Mapping a Retention Index Across the Student Continuum

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Abstract

Student retention is the field of institutional research that has (deservedly) had the most attention. Besides the models proposed by Tinto (1975, 1993), there have been many theoretical and applied papers on many aspects of student retention. These include demographic characteristics, scholastic scores, financial and residential considerations, orientation activities, quality of teaching and supervision, campus life, societal and social integration, support services like libraries, counselling, office bound vs. online student administration and information services, (first year) attrition, experiential training, language proficiency, discrimination, commitment of students, competitiveness with peers, communication and other 'life skills', and so forth. For this précis, some of the more recent research that will be examined includes Madgett and Bélanger (2008), Swail (2006), Carter (2006) and Burns (2010).

The purpose of this article is to describe a mapping of institutional-applicable indices developed over the years, based on single or highly complex analyses and statistical modelling of the aspects above, or combinations of these, or other aspects. The emphasis will be from the student's perspective, over the time period from admission to graduation, and over the nature of phases and processes within the university. Wide anecdotal evidence suggests that managing the knowledge gleaned from data and information, from systemic and/or survey sources, is a strategic approach that may be remiss in many universities, as are the ad hoc retention improvement interventions, rather than an integrated approach.

Keywords: Student retention; Higher education; success; attrition; indicators; model

The advantage of an institution using a coherent and integrated approach, and a fairly sophisticated management, of the information relating to students, staff and facilities is that the quality and value added is available to its principal and senior managers, preferably in aggregated dashboards within up-to-date business intelligence models. Overall success is monitored for trends and for benchmarking for the institution (college or university) as a whole, and will influence responsible academic planning. Predictive models, curious to the country or institution, should also be applied.

A continuous or continued sample of indices, interventions and outcomes is proposed, with an attempt to combine these in additive or multiplicative operations. The focus must be

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on the individual student. The latter must be automatically monitored, flagged and directed to a personalised system of remediation, if necessary. Aggregated calculations that present the institution's quality as a place of higher education are an added advantage.

Student Retention Model

Higher education institutions are in the privileged position of accompanying people through one of the most important stages in their life, when they go through an intensive period of growth and learning. We are wont to call these learners 'students', but the Latin root word is *studio*, as 'to be eager, take pains, strive after, favour', and only lastly, 'to study a subject'. Whatever the perception, age or background of a student, s/he approaches a college or university with various expectations; anticipating a time and process that will culminate in a qualification and long-term benefits such as employment and fiscal stability.

A student coming from a supportive environment of good schooling, hard work, good teaching, positive socialising and sufficient financial resources has a much higher probability of achieving 'success', according to many analyses and predictive models. The privilege and responsibility of an institution is to support and enrich the transition from school-leavers to mature people, who will provide socioeconomical benefit to the community.

In the field of Institutional Research (IR), especially with regard to student retention, it has emerged that the learners' sojourn through higher education is fraught with many challenges. Furthermore, the nature of the challenges in these electronic and globalised times has changed in many ways and remains in flux. Predicting the success of a student under a described set of circumstances requires embarking on a statistical exercise which, if handled with scientific rigor, can anticipate certain results or outcomes. This inference can be drawn on the likelihood of a student progressing positively at a specific juncture or over a specific period. Pin-pointing the problem(s) at a certain time or in a certain phase of the student's path helps the university take any number of measures to steer the student away from 'danger' and to varying degrees of 'success'.

The Concept of the Integrated Model for Student Retention

A three-tiered approach or framework is proposed, where each tier can be viewed as a horizontal layer in a Rubik® cube. Each block on the Rubik® cube layer will represent an aspect affecting the student at the institution. Each block or layer is to be indexed (quantified by suitable measurements) across time and stage in the institution, relative to the phase or stage of the student's academic progress. The tiers or layers are plotted as split cube layers, plotted over time and level of study, with generic descriptions for aspects to be articulated in more detail per specific institution. Each layer presents the combined values that made up the respective composite layer index, say LI, LII and LIII.

Within each layer there will be nine blocks, as in Rubik's® colour-blocked, axled and manipulable, symmetric form. All blocks and layers (horizontal or vertical) are related, can move, and touch each other—they are integrated. The whole 'Retention Cube', which requires continually monitoring the progress of the student, is based on a strategic approach. Since each student is an individual client, the intervention(s) must be most applicable to that particular person

