cumulative frequency	Cumulative percentage	Missing values
Satellite attendance	Attendee	1 758	30.63	1 758	30.63	0
	Non-attendee	3 992	59.37	5 740	100.00	
Exam results	Pass	3 177	55.35	3 177	55.35	0
	Fail	2 563	44.65	5 740	100.00	
Age	<25	1 666	29.02	1 666	29.02	0
	25-34	2 319	40.40	3 985	69.43	
	35-44	1 423	24.81	5 409	94.23	
	44+	311	5.77	5 740	100.00	
Population group	White	536	9.34	536	9.34	1
	Coloured	332	5.78	868	15.12	
	African	4 650	81.02	5 518	96.15	
	Indian	221	3.85	5 739	100.00	
Home language	European	1 270	22.15	1 270	22.15	7
	African	4 463	77.85	5 733	100.00	
Tutoring language	Afrikaans	298	5.19	298	5.19	0
	English	5 442	94.81	5 740	100.00	
Matriculation certificate	Category 1	1 233	21.77	1 233	21.77	36
	Category 2	1 891	33.39	3 124	66.16	
	Category 3	2 540	44.84	5 664	100.00	
Total no. of observations = 5 740						

In the second phase of the analysis (CHAID), the pass/fail rate of the students was regarded as the dependent variable and satellite class attendance, along with the available biographical variables, were entered into the decision tree model as independent variables to investigate the interactive contribution of the independent variables on the students' pass/fail rate. The technique mimics real-life situations in that several effects generally jointly influence an event such as performance.

CHAID methodology, a relatively simple multi-variate classification and data partitioning technique (Eherler & Lehmann, 2001:2), was first developed by Kass (1980). It was introduced to study the interactive nature of the predictors of a dependent variable. The technique automatically selects those predictor variables that jointly, interactively and optimally predict the dependent variable. The technique works extremely well on large datasets with many predictor variables – this fits the data description of the current research.

The data partitioning process is based on the following principles:

- The prediction model is presented in the form of a classification tree referred to as a decision tree.
- The method is a stepwise process and starts off with the root as the set of all respondents partitioned according to the levels of the dependent variable. In the current analysis the 'pass' and 'fail' marks of the examination results variable represent the dependent variable and levels. The step is illustrated in the Step 1 diagram depicted below (BM 1 = Business Management 1 and M1 = Management 1).



In the second step in the data partitioning process, the list of probable predictors is automatically evaluated to establish whether a “best” predictor variable (referred to as a “splitting agent”) can be identified that will split the initial dataset into subsets. Partitioning is conducted in such a way that the most distinctive and significantly different subsets, with respect to the pass/fail categories of the dependent variable, emerge

once partitioned. The partitioning of the data into subsets is referred to as “branching” and the subsets as “branches” or nodes. The Step 2 diagram illustrates the principle as set out in the text.

In subsequent steps, the preceding step’s subsets are again investigated to determine which predictor variable then acts as optimal splitting agent (if such an agent exists) to once again split the subset into the most distinctly different and significant subsets with respect to the pass/fail levels of the dependent variable.

At each step in the process, chi-square tests are calculated to determine whether the splits are significant.

The process continues until one of a number of stopping mechanisms is encountered.

Before embarking on the partitioning process described above, CHAID evaluates the categories of each potential predictor variable (such as the categories of population group and matriculation certificate) and merges categories if judged to behave in a similar fashion with respect to the dependent variable. Dissimilar categories are maintained. The complete decision tree is depicted in Figure 1.

Why resort to segmentation or partitioning? Segmentation analysis proves to be useful in the current research in answering the questions pertaining to:

- which predictors most strongly define the segmentation of first year diploma student success, and once established;
- which combination of the levels of the selected predictors defines student groups most likely to pass first year Business Management and Management modules (identified as student subsets with a high pass/fail ratio); as opposed to
- which combination of levels of these predictors defines student groups at risk of failing first year Business Management and Management courses (identified as student subsets with a low pass/fail ratio).

The structure of the decision tree assists in this regard. If branches of the tree are followed from any given point back to the root, different combinations of characteristics that best define specific target groups can be derived.

The predictor selected for the first split of the trunk represents the most critical success predictor. The importance of predictor contribution to the model decreases in the lower levels of the decision tree.

