2016-06-02

A Predictive Model of Student Satisfaction

Lorraine Sweeney

Dublin Institute of Technology, lorraine.sweeney@dit.ie

Follow this and additional works at: http://arrow.dit.ie/ijap

A Predictive Model of Student Satisfaction
Dr. Lorraine Sweeney
School of Retail and Services Management, College of Business
Dublin Institute of Technology

Abstract

Retention is a challenge for all third level institutions and retention rates remain lower than colleges would like them to be. This has intensified in recent years as participation in higher education has increased and diversified. Student satisfaction and retention represents an important concern for colleges which must understand the reasons why students may choose to leave a programme. While student satisfaction and retention is a well-researched topic, there remain questions to be answered in terms of the factors that lead to non-completion. The aim of this research is to gain a greater understanding of the factors that lead to dissatisfaction and non-completion among third level students in Ireland. This research analyses data from 10,110 respondents of the Eurostudent survey, a survey of student attitude and satisfaction which is administered to all third level students in Ireland. A predictive model was developed and analysed using regression analysis and decision tree analysis. In line with literature reviewed, satisfaction with the student's college, teaching quality, teaching staff, facilities, finances, accommodation and friendship, feeling interested, calm and in good spirits, and the extent to which students exercise, were found to be significant predictors of student satisfaction. In contrast to literature reviewed, this study did not find that social status or income represented predictors of student satisfaction. This research contributes to academic literature and provides greater understanding of the factors that impact on student satisfaction. This study identifies important areas for Higher Education Institutions in Ireland to focus their attention as they endeavour to improve student satisfaction and retention rates.

1

Keywords

Student satisfaction, student retention, satisfaction factors, predictive model

Introduction

Retention is a challenge for all third level institutions (Meling, Kupczynski, Mundy, & Green, 2012). This has intensified in recent years as participation in higher education has increased significantly and diversified (Berger & Lyon, 2005). While a certain percentage will always be expected to drop out of college, an effort should be made to keep this to a minimum (Osman, O'Leary, & Brimble, 2010). Research consistently demonstrates that it costs more to attract a new customer than retain an existing one (Gemme, 1997). This is also the case for third level institutions which would not only benefit from increased fee income but also through low cost word-of-mouth promotion and an enhanced reputation (Kara & DeShields, 2004).

An important concern for colleges is retaining students and understanding the reasons why students may choose to leave a programme (Gibson, 2010). While student satisfaction and retention is a well-researched topic (Braxton & Hirschy, 2005) there remain questions to be answered in terms of the factors that lead to non-completion (Moxley, Najor-Durack, & Dumbridgue, 2001). Retention rates are lower than colleges would like them to be and more knowledge in the area is needed (Berger & Lyon, 2005).

A review of current literature has identified a number of factors that impact on student satisfaction including financial anxiety, quality of lecturers and teaching, student involvement, learning resources, facilities, and social life. Drawing on the findings of the

2

Eurostudent survey, this paper analyses the extent to which these and other factors impact on student satisfaction. A predictive model of student satisfaction is developed and analysed using decision tree and regression analysis. The paper then assesses the relationship between student satisfaction and their post-completion intentions, specifically their intention to go on to further study, and the perception of their career prospects.

The author is a lecturer in the Dublin Institute of Technology (DIT). In her role as lecturer, tutor and programme chair extending ten years she has worked closely with third level students and has developed a keen interest in understanding what drives student satisfaction and retention among third level students in Ireland.

Student Satisfaction

Retention is a challenge for all third level institutions (Meling et al., 2012), especially among first years (Osman et al., 2010; Bennett & Kane, 2009; Moses, Hall, Wuensch, De Urquidi, Kauffmann, Stewart, Duncan & Dixon, 2011) with more than half of students that drop out doing so in their first year (Cox, Schmitt, Bobrowski & Graham, 2005). Many students who endeavour to earn a college degree fail to persist until graduation (Roberts & Styron, 2010) and an effort should be made to keep this to a minimum (Osman et al., 2010).

The importance of student success in higher education is incontestable, whether one's standpoint is that of a student, a programme team, a department, an institution or a higher education system (Yorke & Longden, 2004). Governments around the world are increasingly calling higher education to account for the money that is invested in these institutions (Yorke,

3

1999). Therefore, retention rates are an important concern for every third level institution (Mathews & Mulkeen, 2002). Retention rates are often used as an indicator of the effectiveness and efficiency of an institution or education system (Yorke & Longden, 2004). They are perceived as a reflection of quality (Matthews & Mulkeen, 2002). Retention rates are one of the most common ways students, parents and stakeholders evaluate the effectiveness of colleges. A positive reputation in terms of retention rates increases the college's ability to attract the best students and academic staff (Hagedorn, 2005). Institutions have to know not only who leaves, but why (Tinto, 1993).

A recent Higher Education Authority (HEA) report found that, while university non-progression rates remain consistent at 9%, they increase from 16% to 17% among institute of technology students. The report shows variations between course categories and individual institutions and universities (Murray, 2014). The report also identified a worrying trend among males, with the proportion dropping out by second year up from 17% to 19%, while female non-progression rates remain unchanged at 13% (Murray, 2014).

Although there is little debate over the need to satisfy students, arriving at a precise meaning of what that entails is unclear (Guolla, 1999). From service marketing literature, customers are thought to be satisfied when the quality of service they receive matches or exceeds their expectations (Hill, 1995). Thus, in higher education, student satisfaction occurs when perceived performance meets or exceeds the students' expectations (Mark, 2013). As students evaluate service quality, they typically cannot help but compare the performance they experience with the performance they expected (Wright & O'Neill, 2002). The expectations

4

of students may be influenced by their individual needs, communication from the institution, word of mouth communication and other non-institutionally sanctioned sources such as the student evaluation website ratemyprofessor.com (Wilkins, Melodena & Huisman, 2012).

The impact of satisfaction on retention and performance

Kara and DeShields comment that, "[s]imilar to the importance of satisfying customers to retain them for profit-making institutions, satisfying the admitted students is also important for retention" in all higher education institutions (2004, p.1). A common view is that satisfied students are more likely to be loyal to the university, thus remaining in a programme and possibly maintaining contact and support of an institution after graduation (Gibson, 2010). A study carried out by Aritonang (2014) found student satisfaction is a positive and significant predictor of student loyalty. Kara and DeShields (2004) similarly reported a positive link between satisfaction and retention among students. Thus, an understanding of the factors behind student satisfaction may provide colleges with the tools needed to improve the quality of their services (Stukalina, 2014) and could give a college a competitive advantage (Enache, 2011).

Smayling and Miller's (2012) study examined the relationship between satisfaction and performance of 359 student interns in the US and found a positive relationship existed. Similar studies have found a positive relationship between satisfaction and academic performance among third level students in Portugal (Chambel & Curral, 2005), the US (Rode, Arthaud-Day, Mooney, Near, Baldwin, Boomer & Rubin, 2005) and Armenia (Martirosyan, Saxon, & Wanjohi, 2014).