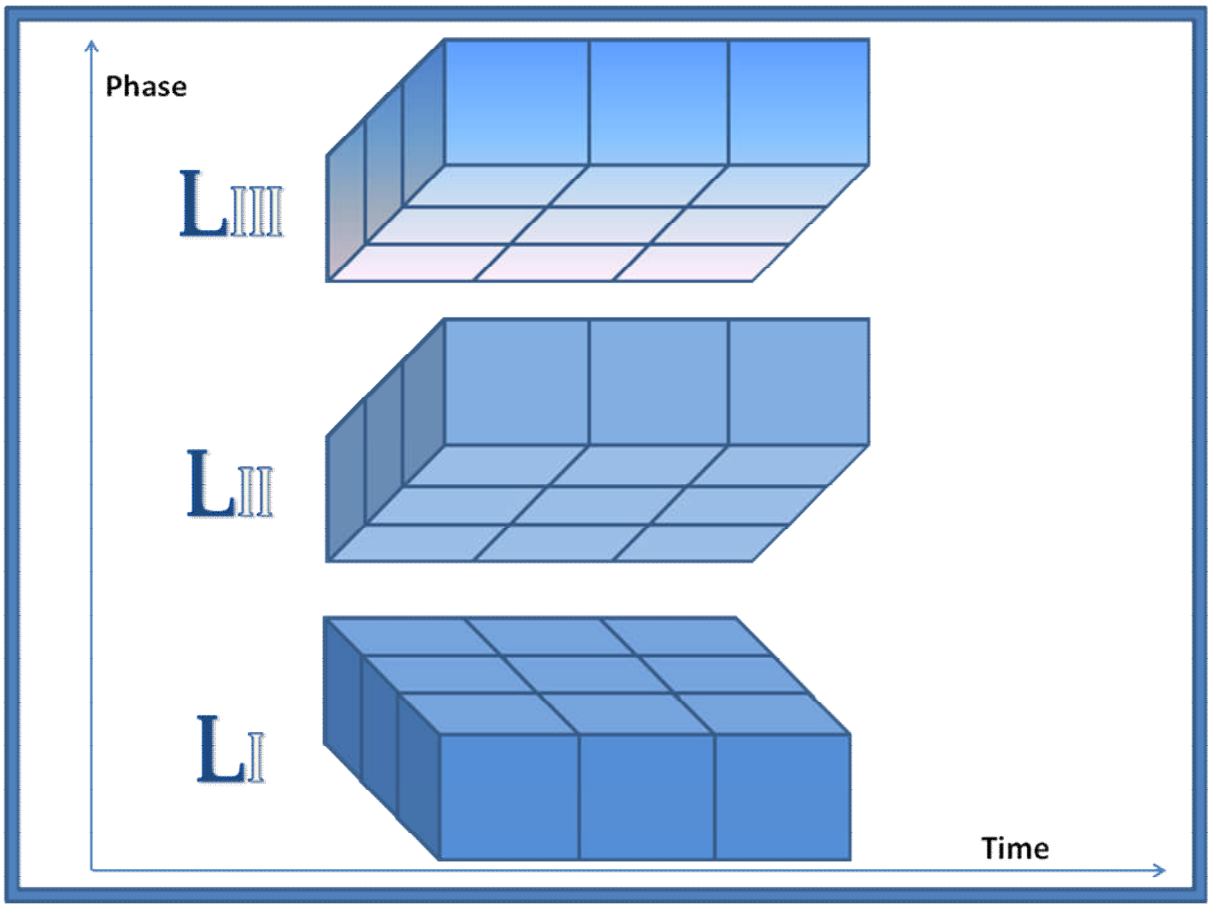

Figure 1

Student continuum: Generic concept.

The choice regarding the aspects that are to be split into the aggregated issues, across time and/or level of study, must be that which is most relevant to a specific institution. The components for a two-year college may differ from those proposed for an intensive postgraduate or industrial research university. The elements (cubes) below could be those for an institution delivering a degree program, with its greatest cohort consisting of undergraduate students.

Layer I: Entry to Higher Education

- Layer I represents the student attributes upon entry, which include, but are not limited to academic preparedness, financial support, demographics, living conditions, social skills, etc.

Layer II: Assimilation and progress

- Layer II represents the student's assimilation into the institution—the learning and social environment and his/her experiences. The orientation or induction; academic programs; navigation across campuses and to classrooms; quality of faculty (academic staff); access to and quality of services like the library, computers; accommodation; additional foundational academic support; outcomes of assessments; new approaches

to studying and large volumes of learning, etc. This layer, mostly in the first year, is where a great deal of student attrition usually occurs.

Layer III: Persistence and Success

- Layer III takes the student further across the years and the academic progress. It reveals the student's commitment, academic prowess, graduation and then the readiness and transition to postgraduate studies, employment or entrepreneurship and hence the socioeconomic impact the graduate can make on society.

Cube-continuum

These three layers atop one another give a broad view to what will be referred to as the 'student continuum'. Each layer has a composite measurement, revealing a probability of success, based directly or indirectly on the quality of the institution's teaching and learning and support services, and leading to additional, student-specific retention improvement interventions.

The three layers should each be subdivided into the most important aspects affecting student success, which are institution-specific.

Student Retention: General

Enrolling a student at an institution of higher education (HE) is always done with the hope that the student will not drop out, but will persist until s/he acquires one or more formal qualifications. Ensuring quality and success across this continuum is what student retention research is all about.

'Failure' and withdrawal versus the norms of 'success', is often measured as, for example, attrition rates at HE institutions, or decreased pass rates, or fiscal loss; often with culpability laid at the door of the student. The trauma experienced by the students who have 'failed', for reasons within or beyond their control, is negative both in a psychological sense as well as in the country's long-term economic wellbeing. The good reputation of a HE institution is also at stake to ensure sustainability of its service over generations.

