

## Questions to ask a vendor

ZogoTech's software combines a Data Warehouse / Business Intelligence solution with a CRM solution. This document is an overview of the different modules and questions to ask potential vendors.

### Data Warehouse / Business Intelligence

A data warehouse combines data from multiple data sources and optimizes it a way that is optimized for reporting and analytics.

Background: Components of a data warehouse

1. ETL (Extract, Transform and Load) – a tool for extracting data from multiple data sources (ERP, National Student Clearinghouse, CBM reports, etc) and merging them together
  - a. Extract
  - b. Transform
  - c. Load
2. Data model – for performance and simplified ad-hoc queries
3. Data dictionary – allow end users to understand underlying data
4. Snapshots – run reports against frozen data
5. Reporting / Analytics
  - a. Enterprise Reports -- dynamic, web-based OLAP analysis for fast, drag and drop
  - b. Subscription reporting -- static reports automatically delivered to a user's inbox in multiple formats (PDF, HTML, etc)
  - c. Completion Point Reporting Engine -- conditional probabilities and time-series analyses (i.e. analysis of gatekeeper completion)
  - d. Ad-hoc Reports -- intuitively combine building blocks together instead of writing JOINS
  - e. Student Engagement Reports -- departmental (contact / intervention) reporting, linking services provided to outcomes
  - f. Predictive Analytics -- enrollment prediction, at-risk prediction
  - g. Geo-spatial analysis and reporting -- view map-based reports, integrated with US Census information
  - h. Dashboard Reporting -- Executive view (scorecards, indicators)
6. Change tracking: Does the system have the ability to track changes even if the ERP does not? i.e. if the ERP only records a student's current major, how will you run reports over time when students change majors?

### Extraction / Data Integration

1. How does the system integrate with the ERP?
2. How will the company respond to updates to the ERP?
3. Which areas do you download from the ERP?
  - a. Classes
  - b. Terms
  - c. Financial Aid
  - d. Test Scores
  - e. Degrees

- f. Facilities (i.e. for class utilization analysis)
  - g. HR
  - h. Finance
4. What other data sources do you have pre-defined integration with?
    - a. National Student Clearinghouse
    - b. CCSSE
    - c. Student Photos
    - d. State Reports (i.e. CBM reports)
    - e. IPEDS
  5. How do we add new data sources to the data warehouse?

## Transformations

Many higher education metrics (cohorts, stop-outs, transfer-outs) need to be calculated based on information downloaded from your ERP.

Some examples in Estudios include:

- Starting / Ending Cohort
- Stop in / Stop-outs
- Transfer In / Transfer Out (via National Student Clearinghouse integration)
- Normalized Time to Degree (by degree type)
- Remediation Levels (what stage is the student in the developmental pipeline? See Remediation Analysis example)
- FTIC – First time in college
- Term Index – necessary for comparing longitudinally comparing different cohorts

## Load / Data Model

Are the tables structured (de-normalized) in a way that end users can easily understand the data without doing joins or are they simply a mirror of the table structure on the ERP?

*What kind of OLAP database does the system use?*

OLAP provides the ability to quickly slice and dice data by different variables. You can create reports simply by dragging and dropping various dimensions (ethnicity, GPA, outcomes, etc). If the vendor does not provide OLAP-based analysis, it will likely be slow to do data analysis with very large data sets (i.e. longitudinal data, or analysis with multiple variables). It also means that end users will have to do far more joins, especially across functional areas (i.e. financial aid)

## Data Dictionary

A Data Dictionary with clear explanations of each metric is built during deployment. See Appendix A

- Does the system include a full data dictionary describing where fields come from and how they are calculated?
- Is the data dictionary generic or is it specific for my school (i.e. how is stop-in calculated for my school)
- Is the data dictionary web-based?
- Can the user drill down on each metric to see the transformation used to generate that metric and see the individual fields from your ERP used to create it?



