

# Teacher-Student Data Link in Data Models From Transactional Systems to the Data Warehouse

## Presented at:

NCES (National Center for Education Statistics) Winter Forum and 24th Annual MIS (Management Information Systems) Conference, Austin, TX

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# Teacher-Student Data Link Models

- What it looks like:
  - 3 types of data structures
  - Essential elements for most likely uses
- Quality of the TSDL:
  - Key Components (success factors)
  - Accurate and Trusted TSDL
  - Roster Verification/ Certification

# Three Types of Data Models

1. Transactional/Operational Reference Model
2. “Interoperability” Model
3. Dimensional Model

# Warning!!! Please read and acknowledge the following terms and conditions:

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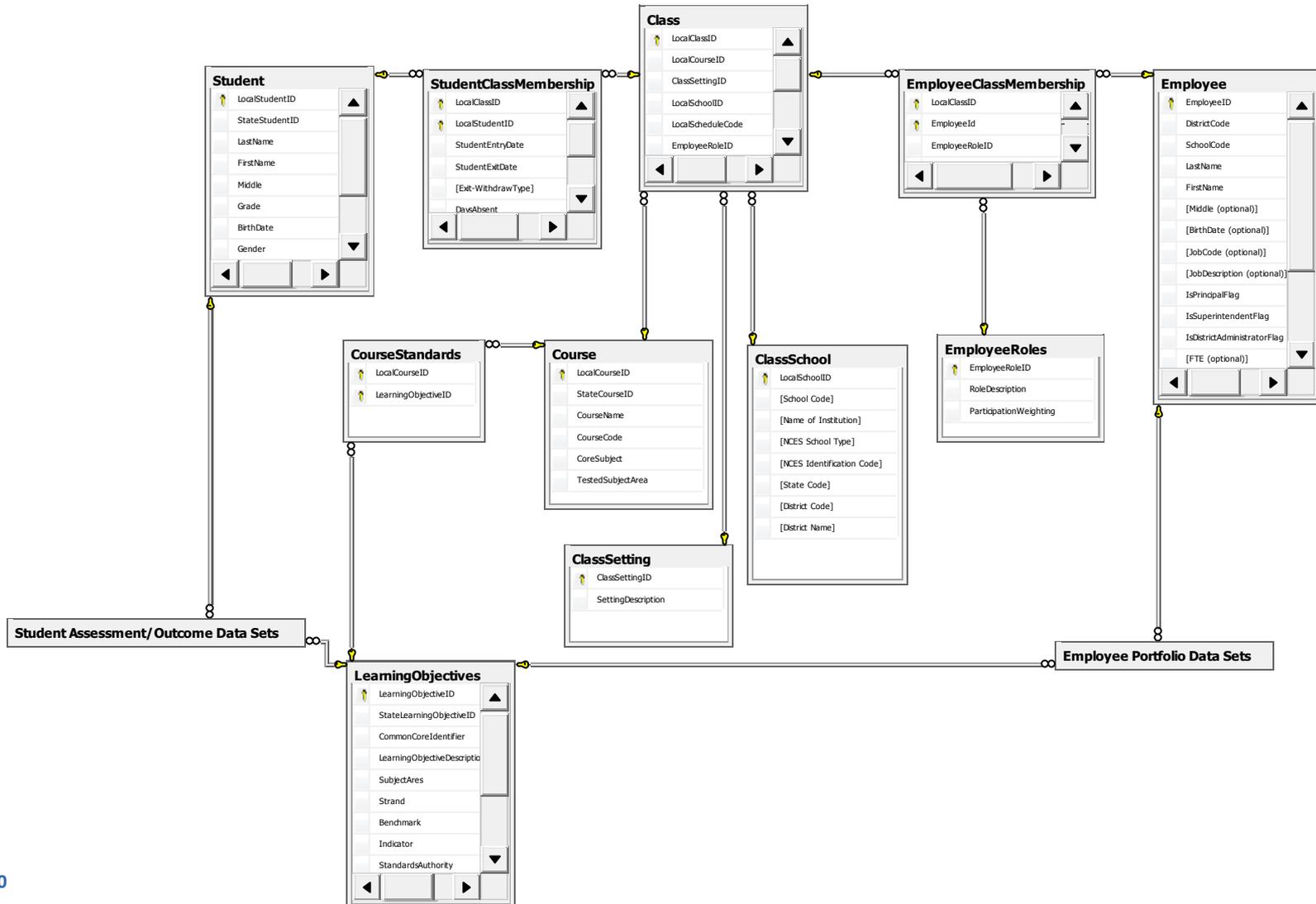
There is no technology-only solution to the Teacher-Student Data Link. Policy environments, organizational issues, and stakeholder perceptions vary. Linking teachers to student outcomes can provide valuable feedback to improve professional practice and student learning. However, an impeachable data link may cause more harm than good.