Student Retention: Models and Factors

A retention paper without a reference to Vincent Tinto's model of student departure (Spady, 1971; Tinto, 1975, 1993) and other groundbreaking authors would be remiss, since their generic validity remains constant. The key areas limiting persistence to this day remain academic backgrounds, inadequate financial aid and poor support networks (Breier, 2010). As a brief overview of the factors influencing student retention, some aspects are listed below.

Madgett and Bélanger (2008)—quoting Swail, Redd, and Perna, (2003) and Swail, (2006)—include financial issues, educational legacy, attitude toward learning, religious background, maturity, social coping skills, communication skills, attitude towards others, cultural values, expectations, goal commitment, family influence, peer influence and social lifestyle as key factors. A student must also establish both academic and social relationships in order to pass through Tinto's three phases of separation (Madgett & Bélanger, as cited by Nora, Cabrera, Hagedorn, & Pascarella, 1996). A useful reference list is that of Adam and Gaither (2005).

In her paper on institutional habitus, Liz Thomas (2002) highlights academic preparedness, academic experience, institutional expectations and commitment, finance and employment, family support and commitment (e.g. childcare for women studying), university support services, the social experience: friendship, mutual support and social networks, attitudes of staff and so forth. She also provides a key selection of references to the body of institutional research and theory exploring the individual, social and organisational factors that impact on student retention in HE (Ozga & Sukhnandan, 1998; Tinto 1975). The effects of motivation or commitment and social connectedness has been well-documented, not only for first-year students, but also further along in undergraduate studies (Allen, Robbins, Casillas, & Oh, 2008).

At the 2010 AIR forum in the United States, Dr William G. Bowen, quoted from his book *Crossing The Finish Line: Completing College At America's Public Universities*:

> If you 'beef up' the *foundational skills* of students (e.g. Maths for Science & Engineering), they do better, because you also develop their *coping skills*. Don't worry then if they take a bit longer to graduate . . .
>
> Next generations do significantly better *if their parents crossed the finish line* (i.e. graduated). If they only attended College, it's insignificant.
>
> *Better performing* kids from '*lousy' high schools* are much better HE prospects than '*average*' performing kids from '*excellent*' schools'.
>
> (See Mattern, Shaw, & Kobrin, 2010)

Minority or Race

Although Tinto's model is not totally applicable to minority students (Braxton, Sullivan, & Johnson, 1997; Tierney, 1993, 1997, 1999), ethnicity remains a key factor in retention (Carter, 2006). The gaps in the attainment of higher education degrees between different ethnic groups of students, and in their attrition rates, have often been noted (Carter, 2006; O'Neil Green, 2007; Pascarella & Terenzini, 2005). Emphasis is placed on racial stereotypes, (unwelcoming) campus climates and faculty relationships (Love, 2009). Blocking the 'leaking pipeline' of non-traditional students would include benefits like earning more money, fewer health problems, less penal involvement and greater longevity (Seidman, 2005), as opposed to continued, very low socioeconomic levels.

Gender

A recent and interesting study within the Science, Technology, Engineering and Mathematics or STEM disciplines looked at attrition and turnover in postgraduate studies. Women and men are equally committed to their studies, but the former still experience limited research support, advancement and freedom of expression (Xu, 2008). Fewer opportunities, including for leadership, play a role in holding back women, rather than stereotypical family responsibilities. The gender-related differentials in predictions of success have been noted, but in some countries or fields of study these differentials may be changing direction (see Haynes Stewart et al., 2009; Houston, Knox, & Rimmer, 2007; and Jones, 2010).

First-Generation Students

Studies have highlighted that first-generation students differ from their peers in many ways. They often come to college with lower school-leaving results (Riehl, 1994), lower

critical thinking abilities (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996), less family support, and spend less time socialising with (academic) peers or interacting with teachers, have lower confidence upon entry and so forth. Those who make it are often expected to support their (large) families, and thus potential postgraduates are lost. These and other aspects are comprehensively covered by Stratton, O'Toole, and Wetzel (2007).

Finances and Accommodation

Factors that influence student dropouts or stopouts (those who leave the institution and return after a period of time) also include, to a large degree, their financial situation. The public universities in some countries rely solely on the state grants and tuition fees for their income. In emerging countries, many financially strapped students make use of a National Student Funding Allocation System, which provides study loans, converted to bursaries upon graduation. The outstanding debt, especially from dropouts, runs into billions, which can be construed as a double loss.

Many students do not have proper accommodation and spend time in a venue like the library on campus. Sometimes meals are subsidised, but not transport. Very few students can be accommodated in residences, while the rest do a daily commute by public transport or on foot. Some come from large yet poor families, or even minor-headed households. The compound effects of these contribute greatly to student attrition (see Stratton et al., 2007 and Tierney, Venegas, & Luna de la Rosa, 2006).

McEwan and Soderberg *(*2006) pointed out an interesting effect: sharing rooms with academically strong room-mates tends to 'lift' the students' marks, but lackadaisical students distract their peers to the detriment of both. Urban, non-residential universities, or unaffordable residence fees, would then negatively impact on students' socialisation, integration to campus life and lack of academic and peer interaction and support. The traditional residence-inspired identity and institutional affiliation may have had a much stronger alumni coherence and support that is lacking in modern, non-residential institutions.