5

Factors impacting student satisfaction and retention

It has been argued that no single factor explains dissatisfaction and non-completion rates among third level students; there are a range of academic, personal, financial and institution specific factors. There are many factors external to the institution which may cause dissatisfaction among students and disruption to their education such as serious illness, financial problems or family issues (Thompson & Prieto, 2013; Osman et al., 2010). Health variables such as smoking and alcohol (Cox et al., 2005) student motivation, effort and anxiety about their personal ability (Sargent, Borthick & Lederberg, 2011) have been shown to impact student satisfaction and retention. In addition, gender may impact on student retention; according to Moses et al. (2011) females are more likely to persist to completion than males.

There are also a number of factors within the control of the institution that can impact satisfaction. According to Alzamel (2014), Bennett and Kane (2009), Priya Raina, Bhadouria & Charu Shri (2013), and Meling et al. (2012), these include quality of education; facilities and staff; design, assessment and delivery of service; cost of education; nature of the learning environment; reputation and recognition of the institution and its programmes.

Academic achievement pre-enrolment

Academic achievement prior to enrolling in college has consistently been reported as a factor impacting student completion (Astin and Oseguera, 2005). Jones (1990) found that students who entered university with high grades at secondary school are less likely to withdraw or fail, Richardson (1995) found this was also the case among mature students. Matthews and

6

Mulkeen's (2002) study of UCD students and a study by Healy, Carpenter & Lynch (1999) of students at three Institutions of Technology reported similar results. According to Bean (2005) institutions enrolling students with the highest academic achievements have the highest retention rates. In addition, parents' educational background (Bean, 2005) and income have been seen directly and indirectly to affect a student's completion (Astin & Oseguera, 2005).

Social factors

According to Stukalina (2014), a university is a social place that contributes to the socialisation of students as well as the development of their personalities. Students must be regarded as active members of the academic community and such involvement impacts on student satisfaction. College, for most students, is not only a time of academic pursuits but also an opportunity to explore or enhance themselves as social beings (Roberts & Styron, 2010). The social lives of students, and their exchanges with others inside and outside the institution, are important in retention decisions (Bean, 2005; Roberts & Styron, 2010). According to Bean, "[f]ew would deny that the social lives of students in college and their exchanges with others inside and outside the institution are important in retention decisions" (2005, p. 227). Yorke's (1999) study of UK students found that unhappiness with the social environment contributed to non-completion. Langbein and Snider (1999) also found that students who were more involved in college life were less likely to leave. Consequently, it is imperative for higher education administrators to work diligently to provide students with opportunities to get involved with campus and activities (Tinto, 1993). Roberts and Styron (2010) found that those that did not return to college had statistically significant lower perceptions of social connectedness than those who remained in their courses.

7

Financial factors

The financial situation of the student is a complex issue likely to affect their decision to leave college (Tinto, 1993). Early studies have reported that financial aid significantly increases the probability that a student will remain (Murdock, 1987; Langbein & Snider, 1999). Financial concerns are commonly cited as an important reason students provide for their departure from college (Astin & Oseguera, 2005). This was cited as a factor leading to non-completion in studies conducted in the UK (Yorke, 1999; Davies & Elias, 2003) and Ireland (Healy et al, 1999). According to Archuleta, Dale & Spann (2013), adverse financial situations and financial anxiety can contribute to the student's dissatisfaction.

External factors

Events which occur elsewhere in a student's life (Tinto, 1993) or those beyond the control of the student may force them to leave college such as family responsibilities, taking care of children or ageing parents, and these concerns can take precedence over academic pursuits (Bean, 2005).

Work commitments

Astin and Oseguera (2005) argue that working full time can impede persistence among third level students; however, working part time or employment on campus does not have the same negative effect.

8

Institutional factors

Elliot (2002) argues that quality of education is an important factor; he went on to argue that students want to experience intellectual growth. Similarly, Frederickson (2012) argues that being intellectually challenged is associated with student satisfaction. According to Kuh, Kinzie, Schuh and Whitt (2005), the relationship between students and academic staff is vital to student success. According to Pascarella and Terenzini (2005) the more contact a student has with academic staff, the more likely it is that the student will persist until graduation. Roberts and Styron (2010) found that those that did not return to college had statistically significant lower perceptions of academic staff approachability than those that remained in their course. Kara and DeShields (2004) also report a positive relationship between academic staff performance and student satisfaction. Bean (1990, p.159) remarks that "putting the best instructors in introductory level courses is (...) a good way to keep students enrolled in school".

Research carried out by Loveland and Bland (2013) found that class scheduling has a significant impact on student satisfaction. According to DeShields et al. (2005) skills developed such as critical thinking and moral awareness, along with preparation for the future, are important factors impacting on student satisfaction. Thomas and Galambos (2004) argue that pre-enrolment factors, such as the accuracy of information provided, impact on satisfaction.

Wilkins et al. (2012) and Stukalina (2014) specifically state that student feedback is an important factor impacting on student satisfaction. In support of Alzamel (2014), Sopon, Ilies

9

& Petean (2013) found that the reputation of the institution is an important contributor to student satisfaction.

Evaluation of Undergraduate Student Experience

Most Higher Education Institutions evaluate the satisfaction and engagement of their students. In addition, there are a number of national studies of student satisfaction. For example, The National Survey of Student Engagement (NSSE) began in the US in 1998 to evaluate student satisfaction among third levels students in higher education across the US. Approximately 5 million students have completed the survey from 1998 to 2000.

Eurostudent is a network of researchers as well as data collectors, representatives of national ministries and other stakeholders who have joined forces to examine the social and economic conditions of student life in higher education systems in Europe. The beginning of Eurostudent goes back to the 1990s. In 2012, the fifth round of Eurostudent project started with an increased number of 27 participating countries from a broad geographical spectrum. The participants reach from Finland in the north all the way to Italy in the south and from Portugal in the west to Armenia in the east.

The Irish Survey of Student Engagement (ISSE) is available to all undergraduate and taught postgraduate students participating in higher education in Ireland. The study began in 2013 and is carried out annually. Almost 60,000 students have participated from 2013 to 2015.

10

Methodology

This study adopts a quantitative methodology, which Malhotra (2007) describes as research that seeks to quantify the data and typically forms some sort of statistical analysis. Such data, according to Collis and Hussey (2009) is more precise and provides a higher degree of reliability in comparison to qualitative data.

This paper draws on findings from the Eurostudent survey of third level students in Ireland. The Eurostudent V survey was co-ordinated in Ireland by Insight Statistical Consulting, an independent marketing research organisation, on behalf of the Higher Education Authority and the Eurostudent consortium. Data was collected from April 22nd 2013 to May 31st 2013. For each round of the Eurostudent survey, two reports are produced - the Irish input into the European Report, and a separate Irish Report. Data for the Irish report has been obtained for this research. This study provides deeper analysis of the data than the Eurostudent report and builds a predictive model of student satisfaction based on the data.