Accept and continue with the session

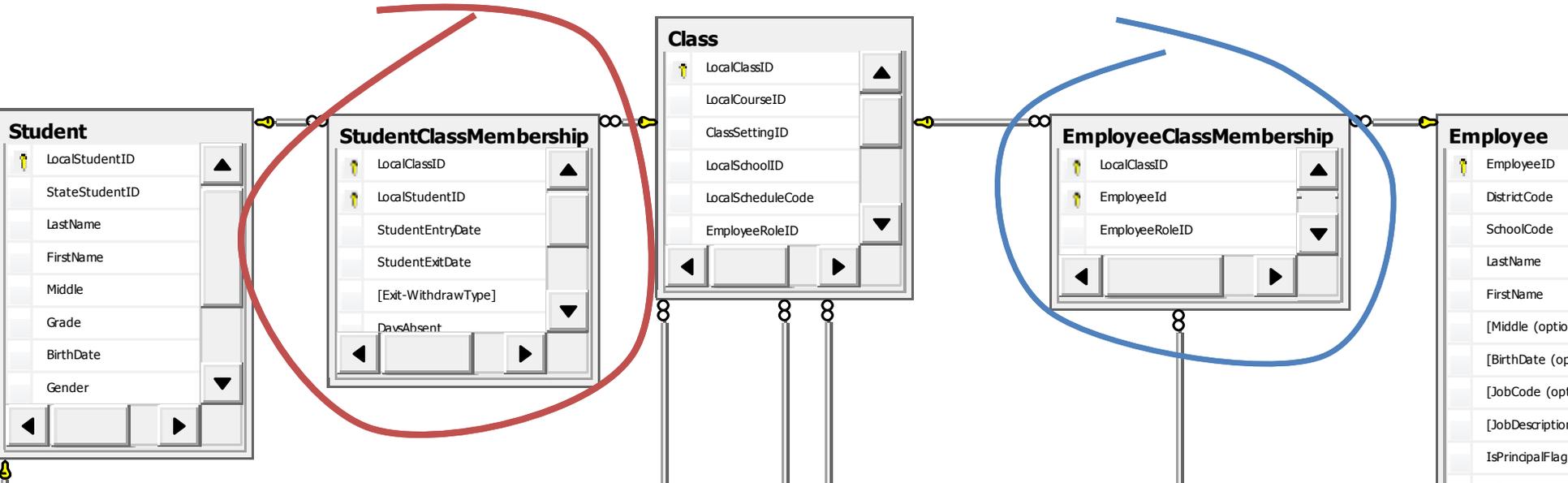
Cancel



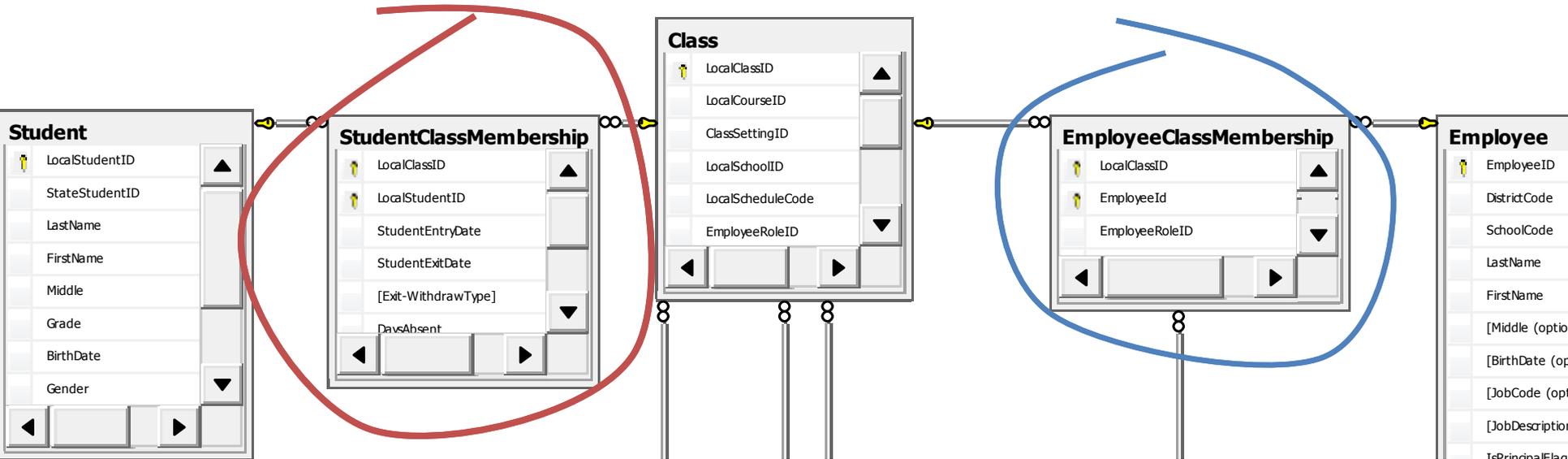
# Transactional/Operational Reference Model