## Report Distribution

1. How does the software schedule the production and distribution of managed reports. How are reports distributed to end-users?
2. Can end-users subscribe to reports without contacting an administrator?
3. Can executives receive reports on the progress of their areas (academic, student services)?
4. Is it possible to automatically receive reports at a specific schedule (every week, census day)?
5. Can users receive reports as email attachments (PDF, Excel, etc) with a link to interactive web-based reports?

## Web-based Collaboration

- Upload files of any type to "My Reports" (i.e. supporting Word documents)
- Publish / Share reports with others to collaborate on issues

## CRM : Student Engagement

1. Does the software include automatically computed at-risk indicators? i.e. from Noel-Levitz?
2. Can the end user add new at-risk indicators?
3. Can you pull up students by groups

## Estudias provides a Student Advising screen showing a Unified View of Student Information

- Financial Aid, Classes, Degrees, Test Scores on one screen
- Noel-Levitz retention indicators all on first screen
- Automatically calculated at-risk indicators (increased credits, has had 3 or more majors, retaking a class)
- Classes the student is retaking highlighted in blue

**Aaron Abel** **National Student Clearinghouse Integration**

General Info | Contacts | Address | Classes | Tests | Financial Aid | Degrees | NSC

**Photo**

**Alerts** **Automatically Computed At Risk Alerts**

At-risk indicators and other pertinent information about the student [Manage](#)

Alert
▶ Student has at least 6 more registered credits than in previous long term
Student is currently enrolled in one or more developmental classes
Student is currently retaking a class

**Noel Levitz Indicators**

Hispanic M

Major: ELEMED

Age: 23

Student ID: 3338293 [SSN](#)

Academic

Start Term / End Term: 2004FA / -- GPA: 1.906

Admission Basis: High School Graduate Credits: 35

## Additional Modules

1. Tutoring (record tutors, set up tutoring schedules, bar code sign-in – important for Title 3)
2. Modules for other areas? TRIO, Perkins?
3. Program Review
  - Allow academic department heads to see detailed performance by their program and create Unit Action Plans
  - See Profit / Loss by program

Course Data	Performance	Faculty Stats	Profit/Loss	Unit Level Plan
2005 - 2006				
Income from State				413,366
Income from Tuition				503,829
Income from Lab Fees				0
Income from Special Fees				914
<b>Total Income</b>				<b>918,109</b>
Personnel Expenses				380,825
Other Expenses				4,546
<b>Total Expenses</b>				<b>385,370</b>
Net Profit/Loss				532,739
Avg P/L per Section				5,122
Adjusted Net Profit/Loss				417,128
Adjusted Avg P/L per Section				4,011
Estimated indirect expense as a percentage of departmental expenses:				30% ▾

## Appendix A: Sample Data Dictionary for *Estudias Enterprise*

### Student Classes

This is split into 2 parts: documentation from the user's perspective and documentation from perspective of the downloads / extract

### User Documentation (Excerpt)

Field Name	English Description	Sample Values	Origin (Downloaded / Calculated)	Formula	Download Origins
Graduation and Retention Status	Outcome for a student at the end of a term	see below	Calculated		National Student Clearinghouse, StudentTerms
...	...	...	...	...	...

### Values

Unknown	Next long term is in the future, so we don't know the student's outcome
Does Not Apply	Student was not enrolled as of the census date
Retained; Same Major	Student returned to the institution the following long term and was enrolled in the same major
Retained; New Major	Student returned to the institution the following long term
Transfer Out	Student transferred to another institution (via National Student Clearinghouse). This term is the student's Ending Cohort
Stop Out	Student did not return the following long term, but did return in some subsequent semester
Drop Out	Student has not returned to the institution. This term is the student's Ending Cohort
Graduated; Returned; Same Major	Student graduated, came back the following long term and took more classes in the same major he/she graduated with
Graduated; Returned; New Major	Student graduated, came back the following long term and took more classes but in a different major he/she graduated with
Graduated; Transfer Out	Student graduated and enrolled in a different institution the following term. This term is the student's Ending Cohort
Graduated; Did Not Return	Student graduated and did not return to the institution the following term. This term is the student's Ending Cohort