The data contains a wealth of information about students and their experience in third level education including financial anxiety, their evaluations of their third level institution including programme effectiveness, effectiveness of lecturing staff, their involvement and motivation in their study, their evaluation of college facilities, social life, travel distance to institution, workload, study abroad, accommodation, health and wellbeing (including alcohol consumption, smoking and exercise levels), work status of guardians and demographic information such as age, gender, nationality, children and income. The survey is available at http://www.eurostudent.eu/download_files/documents/Questionnaire_EV.pdf

11

An MS Excel file containing data of 10,110 students (representing a 5.1% response rate of the higher education student population in Ireland) was uploaded into SPSS for analysis. The predictive model of student satisfaction was analysed in SPSS using regression analysis (multiple linear regression and logistic regression) and decision tree. Multiple regression analysis is a technique employed when the aim of the research is to predict the value of a variable (dependent variable) based on the value of two or more other variables (independent variables). Logistic regression is a statistical method for analysing a dataset in which there are one or more independent variables that determine a dependent variable. The outcome/ dependent variable is measured with a dichotomous variable (a variable in which there are only two possible outcomes). Finally, decision tree represents a classification technique commonly used in data mining (Rokach & Maimin, 2008). The goal is to create a model that predicts the value of the target (dependent) variable based on several input (independent) variables.

Findings and Discussion

Multiple Regression

A multiple regression model was developed to assess the impact of all potential predictor variables on student satisfaction. The Model summary table (Table 1) indicates the initial model reported an adjusted R square value of 0.43. Thus, the independent variables explain 43% of the change in 'Satisfaction with studies'.

12

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.658[a]	.433	**.430**	.720

R - R is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable.

R-Square - This is the proportion of variance in the dependent variable which can be explained by the independent variables. This is an overall measure of the strength of association and does not reflect the extent to which any particular independent variable is associated with the dependent variable.

Adjusted R-square - This is an adjustment of the R-squared that penalizes the addition of extraneous predictors to the model.

Std. Error of the Estimate - This is also referred to as the root mean squared error. It is the standard deviation of the error term and the square root of the Mean Square for the Residuals in the ANOVA table.

Table 1: Multiple Regression Model Summary

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2795.161	41	68.175	131.689	**.000[b]**
Residual	3660.106	7070	.518		
Total	6455.267	7111			

Regression, Residual, Total - The Total variance is partitioned into the variance which can be explained by the independent variables (Model) and the variance which is not explained by the independent variables (Error).

Sum of Squares - These are the Sum of Squares associated with the three sources of variance, Total, Model and Residual. The Total variance is partitioned into the variance which can be explained by the independent variables (Regression) and the variance which is not explained by the independent variables (Residual).

df - These are the degrees of freedom associated with the sources of variance. The total variance has N-1 degrees of freedom. The Regression degrees of freedom corresponds to the number of coefficients estimated minus 1. The Error degrees of freedom is the DF total minus the DF model.

Mean Square - These are the Mean Squares, the Sum of Squares divided by their respective DF.

F and **Sig.** - This is the F-statistic the p-value associated with it. The F-statistic is the Mean Square (Regression) divided by the Mean Square (Residual). The p-value is compared to an alpha level in testing the null hypothesis that all of the model coefficients are 0.

Table 2: Multiple Regression Anova Results

Table 2 indicates that the initial model is significant i.e. there is a statistically significant relationship between the dependent and independent variables. The significant independent variables are shown in bold type in Table 3. These include teaching quality, timetable (class scheduling), teaching staff, facilities, travel distance to college, time pressure, commitment to college, gender, health and well-being variables including feeling in good spirits, calm, rested and interested, whether the student smokes and their level of exercise, extent to which the student experiences difficulty sleeping, concentrating or suffers from headaches, satisfaction with accommodation, finances, friendship and college.

13

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.586	.156		3.748	.000
teaching_quality	**.117**	**.014**	**.100**	**8.310**	**.000**
timetable	**.033**	**.010**	**.035**	**3.208**	**.001**
module_selection	.017	.010	.018	1.758	.079
staff_admin	-.018	.010	-.020	-1.748	.080
staff_teaching	**.047**	**.013**	**.044**	**3.658**	**.000**
facilities	**-.075**	**.009**	**-.082**	**-8.014**	**.000**
pre_achievement	.000	.002	-.002	-.208	.835
distance	-.000	.000	.005	.496	.620
travel_time	.000	.000	-.007	-.556	.578
travel_distance	**.001**	**.000**	**.032**	**2.439**	**.015**
financial_difficulty	-.007	.011	-.008	-.643	.520
working	.000	.002	-.001	-.140	.889
time_pressures_study	**-.062**	**.009**	**-.065**	**-7.094**	**.000**
commitment	**.210**	**.010**	**.195**	**20.423**	**.000**
gender	**-.076**	**.019**	**-.038**	**-4.021**	**.000**
children	-.055	.034	-.015	-1.596	.111
good_spirits	**.030**	**.011**	**.038**	**2.597**	**.009**
calm	**.036**	**.011**	**.048**	**3.352**	**.001**
active	-.003	.010	-.004	-.322	.747
rested	**.020**	**.009**	**.028**	**2.288**	**.022**
interest	**.101**	**.009**	**.141**	**11.842**	**.000**
satisfaction_accomodation	-.019	.009	-.021	-2.127	.033
satisfaction_financial_situation	.044	.011	.055	4.161	.000
satisfaction_friendship	**.112**	**.010**	**.112**	**11.056**	**.000**
satisfaction_college	**.303**	**.012**	**.297**	**24.927**	**.000**
alcohol	.011	.008	.014	1.445	.148
smoke	**.031**	**.014**	**.021**	**2.215**	**.027**
exercise	**-.023**	**.005**	**-.044**	**-4.548**	**.000**
colds	-.007	.010	-.007	-.731	.465
headaches	**.023**	**.007**	**.034**	**3.300**	**.001**
sleeping	**.022**	**.007**	**.033**	**2.990**	**.003**
concentrating	**-.094**	**.008**	**-.131**	**-11.469**	**.000**
stress	-.006	.010	-.007	-.592	.554
father_working_status	.004	.003	.013	1.257	.209
mother_working_status	-.002	.004	-.005	-.479	.632
father_education	-.024	.020	-.013	-1.222	.222
mother_education	.006	.020	.003	.320	.749
social_status	.006	.006	.010	.984	.325
income	-.004	.005	-.007	-.751	.453

Constant - This represents the constant, also referred to as the Y intercept, the height of the regression line when it crosses the Y axis. In other words, this is the predicted value when all other variables are 0.
B - These are the values for the regression equation for predicting the dependent variable from the independent variable. The regression equation is presented in many different ways, for example:

Ypredicted = b0 + b1*x1 + b2*x2 + b3*x3 + b4*x4

Std. Error - These are the standard errors associated with the coefficients.
Beta - These are the standardized coefficients. These are the coefficients that you would obtain if you standardized all of the variables in the regression, including the dependent and all of the independent variables, and ran the regression.
t and **Sig**. - These are the t-statistics and their associated 2-tailed p-values used in testing whether a given coefficient is significantly different from zero.