# Transactional/Operational Reference Model

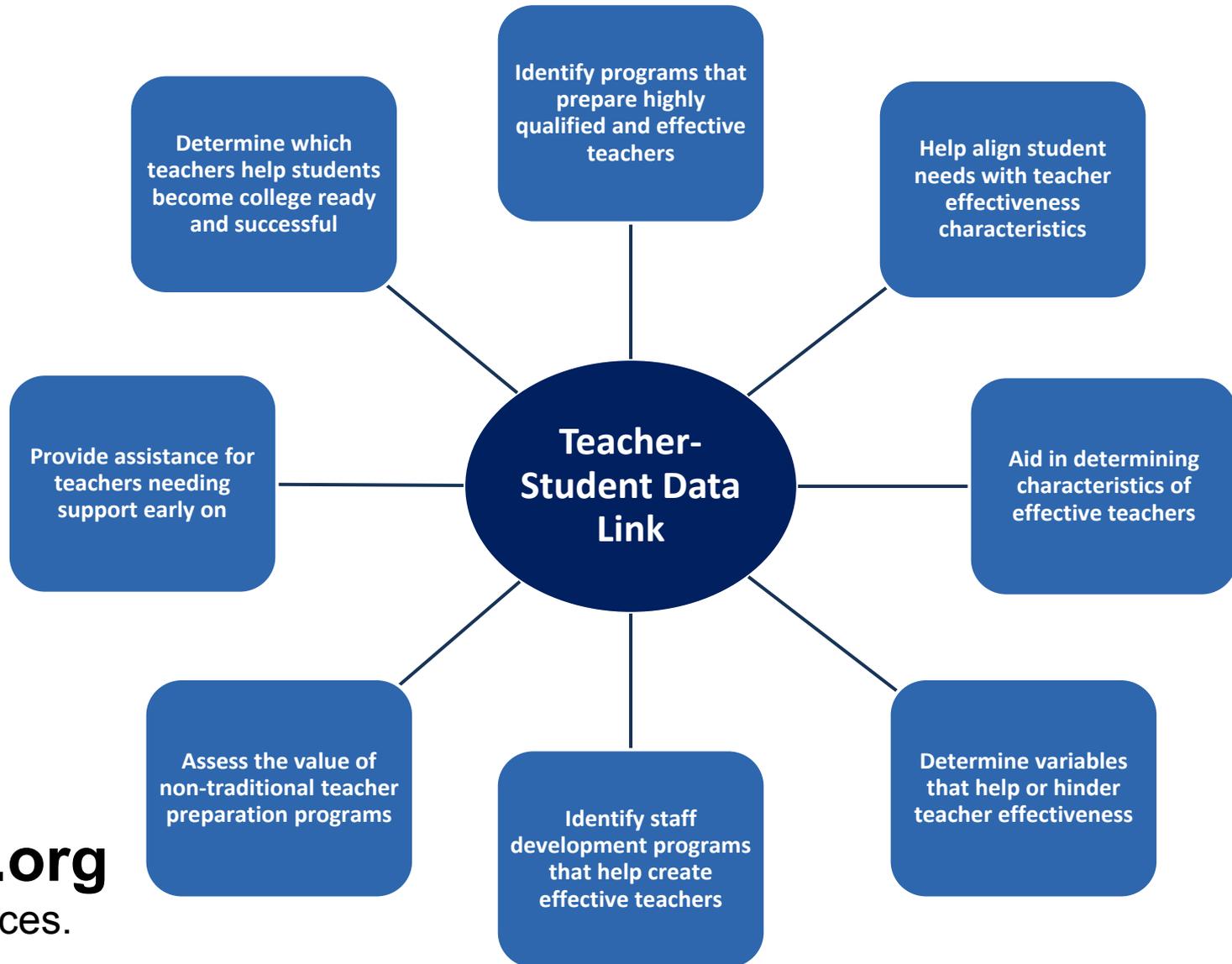


# Transactional Reference Model



**Rules** (based on use)

# Uses of the Teacher-Student Data Link



See  
**TSDL.org**  
for resources.

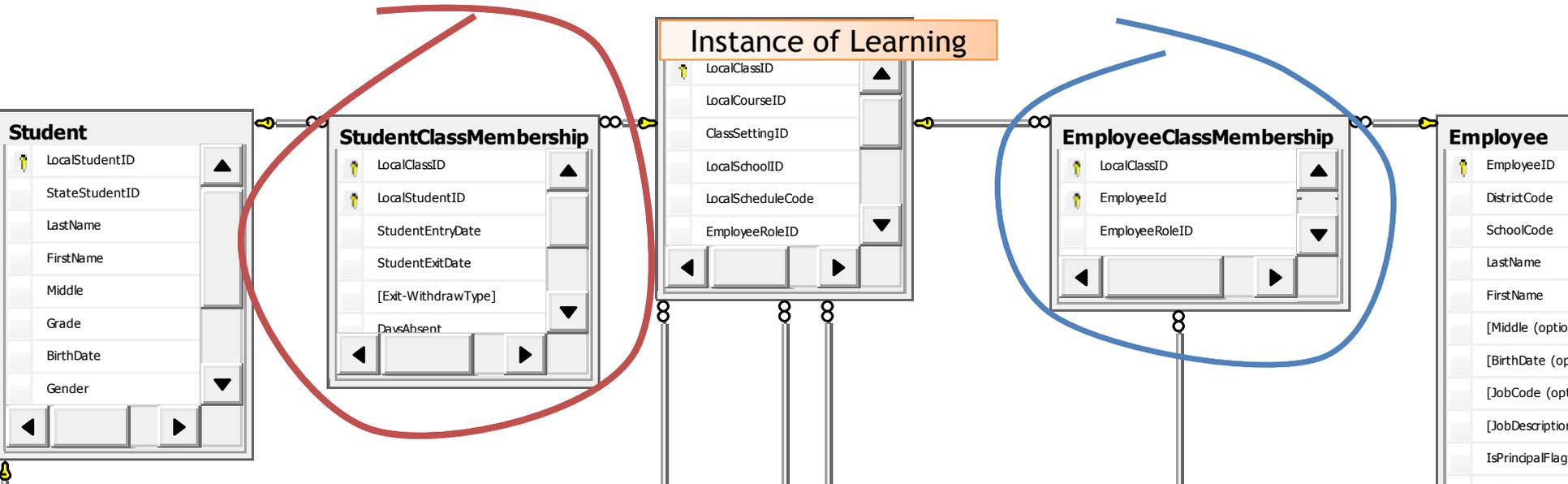
# Teacher of Record Framework

**Sample Definitions:** A **Teacher of Record** is an educator (or educators in co-teaching assignments) who has been assigned the lead responsibility for a student's learning in a subject/course section with aligned performance measures.