Publications have highlighted the impact of the quality of facilities, classrooms, computer labs, campus security, provision for commuters or 'day' students on student retention, for example Reynolds (2007) and Herzog (2007).

At-Risk Students

Many measures, mainly quantitative, have been put in place to identify those students 'at-risk' of dropping out, especially in their first year of HE study. Universities from different continents report attrition rates of 20% and higher (Haynes Stewart et al., 2009). Various predictive models have been developed to identify 'at-risk' students—before entry, upon entry or soon after. Whereas school marks served as good indicators for academic success, their greatest value was for admission to the first year of study (Budden M., Hsing, Budden, C., & Hall, 2010; Haynes Stewart et al., 2009), but many other factors ensure ultimate success (see for example Adebayo, 2008).

One model (Van der Merwe, C. & Van der Merwe, S, 2009) applied data mining techniques to profile probabilities of success for engineering students. Although mathematics played a strong role and appeared 'high up' in decision trees, it was the student with good school marks in the language of university tuition that persisted. Information obtained from surveys or from assessments would also inform the 'degree of risk'. Other persistence issues

do not negate the strong predictive ability of academic performance (Pascarella & Terenzini, 2005), but can be modelled by controlling for the latter by means of statistical analyses.

Much emphasis is placed upon detection of a student at academic/social integration/financial risk, or combinations of these, but the integrated approach and systemic tracking of retention interventions is neglected or left to ad hoc implementation. Supplementary instruction or mentoring is often left to faculty, counselling to a 'wellness' unit, reading and writing programs to 'Academic Development' units—and none of these talk to each other. Unless 'at-risk' students do not use the remediation or other support made available by the institution, they should face exclusion and make room for more determined students.

A contra-example is that of the First-Year Experience (FYE) program at the Auckland University of Technology. Their well-articulated system of identification of 'at-risk' students, repeated communication with students and a well-structured and coherent system of intervention has resulted in a greater degree of student success. The personal contact with these students, among thousands of others, yielded very appreciative feedback (Auckland University of Technology, 2007).

Resources allocated for retention efforts remain a 'trade-off' between not resourcing students who are likely to exit prematurely versus treating students who are likely not to exit in the absence of such treatment (Singell & Waddell, 2010). Although the cost of remediation may have risen exponentially, the anticipated student retention and graduation rates did not improve at a rate commensurate with the efforts and resources invested (Raab & Adam, 2005).

Preventative Measures—Remediation

Postsecondary remediation remains a controversial topic, and it can cause frustration within faculty, 'waste' resources such as funds and facilities, and diminish academic standards (Bahr, 2008). The latter study focused on remedial mathematics, often a prerequisite for SET/STEM programs in many countries.

Prospective students' literacy and numeracy pose problems. Bahr (2008) investigated the effect of mathematics remediation, and van der Merwe and Hay (2008) reflected on English proficiency courses. English is often *not* a home language or first language assessed in high school, yet it is the language of tuition at many universities. Where English is not the country's first language, some international or local, indigenous languages have developed strong scientific terminology—which means that many students can gain HE knowledge in their native tongue. In order to succeed, students must gain and apply specialised knowledge via 'academic' English or other language of teaching and learning (see Stratton et al., 2007).

Mentor support in key functions like teaching, sponsoring, encouraging, counselling and befriending has been successful in many instances (Rose, 2003). Factor analysis (Rose, 2003) was applied in defining the ideal mentor. Examining the 'role model' effect of, for example, 'successful' Black women on similar, entering girl-students is still in its infancy, assumed by the paucity of relevant publications and differing rates of gender equalisation in many countries.

In developing countries most indigenous students are first-generation students; come from unsound schooling systems and have to overcome many barriers to success. Social support, especially in the first year, is crucial (Wilcox, Winn, & Fyvie-Gauld, 2005).

Supplementary instruction, tutoring and other measures are applied; but isolating the benefits of these is difficult. The ethics of 'control groups' not having the benefits of remedial intervention remains a moral dilemma to the (institutional) researcher. Since peer and faculty attitudes and behaviours also influence persistence to degree level (Oseguera & Rhee, 2009) some social reform within institutions could also contribute positively to student retention.

The HE Institution and Retention

A US survey of 837 Presidents and senior administration staff indicated that they all agreed that their institution was 'genuinely committed to increasing persistence'! Yet, at most, 40% of the respondents said that their institution had a 'comprehensive, written retention plan'. Some universities have had such a plan for more than a decade, yet still lack a 'systematic, comprehensive approach' to implementation (Butler, 2010).

It is this lack of a coherent, integrated, strategically guided set of quality monitoring and improvement measures, additional retention interventions, comprehensive management information systems, and communication between financial aid/academic/social/assessment islands or silo operations that defeat the very purpose of a student-centred retention monitoring and implementation plan.