Table 3: Multiple Regression Coefficients

14

Decision Tree

This research developed a predictive decision tree model of the data (Figure 1). It was decided to rescale the target variable to a binary variable i.e. remove those that are neither satisfied nor dissatisfied. From the original dataset only 1,321 students reported that they were dissatisfied. To ensure a balance between satisfaction and dissatisfaction within the target variable it was decided to take a random sample of satisfied respondents. Thus, the analysis was carried out on a total of 2,667 respondents, of which 1,321 reported that they were dissatisfied with their experience in higher education, while 1,346 were satisfied.
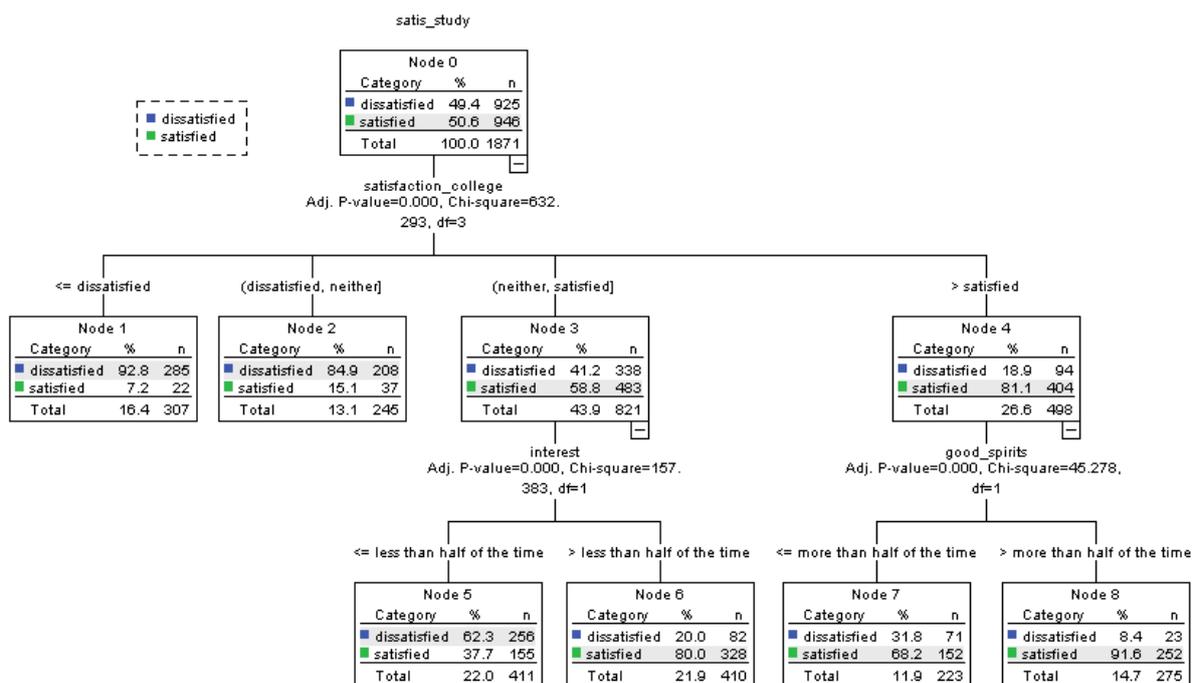
Figure 1: Decision Tree (Training Set)

15
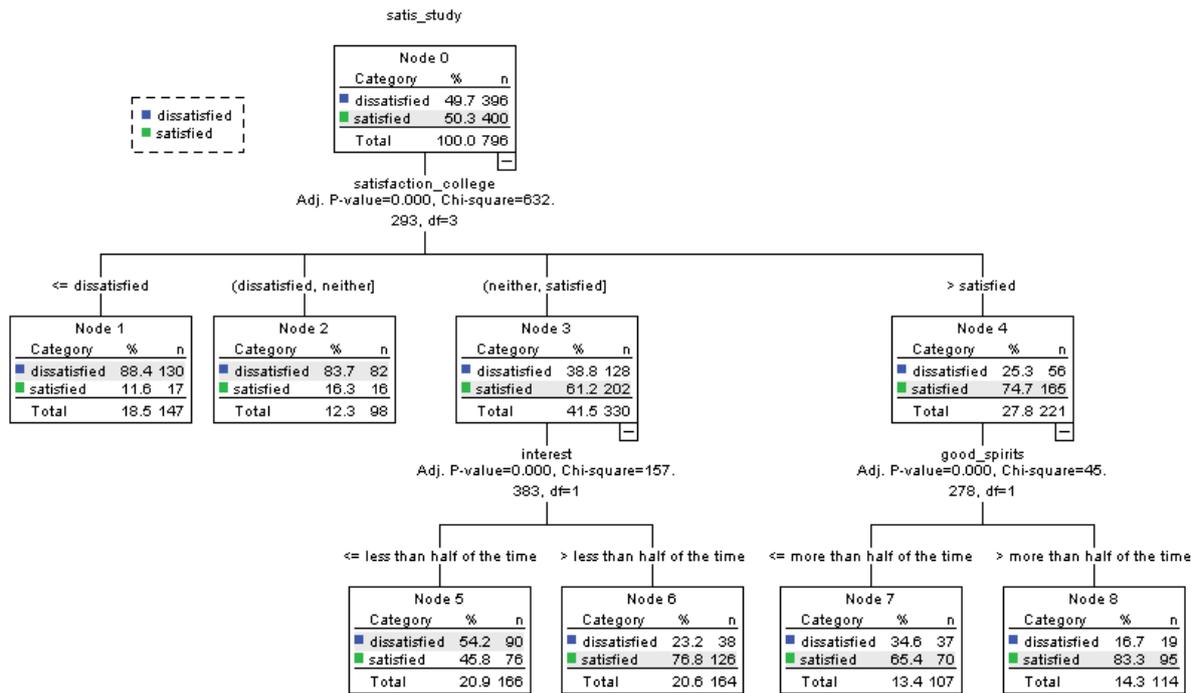
Figure 2: Decision Tree (Holdout Sample)

Sample	Observed	Predicted		
		dissatisfied	satisfied	Percent Correct
Training	dissatisfied	749	176	81.0%
	satisfied	214	732	77.4%
	Overall Percentage	51.5%	48.5%	79.2%
Holdout	dissatisfied	302	94	76.3%
	satisfied	109	291	72.8%
	Overall Percentage	51.6%	48.4%	74.5%

Table 4: Decision Tree Classification

The data was split between a training and a holdout sample. 70% of the data was randomly selected for the training set i.e. the model was developed using this data. The remaining 30% of respondents were used to test the model once complete (holdout sample). The classification matrix (Table 4) indicates that the model correctly predicts 79% of respondents in the training sample and 75% in the hold out sample. In both data sets the model is slightly better at predicting dissatisfied students in comparison to satisfied students.