## Download Documentation

The StudentClasses file has one record for each class taken by a student. It is valid (and possibly desirable depending on the way you want to use Estudios) to include in this file records for classes that were dropped or canceled before the census date. It is also valid (and possibly desirable depending on how you plan to use Estudios) to include in this file records for transfer classes (also known as transfer credits). It is important to keep in mind that all these fields are tracked at the student-class level because they can change from one class to the next.

The table name is "tbl\_StudentClasses". A sample file name would be "estudios- tbl\_StudentClasses-2001FA-0.txt".

The following fields are included:

Field Name	Description	Download Field	Sample Data
id	The primary key for this record. If your information system does not have a primary keys for student-class records, then you should generate at least an ever- increasing number to uniquely identify each record.		098
studentId	This is a foreign key to the <a href="#">Student</a> file. It is the student id.	AS_STUDENT_COURSE_HISTORY.PERSON_UID	0896468
termId	This is a foreign key to the <a href="#">Term</a> file. It is the term when the class was taken. For transfer classes, it is valid to have a null (blank) term.	AS_STUDENT_COURSE_HISTORY.ACADEMIC_PERIOD	2004FA
gradeId .	This is a foreign key to the <a href="#">Grade</a> file. It is the grade (e.g., 'A', 'B', 'C', ...) that was awarded to the student for this class	AS_STUDENT_COURSE_HISTORY.FINAL_GRADE	A, B,C, W, etc
creditTypeld	This is a foreign key to the <a href="#">CreditType</a> table. It represents the type of credit the student got from this class section (remedial vs college-level, transfer vs institutional, etc.). It is invalid for a creditTypeld to be null. Too many things depend on knowing the creditTypeld.	AS_STUDENT_COURSE_HISTORY.COURSE_LEVEL	I, R, T
creditStatusId	This is a foreign key to the <a href="#">CreditStatus</a> table. It represents that last status of this student with respect to this class (whether the class was added, dropped, withdrawn, etc.).	AS_STUDENT_COURSE_HISTORY.REGISTRATION_STATUS	A, D, W
creditStatusDate.	This is the date when the creditStatusId was last changed.	AS_STUDENT_COURSE_HISTORY.FINAL_GRADE_DATE	

credits	<p>The credits for this class (a number). This is a very important field that is used to calculate many other fields such as the attemptedCredits, completedCredits and gpaCredits and, through them, many other fields such as different kinds of GPAs, etc. You can think of credits as the number of credits that would be awarded to the student upon successful completion of this class. That is, this is not the number of credits that the student actually obtained, but the number of credits that he would have obtained had he successfully completed the class.</p>	AS_STUDENT_COURSE_HISTORY.COURSE_CREDITS	3.00
...	...	...	

**Sample Data:**

098,0896468,2004FA,700,19221,,I,X,09/01/04,3.00,UG,  
716,0168970,2004FA,999,19012,,I,X,09/01/04,1.00,UG,  
609,9337683,2004FA,1007,19082,2,R,N,09/15/04,1.00,UG,  
9505,2376307,2004FA,212,18854,2,I,N,08/18/04,3.00,UG,  
35116,1198092,2004FA,82,18493,,I,X,09/01/04,4.00,UG,MI

# Appendix B: Sample Reports

Estudias Enterprise provides several types of reports built-in to the product.