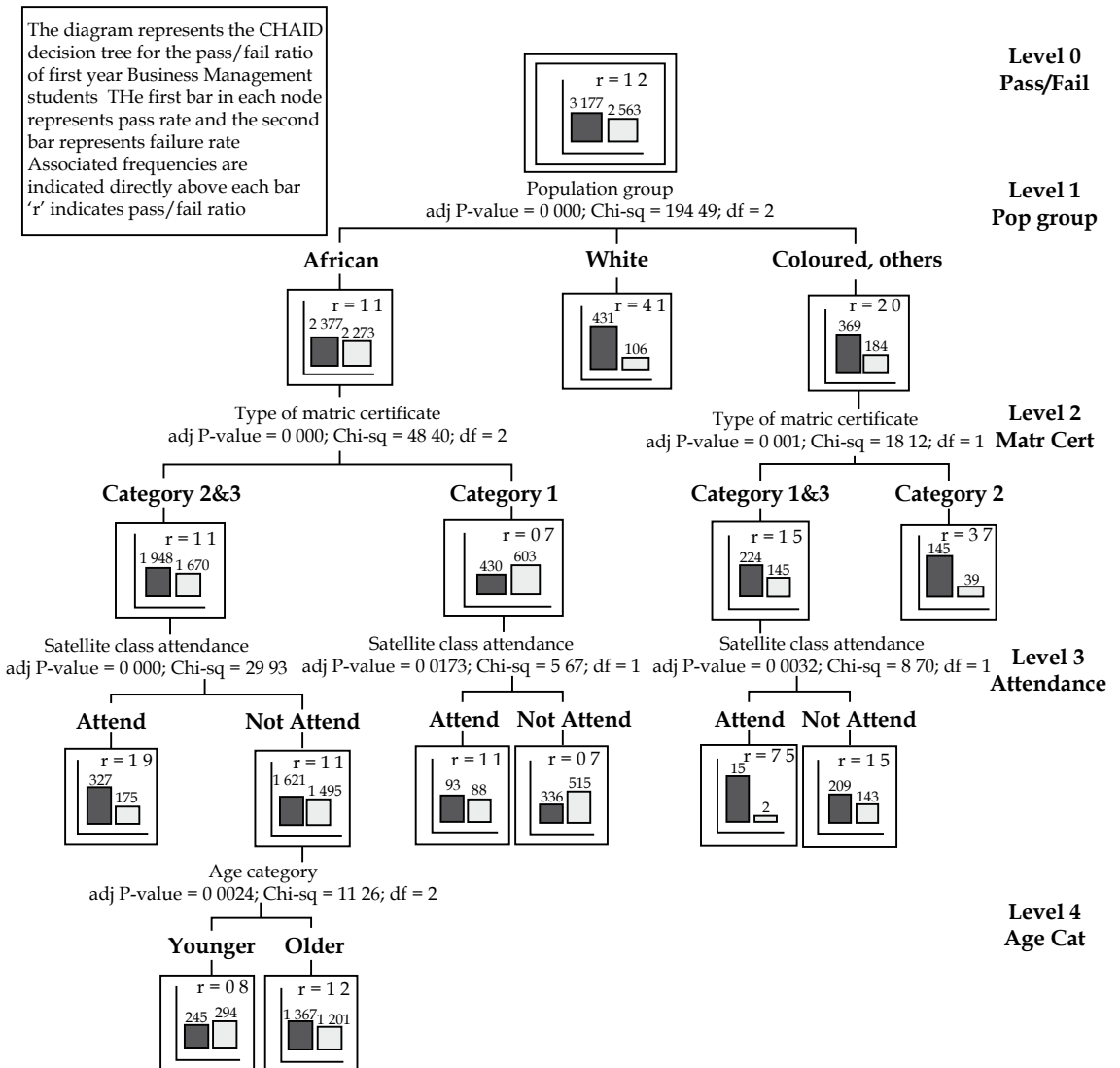
## Results and interpretation of the CHAID analysis

Results of the CHAID analysis (Figure 1) indicated that population group proved to be the first critical and significant success predictor to split performance into distinct and significantly different subsets with respect to the pass/fail ratio attached to each population group. Segregation into three population subsets was significant, as indicated by a probability of less than 0.0001, associated with the chi-square statistic of 197.49. The pass/fail ratios for the African, white and coloured/other subsets were 1.05, 4.07, and 2.01 respectively, which indicates significantly different pass/fail ratios. The ratios imply that, for white respondents, four students passed for every one student who failed, while one African student passed for every student who failed in the African population group. Therefore the most critical, statistically significant contributor in explaining variation in pass/fail performance was the population group. Based on pass/fail ratios, level one data segregation thus indicated the white population group as probably the most successful students and the African students as probably the least successful.

In the second step of the CHAID analysis, the type of matriculation certificate obtained acted as the next most critical splitting agent to split African and coloured population subsets into the most distinct and significantly different sub-subsets with respect to the pass/fail ratios of the performance variable. No splitting agent was identified for the white population subset. Probabilities of 0.001 and less than 0.001 were associated with the chi-square statistics of 48.40 and 18.12 respectively, for the African and coloured/other population groups. The analysis identified type of matriculation certificate as the second most critical and statistically significant success predictor (in conjunction with race group). For the matriculation categories of the African population groups, a pass/fail ratio of 1.11 was reported for category 2 & 3 matriculation certificates, and 0.71 for category 1 matriculation certificates. For the coloured/other population group,



ratios of 1.54 and 3.72 were reported for categories 1 & 3 and for category 2 matriculation certificates respectively. Based on the pass/fail ratio, level two data segregation illustrated the interactive effect of predictors on performance, and (apart from the white population subset, with  $r=4.07$ ) indicated coloured students with category 2 matriculation certificates as the most likely to attain success ( $r=2.01$ ), while African students with a category 1 matriculation certificate are probably more at risk ( $r=0.7$ ).