16

The decision tree for the training set is outlined in Figure 1 while the decision tree for the hold out sample is outlined in Figure 2. The first variable in both datasets is satisfaction with college. The decision tree model predicts that if a student is dissatisfied with their college, they will be dissatisfied with their studies. If a student is neither satisfied nor dissatisfied with their college the next variable is *Interest* (the extent to which the student feels interested). If a student feels interested less than half of the time, they will be dissatisfied whereas if they feel interested more than half of the time they will be satisfied. If a student is satisfied with their college, the next variable is good spirits (the extent to which the students feels in good spirits). If the student feels in good spirits more than half the time, there is a higher probability that they will be satisfied (83%) than if they feel in good spirits less than half of the time (65%).

Logistic Regression

Following the rescaling of the target variable to a binary variable, a logistic regression test was carried out on the data. Table 5 indicates an R square of 0.45, this is similar to the findings of the linear regression test. The classification matrix (table 6) indicates an overall correct classification rate of 82.5%.

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1594.222[a]	**.454**	.605

-2 Log likelihood - This is the -2 log likelihood for the final model. By itself, this number is not very informative. However, it can be used to compare nested (reduced) models.

Cox & Snell R Square and **Nagelkerke R Square** - These are pseudo R-squares. Logistic regression does not have an equivalent to the R-squared that is found in OLS regression; however, many people have attempted to develop one. There are a wide variety of pseudo-R-square statistics (these are only two of them).

Table 5: Logistic Regression Model Summary

17

The significant independent variables are bold in Table 7. These include teaching quality, facilities, travel time and distance to college, time pressure, commitment to college, gender, health and well being variables including feeling calm and interested, level of exercise, extent to which the student experiences difficulty sleeping, concentrating, stress or suffers from headaches, satisfaction with finances, friendship and college. These are similar to those noted in the linear regression test.

	Predicted		
Observed	Dissatisfied	Satisfied	Percentage correct
Dissatisfied	846	187	81.9
Satisfied	171	837	83.0
Overall percentage			82.5

Table 6: Logistic Regression Classification

Table 8 summarises results of the regression (linear and logistic) and decision tree analysis.

18

		B	S.E.	Wald	df	Sig.	Exp(B)
	teaching_quality	**.274**	**.098**	**7.805**	**1**	**.005**	**1.316**
	timetable	.080	.072	1.246	1	.264	1.083
	module_selection	.114	.067	2.883	1	.090	1.121
	staff_admin	-.087	.071	1.473	1	.225	.917
	staff_teaching	.140	.089	2.448	1	.118	1.150
	facilities	**-.243**	**.070**	**12.150**	**1**	**.000**	**.784**
	pre_achievement	-.027	.021	1.588	1	.208	.974
	distance	.000	.000	.367	1	.545	1.000
	travel_time	**-.008**	**.003**	**6.779**	**1**	**.009**	**.992**
	travel_distance	**.010**	**.004**	**6.570**	**1**	**.010**	**1.010**
	financial_difficulty	-.061	.078	.605	1	.436	.941
	working	-.024	.030	.656	1	.418	.976
	time_pressures_study	**-.184**	**.061**	**9.099**	**1**	**.003**	**.832**
	commitment	**.825**	**.078**	**111.604**	**1**	**.000**	**2.283**
	gender	**-.525**	**.142**	**13.691**	**1**	**.000**	**.592**
	children	-.388	.248	2.460	1	.117	.678
	good_spirits	.034	.081	.181	1	.670	1.035
	calm	**.179**	**.078**	**5.279**	**1**	**.022**	**1.196**
	active	-.049	.070	.483	1	.487	.952
	rested	.078	.065	1.434	1	.231	1.081
Step 1[a]	**interest**	**.375**	**.062**	**36.034**	**1**	**.000**	**1.455**
	satisfaction_accomodation	-.074	.064	1.332	1	.248	.929
	satisfaction_financial_situation	**.187**	**.076**	**6.035**	**1**	**.014**	**1.206**
	satisfaction_friendship	**.326**	**.070**	**21.819**	**1**	**.000**	**1.386**
	satisfaction_college	**.859**	**.088**	**95.095**	**1**	**.000**	**2.360**
	alcohol	.016	.059	.073	1	.787	1.016
	smoke	-.037	.096	.150	1	.699	.964
	exercise	**-.121**	**.037**	**10.979**	**1**	**.001**	**.886**
	colds	-.017	.072	.055	1	.815	.983
	headaches	**.139**	**.053**	**6.869**	**1**	**.009**	**1.150**
	sleeping	**.156**	**.056**	**7.771**	**1**	**.005**	**1.169**
	concentrating	**-.546**	**.069**	**62.967**	**1**	**.000**	**.580**
	stress	**-.236**	**.077**	**9.408**	**1**	**.002**	**.790**
	father_working_status	.028	.022	1.676	1	.196	1.029
	mother_working_status	-.016	.028	.333	1	.564	.984
	father_education	-.016	.143	.012	1	.913	.985
	mother_education	-.142	.149	.918	1	.338	.867
	social_status	.019	.048	.151	1	.697	1.019
	income	-.042	.037	1.337	1	.248	.959
	Constant	-5.654	1.162	23.697	1	.000	.004

B - These are the values for the logistic regression equation for predicting the dependent variable from the independent variable. They are in log-odds units. The prediction equation is

log(p/1-p) = b0 + b1*x1 + b2*x2 + b3*x3 + b3*x3+b4*x4

S.E. - These are the standard errors associated with the coefficients. The standard error is used for testing whether the parameter is significantly different from 0; by dividing the parameter estimate by the standard error you obtain a t-value. The standard errors can also be used to form a confidence interval for the parameter.

Wald and **Sig.** - These columns provide the Wald chi-square value and 2-tailed p-value used in testing the null hypothesis that the coefficient (parameter) is 0. Coefficients having p-values less than alpha are statistically significant. For example, if you chose alpha to be 0.05, coefficients having a p-value of 0.05 or less would be statistically significant .

df - This column lists the degrees of freedom for each of the tests of the coefficients.

Exp(B) - These are the odds ratios for the predictors. They are the exponentiation of the coefficients.