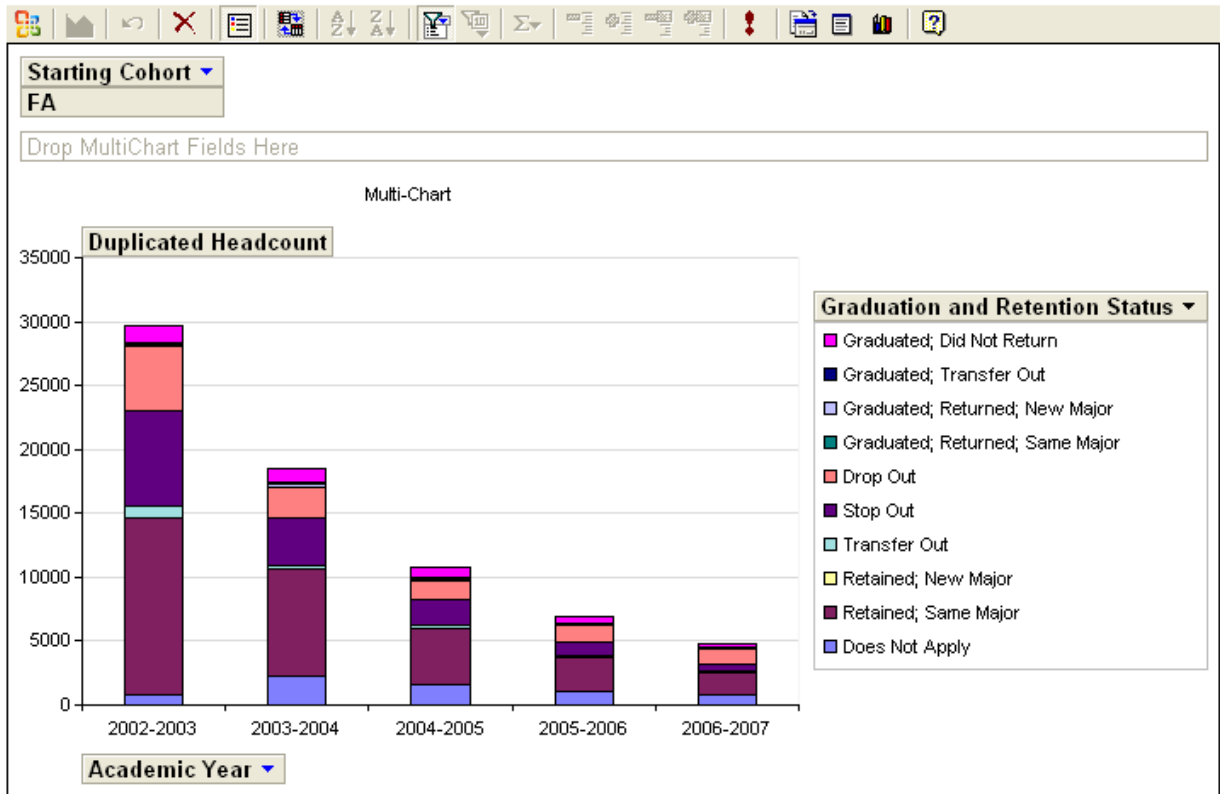
## Enterprise Reports

Enterprise Reports are based on an OLAP database. We have OLAP cubes that describe all the main concepts that are needed by the typical IR office. Because these reports can be modified interactively (via drag and drop, dropdown filtering), potentially millions of different Enterprise Reports can be generated. For example, users can drag other fields such as academic program, gender, and ethnicity.

					Academic Year ▾	
					2005-2006	
Division ▾	Department	Subject ▾	Level	Course Nu	Success Rate (A-C, P, IP)	
Applied Science						73.42%
Business Administration						57.65%
Developmental Education						46.64%
Health & Human Services						72.10%
Humanities & Fine Arts						56.45%
Public Safety & Emergency Service						62.35%
Science & Math	Biology					50.11%
	Chemistry					54.11%
	Engineering					58.49%
	Geology					0.00%
	Mathematics	MATH	1	1314		40.55%
				1316		44.87%
				1324		48.00%
				1325		63.49%
				1332		53.38%
				1340		68.04%
				1351		75.00%
				Total	1332 (Course Number)	45.60%
			2			52.49%
			Total			46.48%
	Total					46.48%
	Physics					66.67%
Total						49.24%