Using the drama analogy of Scott, Bailey and Kienzl (2006), life has various scenes, where all actors (institution and students) perform together—some more dominantly or better in certain areas than others. Pompper (2006) alludes to the contentious debate in HE about 'student-centred' vs. 'institution-centred' strategies to improve student persistence. Similarly, enrolling in an institution with a positive retention climate has an independent effect on the student's completion behaviour (Oseguera & Rhee, 2009).

A critical component in retention is 'student engagement', namely the more intensely and repeatedly the student is learning and improving academically, as well as having constructive interpersonal contact, the better the chance of 'success (La Nasa, Olson, Alleman, 2007). In the United States the National Survey of Student Engagement (NSSE) has been adapted and applied in other countries, and has consistently found that the most important aspects of student engagement remain the quality of relationships between respondents and fellow students and faculty and administrative staff (Clouder, 2009, Delaney, 2008). More sophisticated and comprehensive studies around the complexity of student persistence and integration of various models include those of Bean (1985) and Tinto (1993), and a thorough analysis by Hausmann, Ye, Schofield, and Woods (2009).

Retention and Statistical Science

Institutional Research (IR), like any other research, cannot deliver without the appropriate use of statistical science, especially where inference or prediction relies on using the right analysis technique in the right way at the right time. Survivor functions and hazard rate models are often used to predict dropout at particular time points, and prove very valuable at universities where large proportions of the students are first-generation students.

Much sophisticated modelling of attrition, with statistical techniques like exponential distributions or conditional probabilities, with parameters including race, gender, parent(s) education, family income, high-school scores, has been undertaken (Ishitani, 2003). From basic descriptive findings, to correlation tests and ANOVAs, IR has used factor or principal component analyses, (hierarchical) general linear modelling and structural equations;

multiple or logistic regression; discriminant analysis; multinomial logit; and other methods in the multivariate environment (see, for example, Jones-White, Radcliffe, Huesman, & Kellogg, 2010). Concern over the discernment value of these is based on the implicit assumption of a normal distribution or homogeneity of variances, which is not always met.

In line with the purpose of this article, Bahr's (2009) looked at 'Hierarchical Discrete-Time Event History Analysis to Model Rate of Progress', with the emphasis on enrolment and progress as processes and not discrete events. Delen (2010) includes techniques that may be applied in Decision Support Systems.

Luan and Zhao, (2006) appear in the forefront in data mining applications in retention studies. They also quote Tukey—a famous statistician in the 1900s—who said that a statistician works more like a judge examining and testing clearly identified hypotheses; whereas a data analyst (miner) is like a detective, open to a wide range of ideas, possibilities and idiosyncrasies. In the interest of students and their retention, we should not stick to common statistical practices and methods that we know, but must use tools like data mining software and methods like decision trees, neural networks and so forth (Herzog, 2005, 2006).

Mapping the Student Retention Indices

The cubic model explored at the beginning of this article is now addressed from a different angle. Levels I, II and III indices have been developed after thorough and comprehensive institutional research across continents and types of institutions—often with surprisingly similar results!

Each of the cubes in Level I or II or III of the Rubik® cube should have distinct and/or composite indices, developed as best practice for the environment of a particular institution. Relationships between the indices will obviously not be based only on the commonality of variables or parameters factored into the equation, but rather that they are juxtaposed and integrated within the environment of university buildings, faculty and support staff, undergraduate and postgraduate students, funding and research partners, legislative compliance and other aspects.

At any time-level combination within the student's sojourn, sufficient and applicable measurements must be available to profile the individual student's likelihood of progress and ultimate 'success' (graduating as a well-rounded person, contributing to the health and wealth of the immediate or extended community). These measurements typify one block in the cube, and may be singular predictive probabilities or combined indices based on survey and systemic data. The better the institution's data warehouse and management information system (MIS), containing quantitative data and quantified qualitative data (e.g. perceptions of quality of service), the sooner the institution can intervene and redress where necessary.

A combination of (say nine) indices is also possible, in a geometric mean or weighted mean, and similarly three indices per respective level can be compounded additively or multiplicatively, at any stage in the student's progress. The nature and calculation of success or retention-determining indices must be updated as circumstances change. More sophisticated analytical and explorative techniques will improve the accuracy of the profiling or predictive capacity for student persistence. Some indices may be generic— for example, those that 'predict' first-year attrition or academic hiccups; others more specific, for example those run by a particular religious order, or those combining qualitative research findings into the retention predictors.

Analysing the retention capacity of an institution could use the very same indices and student outcomes to profile the quality, effectiveness and efficiency of its business; but additional operational and strategic performance indicators would be required for an institutional profile. A sophisticated management information or business intelligence system would greatly facilitate the detection of various types or levels of risk for student attrition. More important is the measures implemented to advance 'success' for the student.

The interventions required at any cube or nine-cube level of Rubik's® cube may be remedial or expulsive, operational or strategic, policy- or money-driven or require other resources. These operate in juxtaposition, are interdependent and the causal effects of particular steps taken to improve student (and staff) retention are difficult to isolate for IR purposes, or for earmarked funding or other improvement measures.