A **Contributing Professional** is an individual who has been assigned the responsibility to provide additional services that support and increase a student's learning.

See **TSDL.org** for resources.

# Transactional/Operational Reference Model



“Instance of Learning”

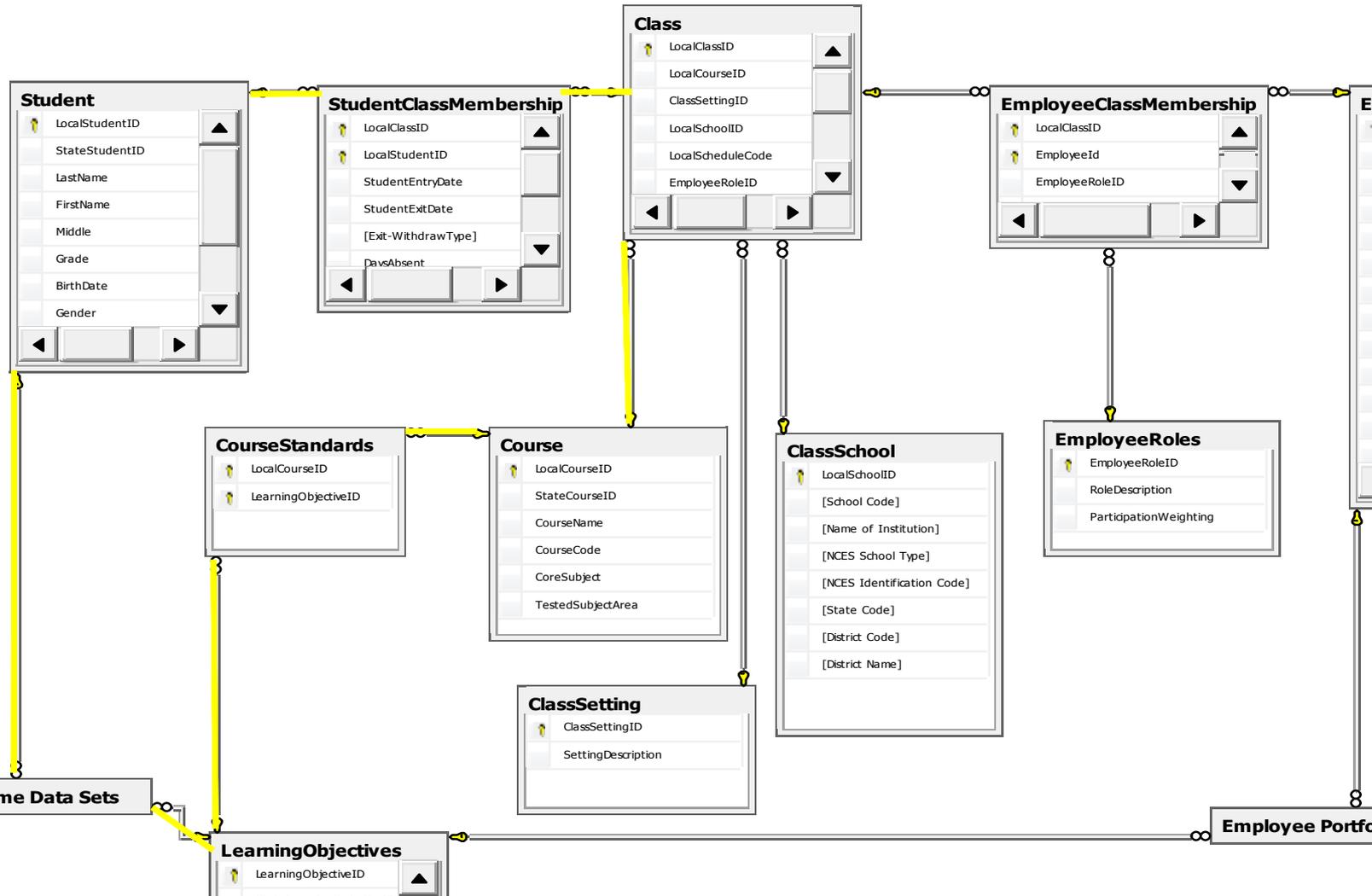
e.g.