**Figure 1: Course Success by Division**

Drill down to see by department, subject, course number. Note that success rate in freshman MATH classes (Level 1) increases steadily by course number except for a drop in MATH 1332. (The brave can also drill down by faculty)



Above: Graduation and retention by cohort. Looking at 2002 Fall Cohort, users can tell at a glance how many graduated, transferred (via National Student Clearinghouse integration), Stopped out, or Dropped out.

Other sample reporting areas: Time to degree (normalized by degree type), Financial Aid Awards

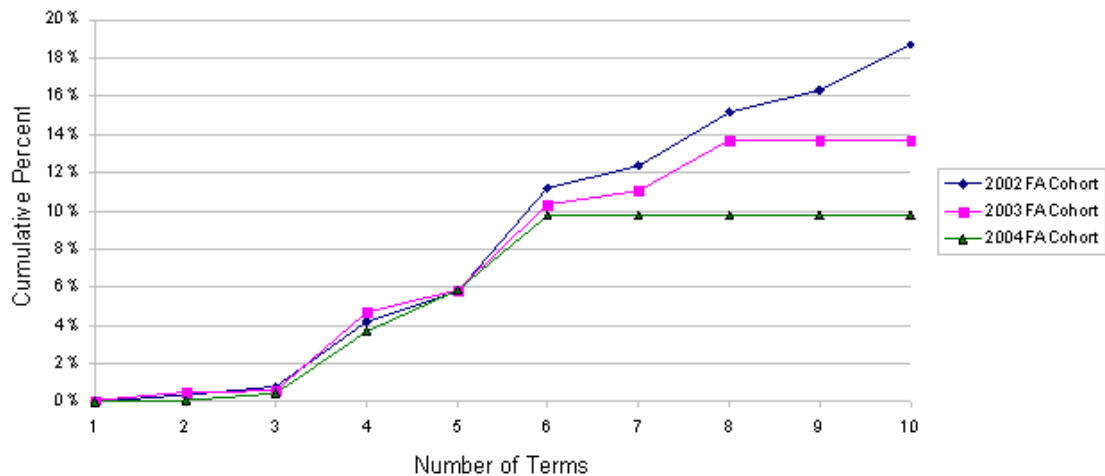
## Example: Remediation Analysis

Starting Cohort ▾						
FA		Latest Math Sublevel ▾				
		Level 0	Level 1	Level 2	Pre-Gateway	Post-Gateway
FTIC Math Sublevel ▾	Duplicated Headcount	Duplicated Headcount	Duplicated Headcount	Duplicated Headcount	Duplicated Headcount	Duplicated Headcount
Level 0	39.49%	26.82%	18.20%	12.03%	3.46%	
Level 1		28.77%	24.21%	37.34%	9.68%	
Level 2			40.39%	18.61%	41.00%	
Pre-Gateway				49.74%	50.26%	
Post-Gateway					100.00%	
Grand Total	5.34%	13.16%	18.09%	34.28%	29.13%	

## Completion Point Reports

The Completion Point Reporting Engine is a powerful tool for calculating conditional probabilities and time series analyses. Users can ask questions like:

- Once a student passes class X, what is the probability that he/she will graduate in 3 more years? (i.e. to identify gatekeeper classes)
- Once a student enrolls in class X, how long does it take him/her to pass it? How long before he/she will enroll in/pass the subsequent class?
- What percentage of students in a particular cohort (academic program, gender, ethnicity) graduated within 8 terms of enrolling?



Above: Comparing cohorts can be very difficult to do without the appropriate transformations in the data warehouse. An important transformation shown above is the Term Index: the number of terms relative to the student's starting cohort. This chart shows the graduation rate over time comparing students who started in each of three fall semesters. After 6 terms, the 2002FA cohort graduated the largest number of students.