The titular reference to the student continuum is based on all the above elements, which will affect particular outcomes in a heterogonous way. Each student is an individual; hence a Caucasian, 19-year-old female, six months into engineering studies may have a similar status index to a 25-year-old Indian male in his second year in hydroponics; therefore one must factor time and/or phase into the equation, directly or indirectly, by adapted or alternative indices.

Graphic mapping of the three layers is done (separately to facilitate legibility) in Figures 2, 3 and 4. The selection of cube titles, and their grouping into the layers below, is a *pro forma* proposal, to better illustrate the integrated model.

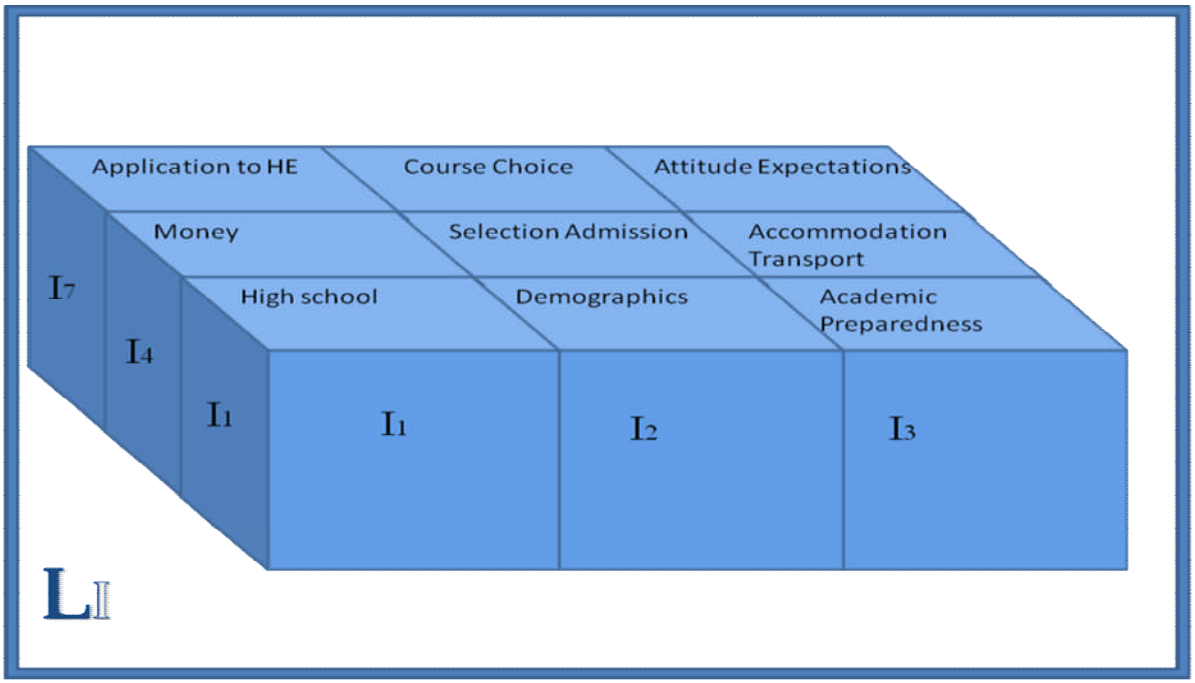

Figure 2

Entry into higher education.

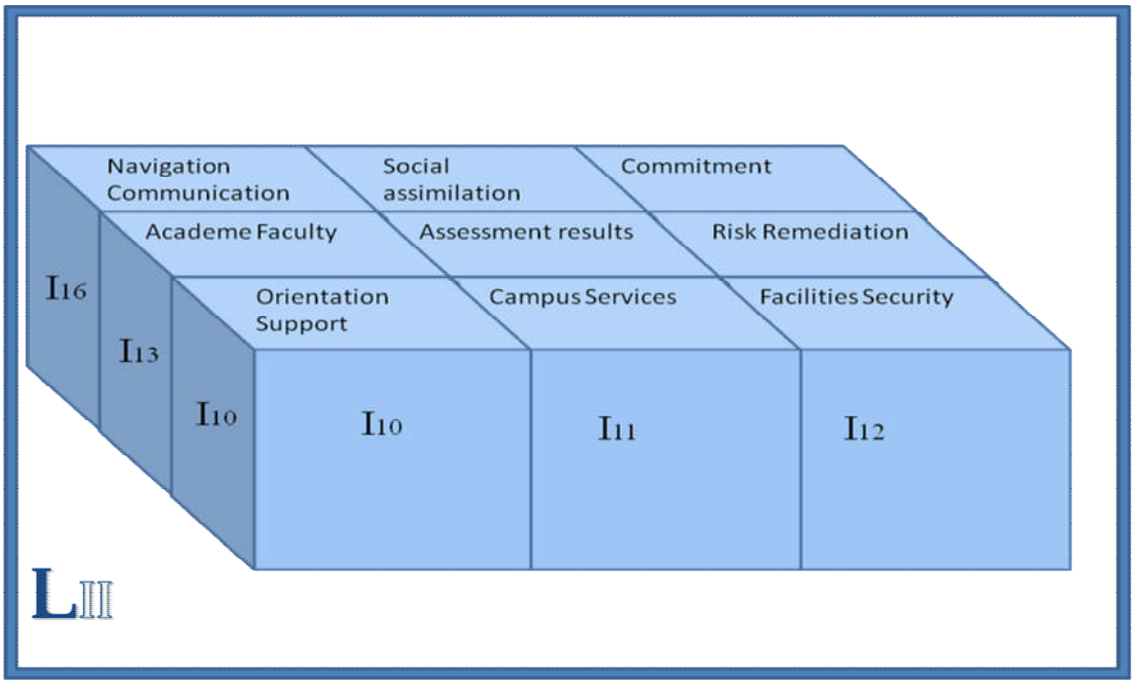

Figure 3

Assimilation.