Table 7: Logistic Regression Variables in the Equation

19

Predictor variable	Linear Regression	Decision Tree	Logistic Regression
Teaching quality	☆		☆
Timetable (class scheduling)	☆		
Teaching staff	☆		
Facilities	☆		☆
Travel distance to college	☆		☆
Travel time to college			☆
Time pressures	☆		☆
Commitment to studies	☆		☆
Gender	☆		☆
Feeling in good spirits	☆	☆	
Feeling calm	☆		☆
Feeling rested	☆		
Feeling interested	☆	☆	☆
Satisfaction with accommodation	☆		
Satisfaction with finances	☆		☆
Satisfaction with friendships	☆		☆
Satisfaction with college	☆	☆	☆
Smoking	☆		☆
Exercise	☆		
Difficulty sleeping	☆		☆
Difficulty concentrating	☆		☆
Stress			☆
Experiencing headaches	☆		☆

Table 8: Summary of Predictor Variables

Analysis of the three tests indicates that satisfaction with college is the most important predictor variable of student satisfaction. The research noted that 79% of satisfied students are also satisfied with their college in comparison to just 26% of dissatisfied students. This is

20

in line with Elliot's (2002) argument that quality of education is an important factor and Ozga and Sukhandan (1998) findings from qualitative research in the UK. They argued that previous models placed too much emphasis on the fault of the student and argued that the reasons for non completion are evenly distributed between the student and the institution. It is important that colleges ensure students are satisfied with the college, in particular this study highlighted the importance of teaching quality, teaching staff and facilities. Kuh et al. (2005) and Pascarella and Terenzini (2005) highlight the importance of teaching staff and the relationship they develop with students. Roberts and Styron (2010) found that those that did not return to college had statistically significant lower perceptions of academic staff approachability than those that remained in their course. Kara and DeShields (2004) also report a positive relationship between academic staff performance and student satisfaction.

Class scheduling was noted as important in the linear regression model only. This is in line with research carried out by Loveland and Bland (2013) who found that class scheduling has a significant impact on student satisfaction.

Student exercise was noted as a significant predictor variable in both the linear and logistic regression. Colleges should encourage students to take regular exercise and ensure facilities are available for students. Students who are more committed to their studies report higher levels of satisfaction and colleges should ensure student feel involved and committed to their studies.

21

It was noted in the literature that working full-time can impede persistence among third level students (Astin & Oseguera, 2005). While this was not reported as a significant predictor of satisfaction, time pressure was also noted as an important variable. Colleges should ensure students have adequate time to study and undertake course work, possibly through class and assignment/assessment scheduling.

This study also highlighted the importance of health and wellbeing. Feeling interested was reported as an important predictor variable in all models. Just 4.2% of students that feel interested most or all of the time report that they are dissatisfied, in comparison to 29.8% of students that are interested none or some of the time. This highlights for colleges the importance of attracting and retaining student's interest. Elliot (2002) argues that quality of education is an important factor affecting student satisfaction; he went on to argue that students want to experience intellectual growth. Similarly, Frederick (2012) argued that being intellectually challenged is associated with student satisfaction. Astin (1991) argued that student involvement has a major impact on students' learning and development. As such, the effectiveness of educational policy or practice is directly related to its capacity to increase student involvement (Braxton & Hirschy, 2005). This was also noted in Tinto's (1975) Interactionalist Theory which argues that a student's decision to withdrawal is the culmination of a longitudinal process that determines a student's ability to integrate into the academic and social aspect of an institution. Feeling calm and in good spirits were found to be significant predictor variables in two models.

Satisfaction with finances was noted as an important predictor variable in two models. This is in line with Tinto's (1993) argument that the financial situation of the student is likely to

affect their decision to leave college. Financial concerns are commonly cited as an important reason students give for their departure from college (Astin & Oseguera, 2005). This was cited as a factor leading to non completion in studies conducted in the UK (Yorke, 1999; Davies & Elias, 2003) and Ireland (Healy et al., 1999). According to Archuleta et al. (2013) adverse financial situations and financial anxiety can contribute to students' dissatisfaction. Murdock (1987) found financial aid promotes persistence. Langbein and Snider (1999) found that more financial aid significantly increases the probability that a student will remain within college.

Satisfaction with friendship was also noted as significant in two models. This highlights the importance of students making friends and feeling involved in college. It was noted in the literature that the social lives of students and their exchanges with others inside and outside the institution are important in retention decisions (Bean, 2005). Roberts and Styron (2010) found that those that did not return to college had statistically significant lower perceptions of social connectedness than those that remained in their course. Ethington (1990) also found academic and social integration has a direct and positive effect on completion. As noted by Tinto (1993), it is imperative for higher education administrators to work diligently to provide students with opportunities to get involved with campus and activities.

While literature has argued that parents' educational backgrounds (Bean, 2005) and income have been seen to directly and indirectly affect a student's completion (Astin & Oseguera, 2005), this study did not find either of these variables as predictors of student satisfaction.

23

Satisfaction and future plans

Analysis was also performed on the relationship in Eurostudent survey responses between student satisfaction and their intention to pursue further studies. Figure 3 and Table 9 indicate that there is no relationship between further study intentions and satisfaction among this group of students.
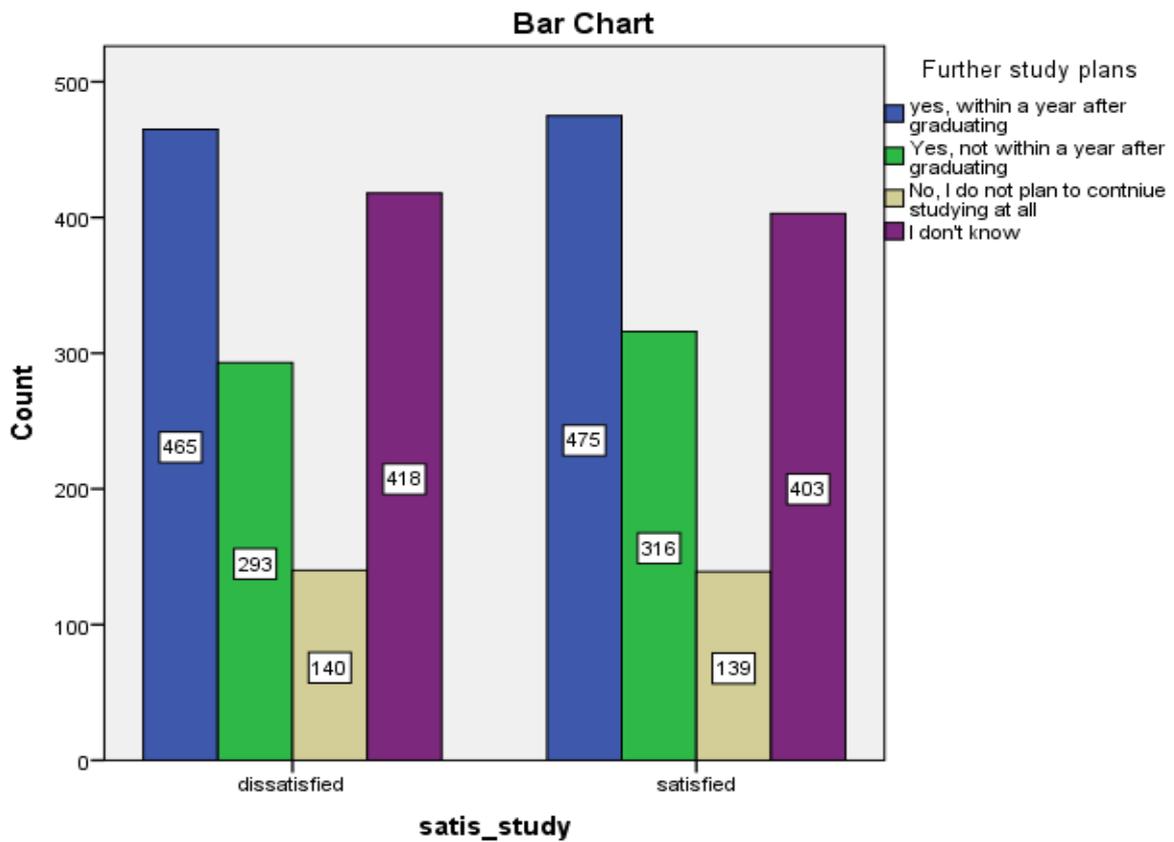
Figure 3: Satisfaction * Further study plans Bar chart