- Pull-out instruction
- Project-based learning
- Mastery learning

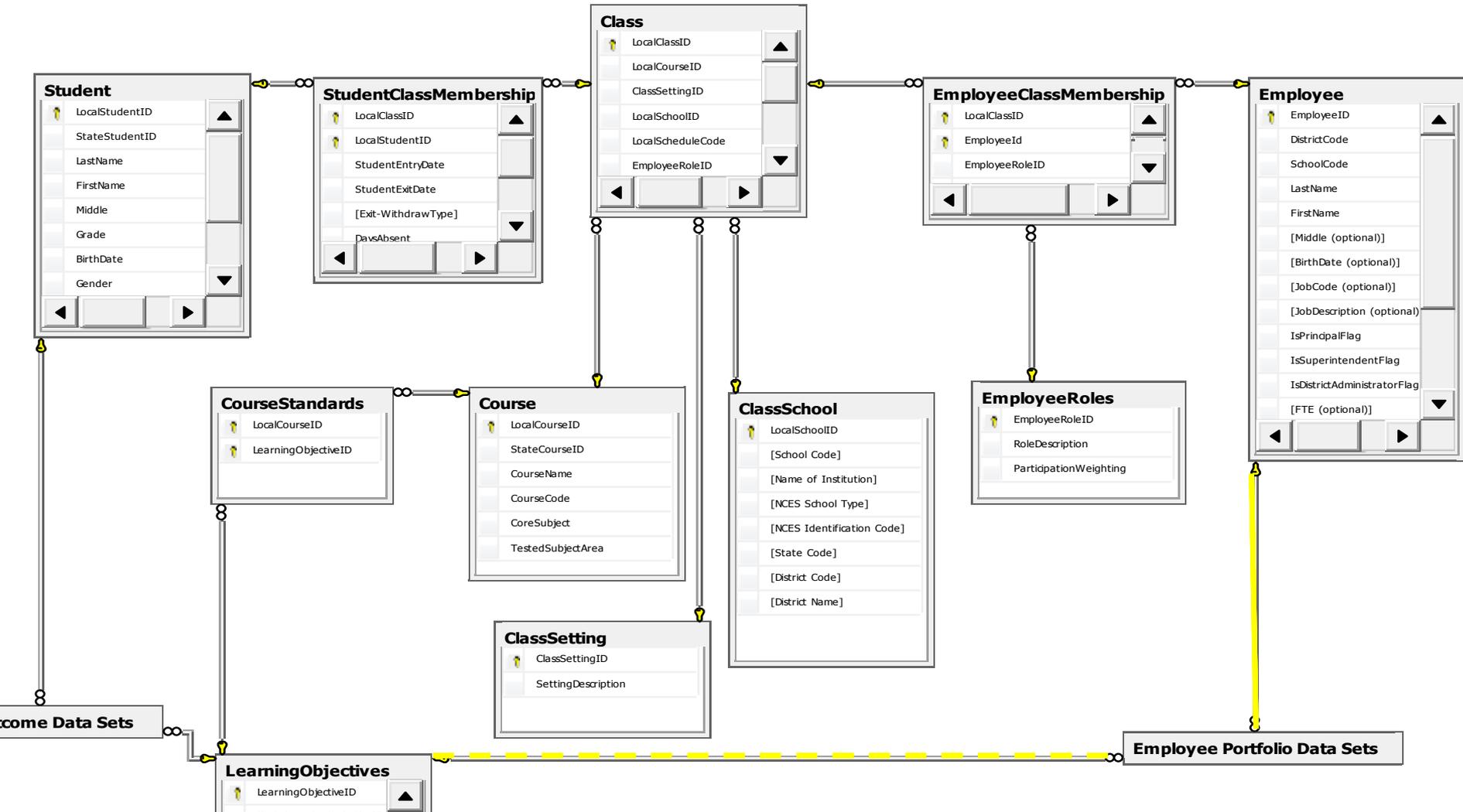
# Transactional/Operational Reference Model



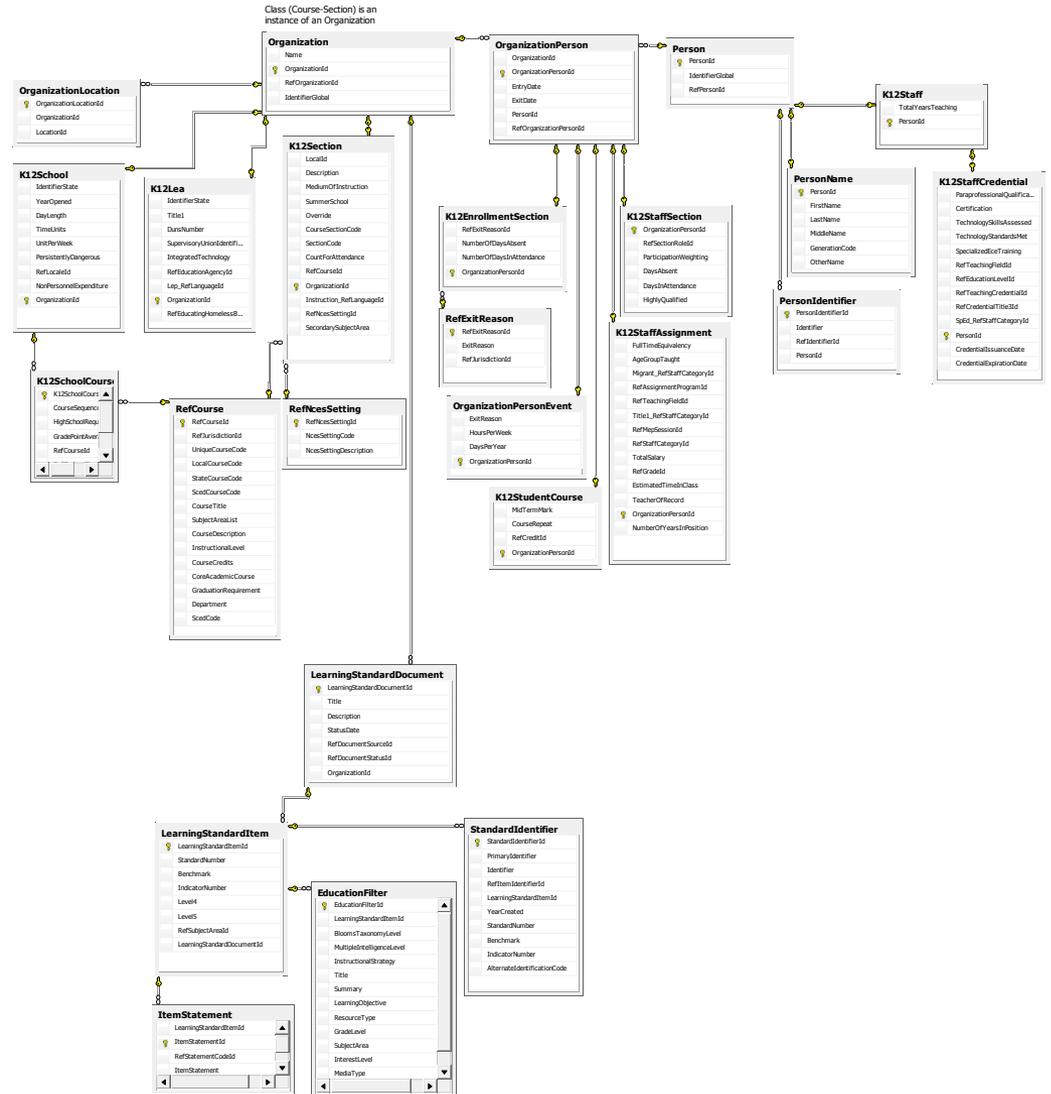
# Transactional/Operational Reference Model