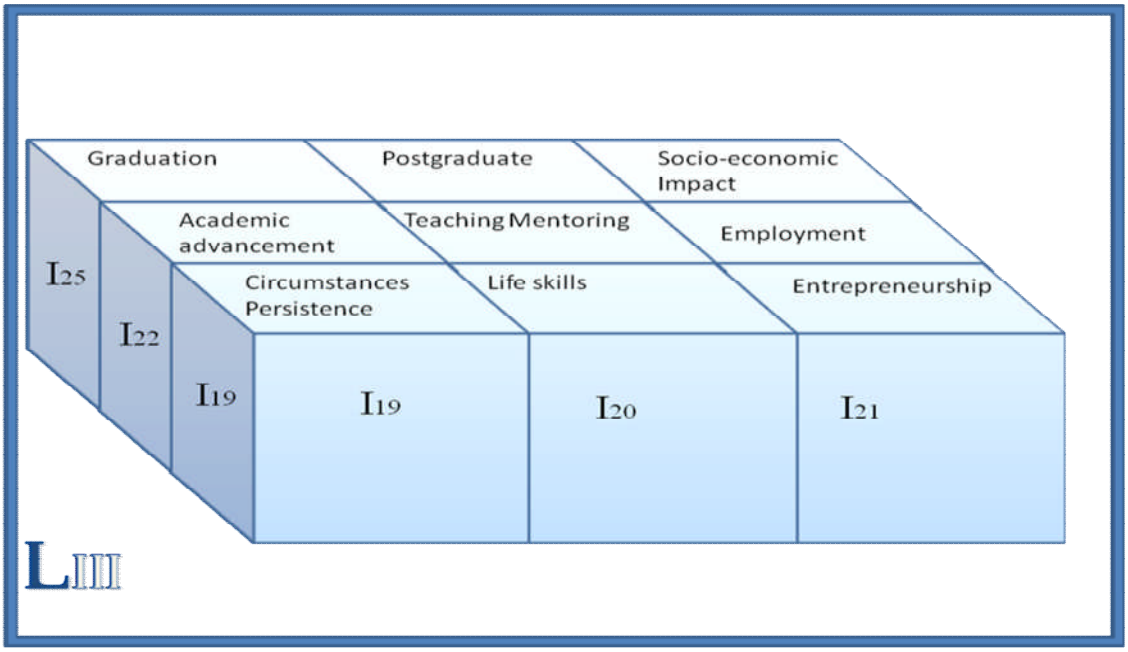

Figure 4

Success.