This chart can be done with any starting point (starting cohort, obtained a certain number of hours) or any ending point (graduated, transferred, completed a certain class). Terms can be measured in Elapsed / Enrolled terms, or Long / Short terms (i.e. include summers).

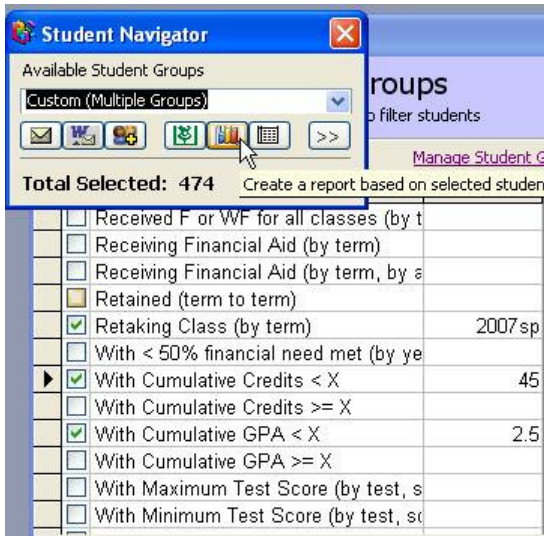
## **Ad-hoc Reports**

Not all queries can be handled with OLAP cubes. Those that involve arbitrary ranges (i.e. students with GPA < 2.25) or those that involved very complicated criteria (i.e. students who failed in one term and are retaking classes in another term) cannot be done well in OLAP cubes. Estudios includes a specialized engine for handling these types of requests. These reports are created by first selecting the entities to report on—for example, the set of students to include in the report. Then a report is chosen from a list of reports which can be extended by the end-user. The report is then applied to the list of selected entities.

The mechanism used to select students, is called the Navigator in Estudios. It allows the user to select students by using almost any conceivable criteria. It also allows the user to use more than one criterion at a time. This is done in a very intuitive user interface that is meant for non-technical people. The navigator can be extended by end-users if additional ways of selecting entities / building blocks are required.

The reports that are provided are quite extensive and can be extended by end-users. The process of selecting students is decoupled from the reporting so that any report can be run on any group of students. The end result of this style of report generation is that literally millions of different reports can be generated without the need to customize the product.

The student groups are implemented as simple SQL statements, so it is almost trivial to add new groups



Left: Identifying students who may be at risk: With a few clicks, end users can see that there are 474 students who are retaking a class, have < 45 credits and have < 2.5 GPA.

Then a report can be run on these students to get an operational list (i.e. which courses are they enrolled in) or do more analytical options like see characteristics of those students vis-à-vis other students.

The Student Engagement module allows end users to email these students directly from this interface and record those contacts

## Student Engagement Reports

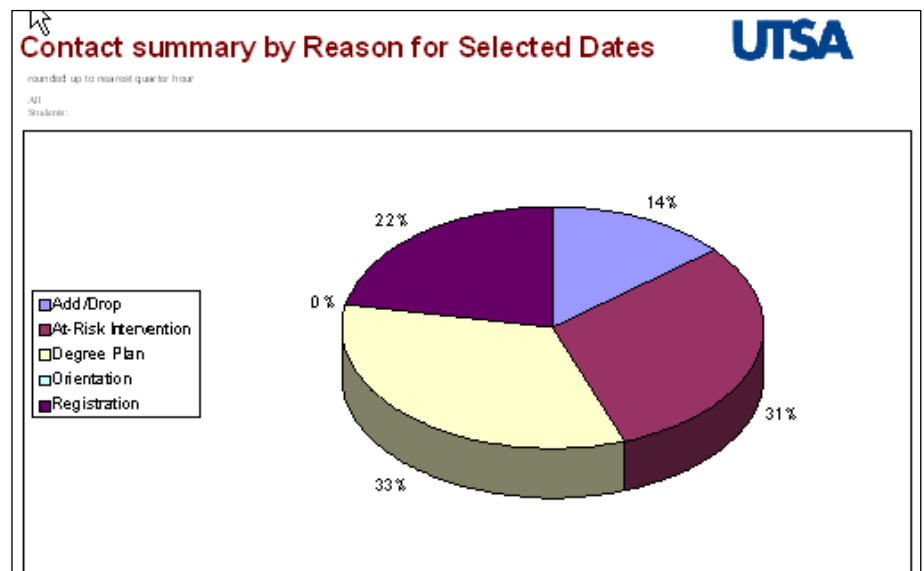
Schools that license the Student Engagement module can effectively link the services they are providing to learning outcomes. This data can be used operationally: how many students are we seeing per day/week/time of day? Which departments are most successful at helping students improve GPA?