# Transactional/Operational Reference Model

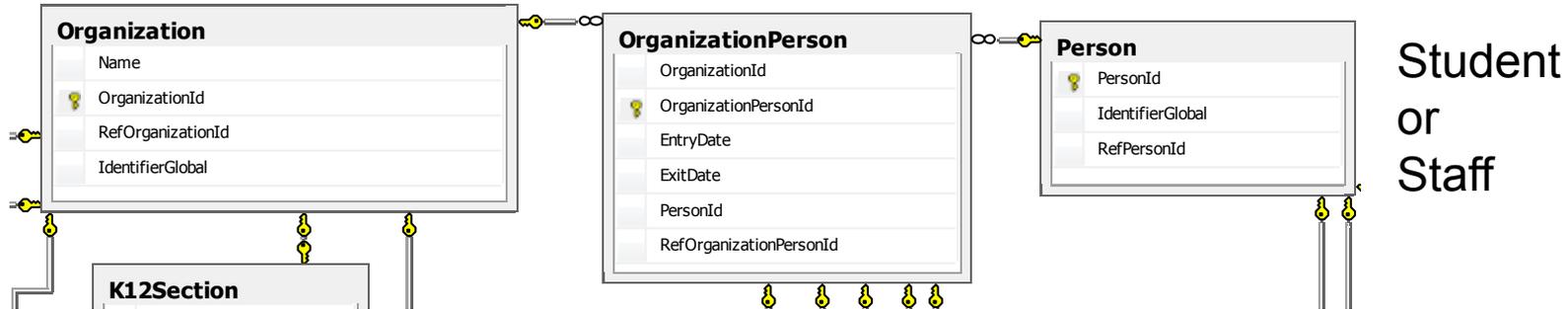


# Interoperability Model -- CEDS State Core



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Class (Course-Section) is an instance of an Organization



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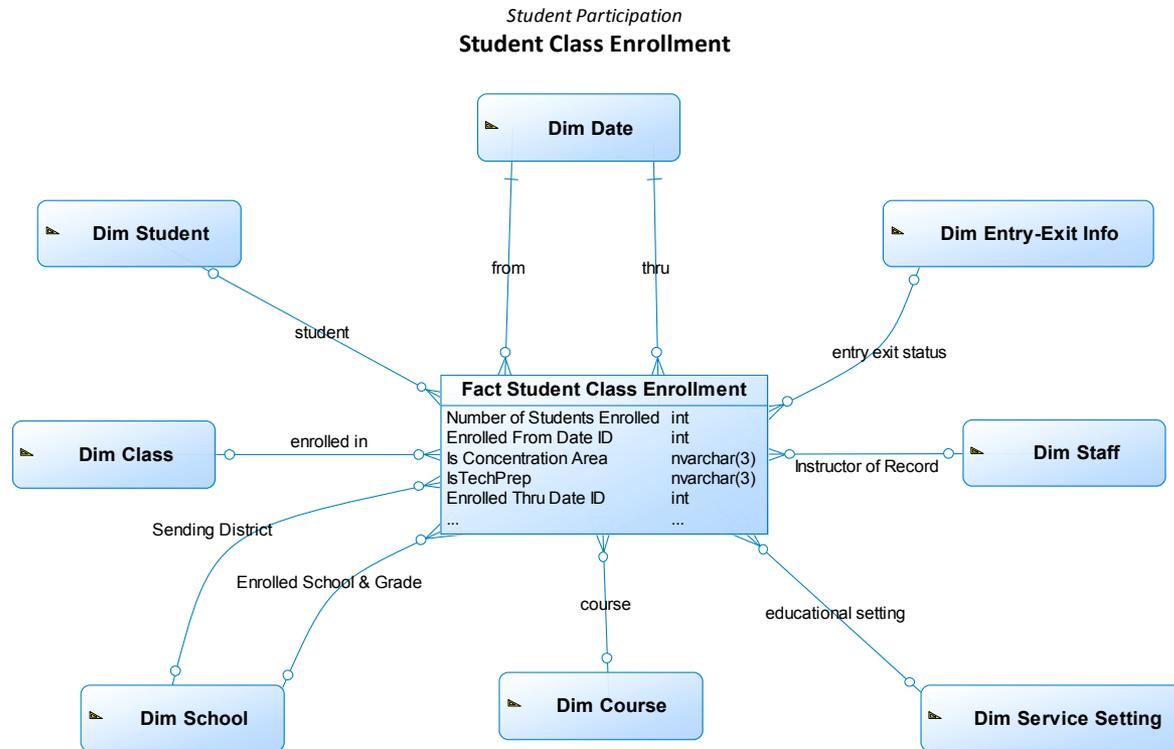
Class (Course-Section) is an instance of an Organization