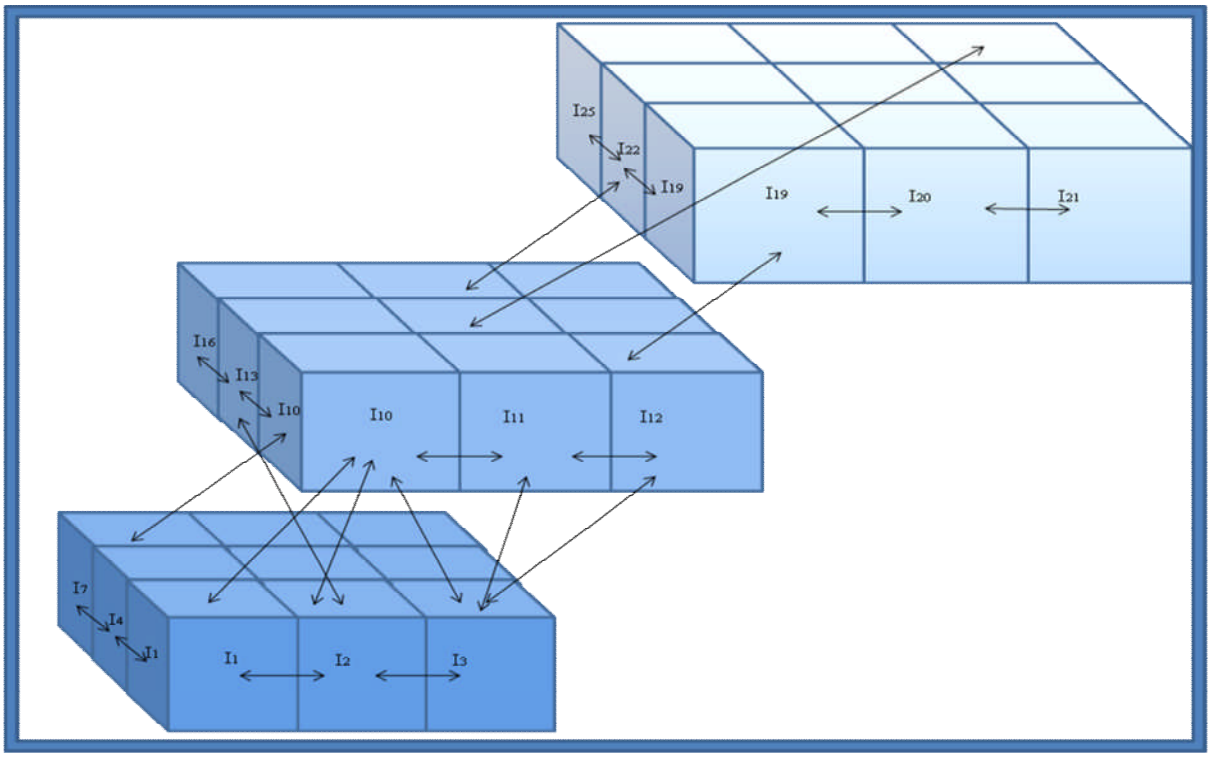

Figure 5

Indicator(s) relationships.

The bi-directional arrows reflect the fact that those particular indices are related—statistically or by common variables. The long arrow between layers two and three can be interpreted as linking the central blocks of LII and LIII, or it could describe the composite relationship between the 'assimilation' level (Figure 3) and the 'success' level (Figure 4).

For example, in LI, the academic outcomes on application to university; the financial support; the grading of a high school; their race and/or gender; their standing in the admission scale(s); and their secure and affordable accommodation and transport, would be based on predictive models, as developed for that particular HE system, and could be singular or composite.

Let the values be 75, 50, 78, 46, 61, 37, on an index scale of 1 to 100, respectively, for the list above. Distinct decisions can be made for each issue—for example, a selection for admission points scale; or a composite could be formed by taking the 6^{th} root of the product of these six values (geometric mean).

Between Layers I and II, for example, I6 (includes transport) could be correlated with I12 (campus security), and the value of their geometric mean could trigger the student's right to a commuting subsidy.

Using a small ad hoc sample from the literature, a first layer (LI) indicator such as the attrition rate of new students (Patrick, 2001) is addressed. Longitudinal studies (Harackiewicz, Barron,, Tauer &Elliot, 2002) in a stable enviroment can yield a good estimate for continuation to a second year. A few less common indicators, like the number of courses dropped in the first three weeks; his/her financial situation (Chen & DesJardins,

2008), particularly in the first month; the quality of student engagement in the first 3 months (Cabrera, Colbeck, & Terenzini, 2001; NSSE surveys) can be combined with tried and tested indicators like school-leaving scores or demographical attributes. Post-modelling validation (of which the Receiver Operational Curve [ROC] is but one [Vivo & Franco, 2008]) is essential before institutional decisions are taken.

A cohort of new mechanical engineering students are admitted to institution *H*, where the persistence rate in this field has been established as 64%. Based on the profile of one of them, Ms *X*, her particular indicator values are the following: dropping a course 35%; good financial situation 79%; excellent teachers and their quality value 78%; gender plays a role of 55%; and a mathematics score of 74% from school. Having used a multiplicative approach, the geometric mean is 61.5%. Overall, she is identified as a borderline risk (62% < 64%); but on looking closely the lowest indicator is 35%, which possibly means she needs just a little more help in her choice of elective courses. Intervening with regard to this one aspect costs little, compared to sending her through a whole batch of additional development sessions, based on a composite index that might support the institution, rather than the individual student.

Conclusion

With all the research that has gone into student retention, there is a plethora of publications on student attrition and student success. Predictive models, based on data analyses, surveys and qualitative information, abound. Addressing the components of this integrated model, the identification of potential pitfalls that may await students, and many appropriate, affordable and effective remediation efforts that have yielded significant improvements in successful outputs and outcomes regarding students in higher education, are known.

The strategic potential and results of implementation of an integrated model are lucid. Getting higher education to cooperate within and between institutions, often with minimal resources and conflicting priorities, could be challenging. One way to implement the model may be in phases and scope; for example, start with identifying the straightforward profiles of incoming students, admissions requirements and their adaptations or customisation, and apply early assimilation efforts for new students. The institution must engender automation, cooperation and integration of these activities. If many or all of the cubes in the layers are already present, but fragmented, ensure the participation of all role-players and extensive support from information technology platforms. Even if ‘student access with success’ is explicitly stated in a higher education institution’s vision, the integrated retention project may flounder without an enthusiastic and committed patron, empowered to act and implement the necessary steps.

In summary, having reviewed student retention as a whole, the emphasis must be placed on the high-level strategic approach to planning for the management of integrated information management and constant extension of collection of data. Institutions must also ensure institutional research is encompassing to define precise profiles and patterns causing student attrition, and to intervene constantly, in a timely manner, effectively and efficiently with measures appropriate to lowering attrition, speeding up throughput and serving the purpose for a particular community.

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