The data can also be used strategically. i.e. We are making an effort to reach out to at-risk students. Is it having an impact on retention, graduation, GPA? How much? If we expand by X number of students, how many additional advisors will we need?

## Predictive Analytics

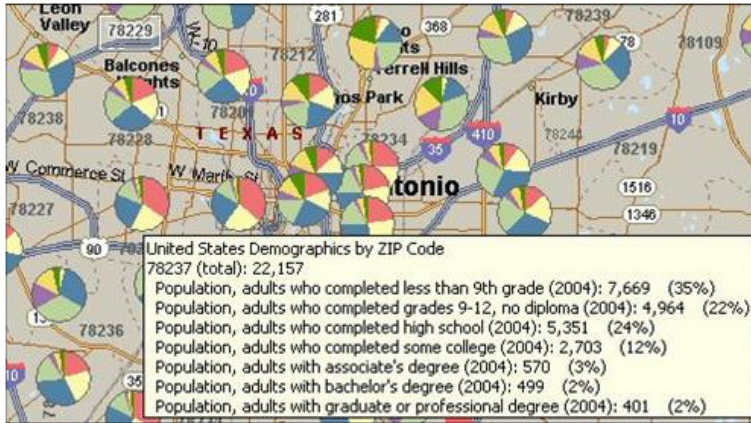
It's almost a cliché now, but the maxim is still true: Reporting on the past is like driving by looking through

the rear view mirror. Predictive analytics such as enrollment prediction allow colleges to look towards the future. ZogoTech is able to offer some of the strongest predictive analytics by working off of the tools that Microsoft includes with SQL-Server. Whereas other companies have spent millions on developing proprietary data mining algorithms, ZogoTech is able to leverage Microsoft tools and focus its time on customizing those algorithms for higher education.



## Geo-Spatial Analysis

Analyze students by incoming zip code or address looking at metrics such as Average Education, Household / Disposable income, Population, Age, Ethnicity, and Crime.



## Dashboard Reporting

Dashboard reporting allows schools to

- Create a distributed Institutional Effectiveness process
- View automatically updated performance measures (student services and academic)
- Link services provided to student learning outcomes
- Consistently report progress across multiple groups
- Define key performance indicators (KPI)
- Define quantifiable and qualitative goals for each department
- Monitor progress through dashboard and drill-down views

Key Performance Indicators as of 6/4/2007				
	Overall Score		Prev. Month Score	End of Year Score
College Monthly Key Performance Index Score	9.2		9.2	9.4
<b>Strategic Priorities for Student Learning</b>				
Key Performance Indicators (Weighting Factors)	Monthly Score		Prev. Month Score	End of Year Score
Respond to Community Education Needs (20%)	9.4		9.4	9.0
Enable Student Success (%35)	7.4		8.3	8.7
Enable Success for All Employee Groups (20%)	9.8		9.8	9.9
All scores based on a scale of 10. Green = Within Target range, Yellow = 89.99%-8500% of target range, Red = Less than 85% of target range				