# Dimensional Model (Class Enrollment Fact)



# Dimensional Model (Student Class Enrollment Fact)



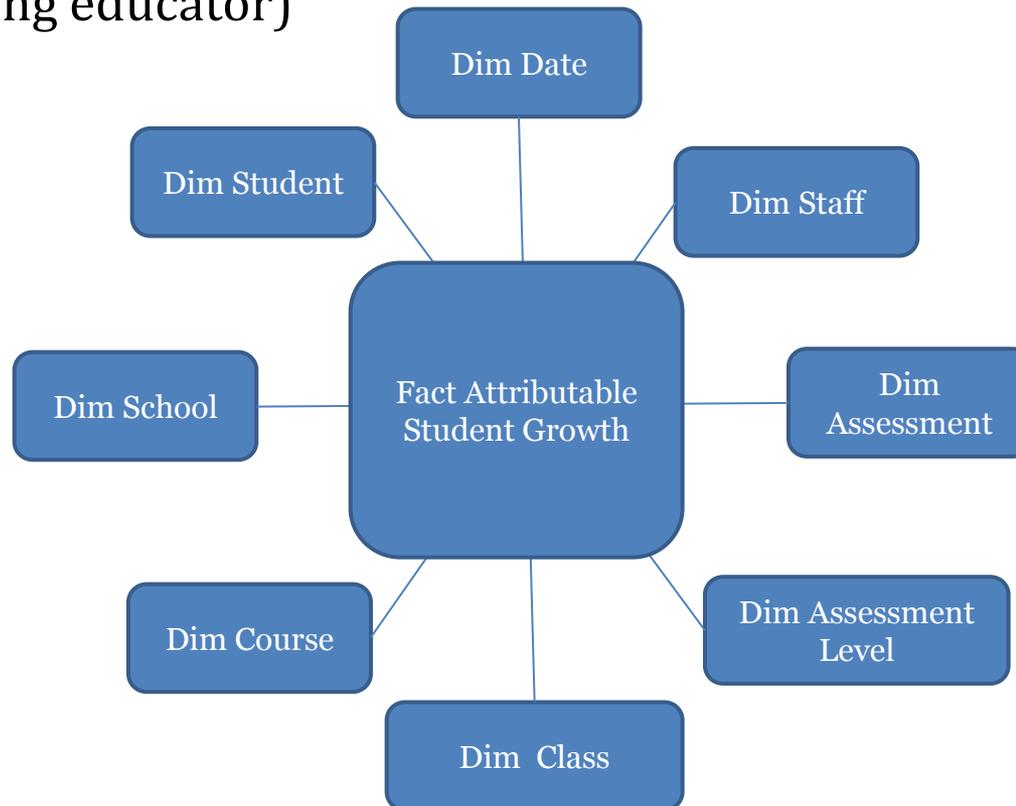
This example comes from NH's open Ed.DW model, for more information:

<http://sites.google.com/site/EducationDataWarehouse>

# Star Schema to Support Uses of TSDL

e.g., Attributable Student Growth

(grain: student growth attributable to teacher-of-record or contributing educator)



# Data Quality (and trust)

Teacher-Student Data Link is about more than data.

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# **Ten Key Components for Teacher-Student Data Link and Processes**

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# Ten Key Components for TSDL and Processes

TSDL Component	Process	SEA	LEA	School
1. Managing Schedules and Courses	❖ Manage State Common Course Catalog	X		
	❖ Manage Course Catalog		X	
	❖ Create and Maintain Student and Class Schedules			X
2. Uniquely Identifying Educators and Managing Profiles	❖ Certify Educators	X		
	❖ Issue Unique State Educator IDs			
	❖ Track Educator Certification and Highly Qualified Status		X	
	❖ Manage Unique State Educator IDs			
3. Uniquely Identifying Students and Managing Student Profiles and Enrollment Data	❖ Manage Educator Profiles			X
	❖ Issue Unique State Student IDs	X		
	❖ Manage Unique State Student IDs		X	
	❖ Manage Student Profiles			X
	❖ Enroll and Discharge Students			

# Ten Key Components for TSDL and Processes (continued)

TSDL Component	Process	SEA	LEA	School
4. Tracking Daily Attendance/Membership for Teachers and Students	❖ Manage Average Daily Attendance and/or Membership	X	X	
	❖ Track Teacher and Student Attendance			X
5. Recording and Reporting Grades and Transcripts	❖ Link Transcripts to Higher Education	X		
	❖ Manage Transcripts		X	
	❖ Track Grades and Issue Report Cards			X
6. Managing Assessments and Outcome Data	❖ Administer Assessments	X		X
	❖ Link Student Learning and Outcome Data Manage Local Assessments		X	
7. Managing Data Linkages and Flow	❖ Manage Data Flow between SEA – LEA – School	X	X	X

# Ten Key Components for TSDL and Processes (continued)

TSDL Component	Process	SEA	LEA	School
8. Strengthening Data Governance and Management	❖ Data Governance	X	X	
	❖ Continuously validate teacher-student data link			X
9. Using Teacher-Student Link Within the Organization	❖ Continuous SEA Service Improvement Planning and Evaluation process tied to TSDL data	X		
	❖ Continuous District Improvement Planning and Evaluation process tied to TSDL data		X	
	❖ Continuous School Improvement Planning and Evaluation process tied to TSDL data			X
10. Cross-Agency Linkages	❖ Linking Data Across Agencies e.g., State Agencies, Community Services Agencies	X	X	X

# Roster Verification/Certification

...for unimpeachable confidence in the data link.