24

		Further study plans				Total
		yes, within a year after graduating	Yes, not within a year after graduating	No, I do not plan to continue studying at all	I don't know	
Satisfaction study	dissatisfied	35.3%	22.3%	10.6%	31.8%	100.0%
	satisfied	35.6%	23.7%	10.4%	30.2%	100.0%
Total		35.5%	23.0%	10.5%	31.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.144[a]	3	.767
Likelihood Ratio	1.144	3	.767
Linear-by-Linear Association	.540	1	.462
N of Valid Cases	2649		

Table 9: satisfaction * Further study plans Crosstabulation

An analysis of the relationship between satisfaction and perception of employment prospects (Tables 10 and 11) indicates that satisfied students rate their employment prospects (both nationally and internationally) higher than dissatisfied students. Chi-Square test results indicate that the difference is statistically significant.

		Employment prospects (National)					Total
		very poor	poor	neither	good	very good	
Satisfaction study	dissatisfied	11.8%	30.0%	12.3%	29.9%	16.1%	100.0%
	satisfied	6.8%	17.3%	10.9%	39.4%	25.5%	100.0%
Total		9.3%	23.5%	11.6%	34.7%	20.9%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	101.203[a]	4	**.000**
Likelihood Ratio	102.140	4	.000
Linear-by-Linear Association	95.520	1	.000
N of Valid Cases	2435		

Table 10: satisfaction * Employment prospects (National) Crosstabulation

25

		Employment prospects (International)					Total
		very poor	poor	neither	good	very good	
Satisfaction study	dissatisfied	4.3%	12.6%	12.0%	39.0%	32.1%	100.0%
	satisfied	1.4%	5.6%	9.5%	39.9%	43.6%	100.0%
Total		2.9%	9.1%	10.7%	39.5%	37.9%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	73.418[a]	4	**.000**
Likelihood Ratio	75.170	4	.000
Linear-by-Linear Association	71.870	1	.000
N of Valid Cases	2314		

Table 11. Satisfaction * Employment prospects (International) Crosstabulation

This research found that 70% of students report that they are satisfied and 14% indicate that they are dissatisfied (16% report that they are neither satisfied nor dissatisfied). This research provides important insight of the factors that impact on student satisfaction. Internal factors include satisfaction with college, teaching staff and facilities. External factors include satisfaction with finances, accommodation and friendship, feeling interested, calm and in good spirits. It is recommended that senior leadership teams in Irish Higher Education Institutions monitor these factors to identify students that are dissatisfied or likely to become dissatisfied in the near future and develop strategies to support these students.

Conclusion

A predictive model of student satisfaction was developed and analysed using linear regression, decision tree analysis and logistic regression. An analysis of the three models found that satisfaction with college is the most important predictor variable of student satisfaction. This study also highlighted the importance of teaching quality, teaching staff and facilities. This research found a positive feeling interested, calm and in good spirits were found to be significant predictor variables of student satisfaction. Satisfaction with finances,

26

accommodation and friendship were noted as an important predictor variable in two models. However, social class and income were not found to be predictors of student satisfaction.

The research found that there is no relationship between further study intentions and satisfaction among this group of students. An analysis of the relationship between satisfaction and perception of employment prospects (both nationally and internationally) found satisfied students rate their employment prospects higher than dissatisfied students.

It is recommended that future research is carried out among students enrolled in Higher Education Institutions in Ireland using a purposely developed instrument that draws on current literature in the area. This data should be used to develop a prediction model of student satisfaction and retention and analyse the relationship between satisfaction and retention.

27

References

Alzamel, S. (2014). Factors that influence student satisfaction with international programs in institutions of higher education: A proposed case study of University of Dayton. *International Journal of Global Business, 7*(1), 15-24.

Archuleta K., Dale A., & Spann, S. (2013). College students and financial distress: Exploring debt, financial satisfaction and financial anxiety. *Journal of Financial Counselling, and Planning* 24(2) 50-62.

Aritonang, L. (2014) Student loyalty modelling. *Trziste, XXVI*(1), 77-91.

Astin A., & Oseguera L. (2005) *Degree attainment rates at American colleges and universities.* Los Angeles: Higher Education Research Institute, University of California.

Bean, J. (2005). Nine themes of college student retention. In A. Seidman (Ed.), *College student retention* (pp. 215-243). Westport: Praeger Publishers.

Bennett, R., & Kane S. (2009). Factors associated with high first year undergraduate retention rates in business departments with non traditional intakes. *International Journal of Management Education, 8*(2), 53-66.

Berger, J., & Lyon, S. (2005). Past to present: A historical look at retention. In A. Seidman (Ed.), *College student retention.* Westport: Praeger Publishers.

Braxton, J., & Hirschy, A. (2005). Theoretical developments in the study of college student departure. In A. Seidman (Ed.), *College student retention.* Westport: Praeger Publishers.

Chambel, M., & Curral, L. (2005). Stress in academic life: Work characteristics as predictors of student well-being and performance. *Applied Psychology: An International Review 54*(1), 135-47

Collis, J., Hussey, R., & Hussey, J. (2009). *Business Research: A practical guide for undergraduate and postgraduate students.* Basingstoke: Palgrave Macmillan.

Cox, P., Schmitt E., Bobrowski P., & Graham, G. (2005). Enhancing the first year experience for business students: student retention and academic success. *The Journal of Behavioural and Applied Management, 7*(1), 40-68.

Davies, R., & Elias, P. (2003). *Dropping out: a study of early leavers from higher education.* DfES Research Report RR 386. Norwich: The Stationery Office.

DeShields, O., Kara A., & Kaynak, E. (2005) Determinants of business student satisfaction and retention in higher education. *International Journal of Educational Management 19*(2), 128-39.

Elliot, K. (2002). Key determinants of student satisfaction. *Journal of College Student Retention, 4*(3), 271-279.

Enache, I. (2011). Customer behaviour and student satisfaction. *Bulletin of the Transilvanian University of Brasov, 4*(2), 41-46.

Ethington, C. (1990). A psychological model of student persistence. *Research in Higher Education, 31*(3), 279-93.

Eurostudent V (Irish Report): www.hea.ie/sites/default/files/eurostudentv_final.pdf

Eurostudent V (European Report): www.eurostudent.eu/results/reports

Frederickson, J. (2012). Linking student effort to satisfaction: The importance of faculty support in creating a gain-loss frame. *Academy of Educational Leadership Journal 16*, 111-24.