**Figure 1:** CHAID decision tree for first-year Business Management and Management success/failure rate

Satellite class attendance was identified in the third level as the most influential and statistically significant splitting agent. This made satellite class attendance a contributor in jointly explaining and predicting the performance of students. The pass/fail ratios for the attendance and non-attendance categories of the satellite class-splitting agent of the level three subsets are:

- 1.9 and 1.1 for the African population group in possession of a category 2 or 3 matriculation certificate

- 1.1 and 0.7 for the African population group in possession of a category 1 matriculation certificate
- 7.5 and 1.5 for the coloured population group in possession of a category 1 or 3 matriculation certificate.

The chi-square probabilities associated with the level three subsets were equal to 0.0001 (chi-square=29.93), 0.01 (chi-square=8.97), and 0.05 (chi-square=5.66) respectively, and indicate significance on the 0.1%, 1% and 5% levels of significance, respectively. Level three data partitioning identified African students who wrote category 1 examinations and did not attend satellite classes as an at-risk student group ( $r=0.65$ ). In addition, data partitioning suggests that African students who wrote the category 2 or 3 matriculation examination and did not attend satellite classes, also to be at risk. Age level should be ignored, as the significance attached to this small proportion is negligible. (Conclusions regarding the level 1-3 subset are based on more observations and represent a more conservative prediction). Level three data partitioning thus indicated that satellite class attendance contributed jointly and significantly to predicting student performance. This result confirms the findings of the initial research.

The risk estimate, which estimates the accuracy of the model, was calculated as 0.41, with a standard error of 0.0065. The standard error is very small, which indicates that the risk of misclassification is stable, but the chance of misclassification is about 41%.

The profiling of the successful and at-risk student should thus follow the pass/fail ratio path relating to high and low ratios throughout the decision tree. The relative sample size of subsets should also be considered when making deductions. Results can be summarised to describe the success profile of a first-year Business Management or Management student as follows:

- either a white student ( $r=4.07$ ); or
- a coloured student ( $r=2.01$ ) in possession of a category 2 matriculation certificate ( $r=3.72$ ).

The profile describes the at-risk diploma student as:

- an African student ( $r=1.05$ ); who is
- in possession of a category 2 matriculation certificate ( $r=1.11$ );
- who did not attend satellite classes ( $r=1.08$ ); and
- is younger than 35 ( $r=0.83$ ).

## Summary and conclusions

The significance of the effect of satellite class attendance on performance, established in the initial research (Swanepoel et al, 2009), was validated by this research and satellite class attendance, as a significant third-level success predictor in the CHAID model, attests to this. This research has furthermore added new and relevant applied knowledge to the field of ODL and blended learning in that the interactive nature of success predictors (incorporating satellite classes) in first year Business Management and Management modules, was identified and verified through the CHAID analysis strategy. The strategy allowed the effect of interaction between success predictors to be acknowledged and described in success and at-risk profiles for students.

Success profiles suggested that population group, the type of matriculation certificate and satellite class attendance impacted on students' academic performance. In research, attributes such as ethnicity are a given and appreciated as such. However, if influential forces such as varying matriculation standards can be phased out (all SA students in public schools have since 2008 written the same matriculation examinations) with a more uniform student corps entering into first year Business Management and Management modules, the impact of satellite classes as a blended learning intervention might be found to be even more beneficial. Nkomo, Weber and Amsterdam (2009:331) maintain that the exclusion from quality education for all has a paralytic effect on both the individual and society. A longitudinal evaluation study on the effectiveness of satellite classes will have to be conducted to monitor whether the gradual phasing in of a uniform entry level in the first year will indeed cancel out the identified current differences in entry-level effect. However, the non-uniform entry level of first year students will probably take more time to peter out at Unisa, as an ODL institution, than at residential tertiary institutions. The average age of students at ODL institutions is typically higher and Unisa is no exception (with 50.6% of Unisa students in the 'over 29' age category, according to Subotzky, 2009). Students with 'old' matriculation certificates

will therefore be in the system over a longer period of time than at residential South African universities, which attract larger numbers of school-leaving matriculants who study full-time.

The risk estimate of the current CHAID analysis was reported as 0.41, which is still relatively high and indicates that other success predictors, currently unknown, could possibly explain an additional component of the variation present in the data. Further research should also consider new potential success predictors, such as psychographic factors, to the success profile.

The CHAID analysis methodology followed in this study proved to be highly applicable to the particular research context. The applicability of the research methodology and ease of interpretation suggest that the technique in itself could add value to the broader base of research available strategies and be applied under similar profiling conditions.

An honest desire to fathom the success profile structure of first year Business Management and Management students so as to enhance student learning in an ODL context, should remain the driving force of research in this regard, in the hope that measures might evolve to contribute to improved student throughput and more effective blended learning interventions.

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