Gemme, E. (1997). Retaining customers in managed care market. *Marketing Health Services* Fall, *17*(3), 19-21.

28

Gibson, A. (2010). Measuring business student satisfaction: A review and summary of major predictors. *Journal of Higher Education Policy and Management,* 32(3), 251-59.

Guolla, M. (1999). Assessing teaching quality to student satisfaction relationship: Applied customer satisfaction research in the classroom. *Journal of Marketing Theory and Practice,* 7(3), 87-96.

Hagedorn, L. (2005). How to define retention: A new look at an old problem. In A. Seidman (Ed.). *College student retention,* pp.89-105. Westport: Praeger.

Healy, M., Carpenter, A., & Lynch, K. (1999). *Non-completion in Higher Education: A Study of First Year Students in Three Institutes of Technology.* Ireland: Institute of Technology Carlow, Dundalk Institute of Technology, Institute of Technology Tralee.

Hill, F. (1995). Managing service quality in higher education: the role of the student as primary consumer. *Quality Assurance in Education, 3*(3), 10-21.

Irish Survey of Student Engagement: www.studentsurvey.ie

Jones, W. (1990). Perspectives on ethnicity. In L. Moore (Ed.). *Evolving theoretical perspectives on students,* pp. 59-70*.* San Francisco: Jossey-Bass.

Kara, A., & DeShields, O. (2004). Business student satisfaction, intentions and retention in higher education: An empirical investigation. *MEQ, 3*(Fall), 1-16.

Kuh, G., Kinzie, J., Schuh, J., & Whitt, E. (2005). *Student success in college: Creating conditions that matter.* San Francisco: Jossey-Bass.

Langbein, L., & Snider, K. (1999). The impact of teaching on retention: some quantitative evidence. *Social Science Quarterly,* 80(3), 457-72.

Loveland, K., & Bland, E. (2013). Impact of course scheduling formats on student learning and satisfaction. *International Atlantic Economic Society,* 41, 191-92.

Malhotra, N. (2007). *Marketing Research: An applied orientation.* New Jersey: Pearson/Prentice Hall.

Mark, E. (2013). Student satisfaction and the customer focus in higher education. *Journal of Higher Education Policy and Management, 35*(1), 2-10.

Martirosyan, N., Saxon, D., & Wanjohi, R. (2014). Student satisfaction and academic performance in Armenian higher education. *American International Journal of Contemporary Research, 4*(2), 1-5.

Matthews, N., & Mulkeen, S. (2002). *Staying the course? A study of student retention: UCD entrants 1999-2001.* Dublin: University College Dublin.

Meling, V., Kupczynski, L., Mundy, M., & Green, M. (2012). The role of supplemental instruction in success and retention in math courses at a Hispanic serving institution. *Business Education Innovation Journal, 4*(2), 20-31.

Moses, L., Hall, C., Wuensch, K., De Urquidi, K., Kauffmann, P., Stewart, W., Duncan, S., & Dixon, G. (2011). Are math readiness and personality predictive of first year retention in engineering? *Journal of Psychology, 145*(3), 229-45.

Moxley, D., Najor-Durack, A., & Dumbrigue, C. (2001). *Keeping students in higher education: Successful practices and strategies for retention*. London: Kogan Page.

Murdock, T. (1987). It isn't just money: The effects of financial aid on student persistence. *Review of Higher Education, 24*(1), 47-71.

Murray, N. (2014) Males linked to growing dropout rate at third level. *Irish Examiner,* July 14th 2014.

National Survey of Student Engagement: www.nsse.indiana.edu

Osman, D., O'Leary, C., & Brimble, M. (2014). Model to evaluate attrition/retention decisions by accountancy diploma students: case study evidence from Sudan. *Business Education and Accreditation, 6*(2), 71-88.

29

Ozga, J., & Sukhnandan, L. (1998). Undergraduate Non-Completion: Developing an Explanatory Model. *Higher Education Quarterly, 52*(3), 316–33.

Pascarella, E., & Terenzini, P. (2005). *How college affects students: A decade of research.* San Francisco: John Wiley & Sons.

Priya Raina, S., Bhadouria, S., & Charu Shri. (2013). An empirical study on satisfaction level of students from technical institution. *SIES Journal of Management, 9*(2), 24-46.

Richardson, J. (1995). Mature students in higher education: II. An investigation of approaches to studying and academic performance. *Studies in Higher Education, 20*(1), 5-17.

Roberts, J., & Styron, R. (2010). Student satisfaction and persistence: factors vital to student retention. *Research in Higher Education,* 6, 1-18.

Rode, J., Arthaud-Day, M., Mooney, C., Near, J., Baldwin, T., Boomer, W., & Rubin, R. (2005). Life satisfaction and student performance. *Academy of Management Learning & Education, 4*(4), 421-33.

Rokach, L., & Maimon, O. (2008). *Data mining with decision trees: Theory and applications.* New Jersey: World Scientific.

Sargent, C., Borthick, A., & Lederberg, A. (2011). Improving retention for principle of accounting students: Ultra short online tutorials for motivating effort and improving performance. *Issues in Accountancy Education, 26*(4), 657-79.

Smayling, M., & Miller, H. (2012). Job satisfaction and job performance at the internship level. *Journal of Leadership, Accountability and Ethics, 9*(1), 27-33.

Sopon, D., Ilies, L. & Petean, F. (2013). Quality of educational services: The influence of external factors on university student satisfaction – a case study. *Managerial Challenges of the Contemporary Society, 6*, 112-16.

Stukalina,Y. (2014). Identifying predictors of student satisfaction and student motivation in the framework of assuring quality in the delivery of higher education services. *Business, Management and Education, 12*(1), 127-37.

Thomas, E., & Galambos, N. (2008). What satisfies students? Mining student opinion data with regression and decision tree analysis. *Research in Higher Education, 45*(3), 251-69.

Thompson, L., & Prieto, L. (2013). Improving retention among college students: Investigating the utilization of virtualized advising. *Academy of Educational Leadership, 17*(4), 13-26.

Tinto, V. (1993). *Leaving College: Rethinking the causes and cures of student attrition*, 2nd ed. Chicago: University of Chicago Press.

Wilkins, S., Melodena, S., & Huisman, J. (2012). Student satisfaction and student perceptions of quality at international branch campuses in the United Arab Emirates. *Journal of Higher Education Policy and Management, 34*(5), 543-56.

Wright, C., & O'Neil, M. (2002). Service quality evaluation in the higher education sector: An empirical investigation of students' perceptions. *Higher Education Research and Development, 21*, 23-40.

Yorke, M. (1999). *Leaving Early: undergraduate non-completion in higher education*. London: Falmer.

Yorke, M. & Longden, B. (2004) *Retention and Student Success in Higher Education*. Maidenhead: Society for Research into Higher Education/Open University.

30