# Warnings About Roster Verification

- Rigor and frequency of RV process must take into account:
  1. Intended uses of the teacher-student link
  2. Quality of data in source systems
  3. Policy environment

# Warnings About Roster Verification

- Not about the technology “tool”
- Not one-size-fits-all

# Warnings About Roster Verification

...well defined specific process to address:

1. Intended uses of the teacher-student link  
higher stakes uses = more rigorous process
2. Quality of data in source systems  
accurate, complete, granular, longitudinal, auditable, trusted
3. Policy environment

*...and a number of other factors of “capability maturity.”*

# Arkansas' Active Course Rosters



<http://www.arkansased.org>



# ADE Teacher Student Data Link (TSDL) Reporting Data Model

- ❑ Data Model is fully dimensional in nature which helps to slice and dice the data across various school years
- ❑ Data Model comprises of Facts and Dimensions related to
  - Teacher
  - Student
  - Course
  - Assessments (In Development)
- ❑ Data model conforms to the basic definition of data warehousing – integration of subject oriented data marts through dimensional conformity



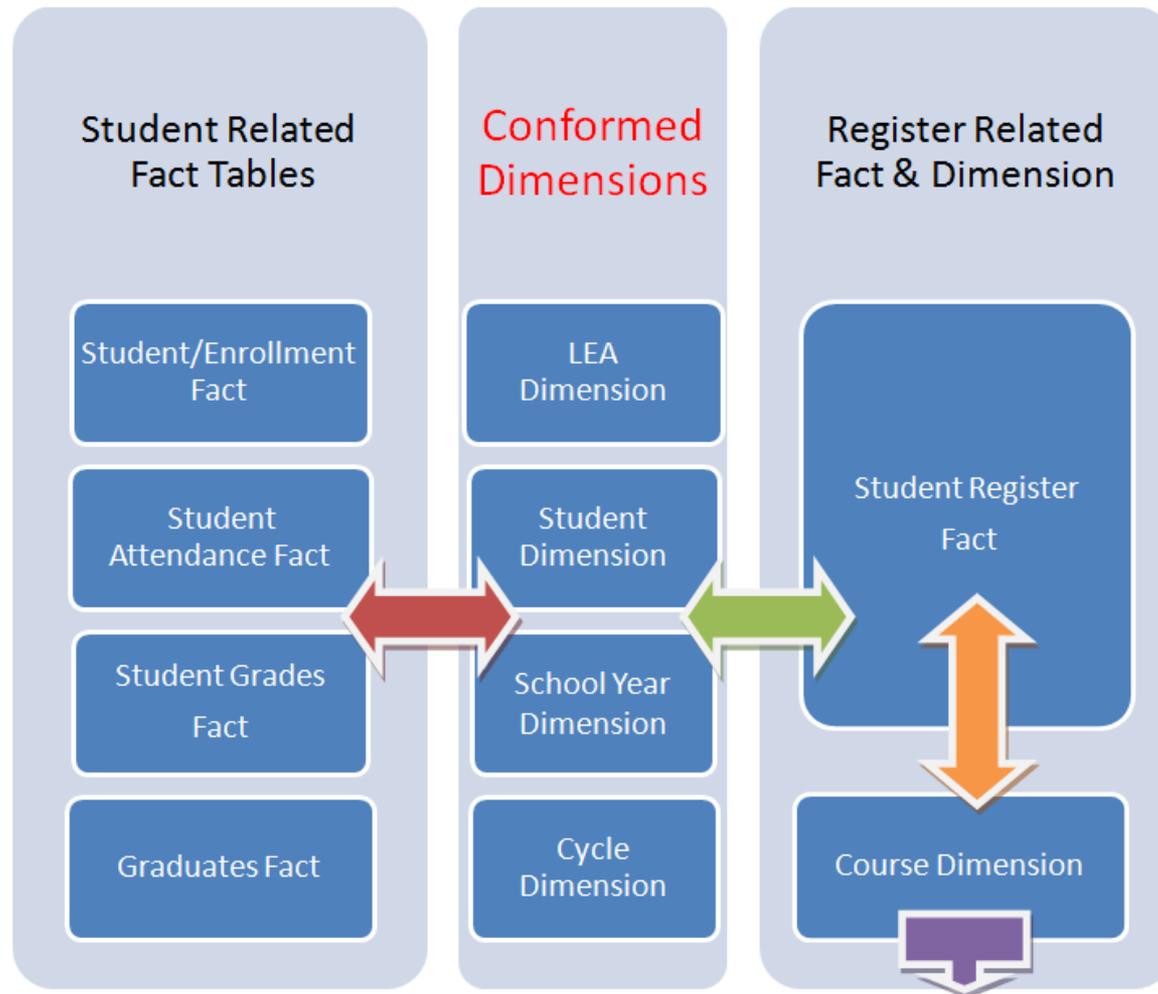
# ADE Teacher Student Data Link (TSDL) Reporting Data Model – Crosstab View

Dimensions	LEA	School Year	Cycle	Student	Course	Staff
Enrollment Fact	X	X	X	X		
Register Fact	X	X	X	X	X	
Class Schedule Fact	X	X	X		X	X
Job Assignment Fact	X	X	X			X

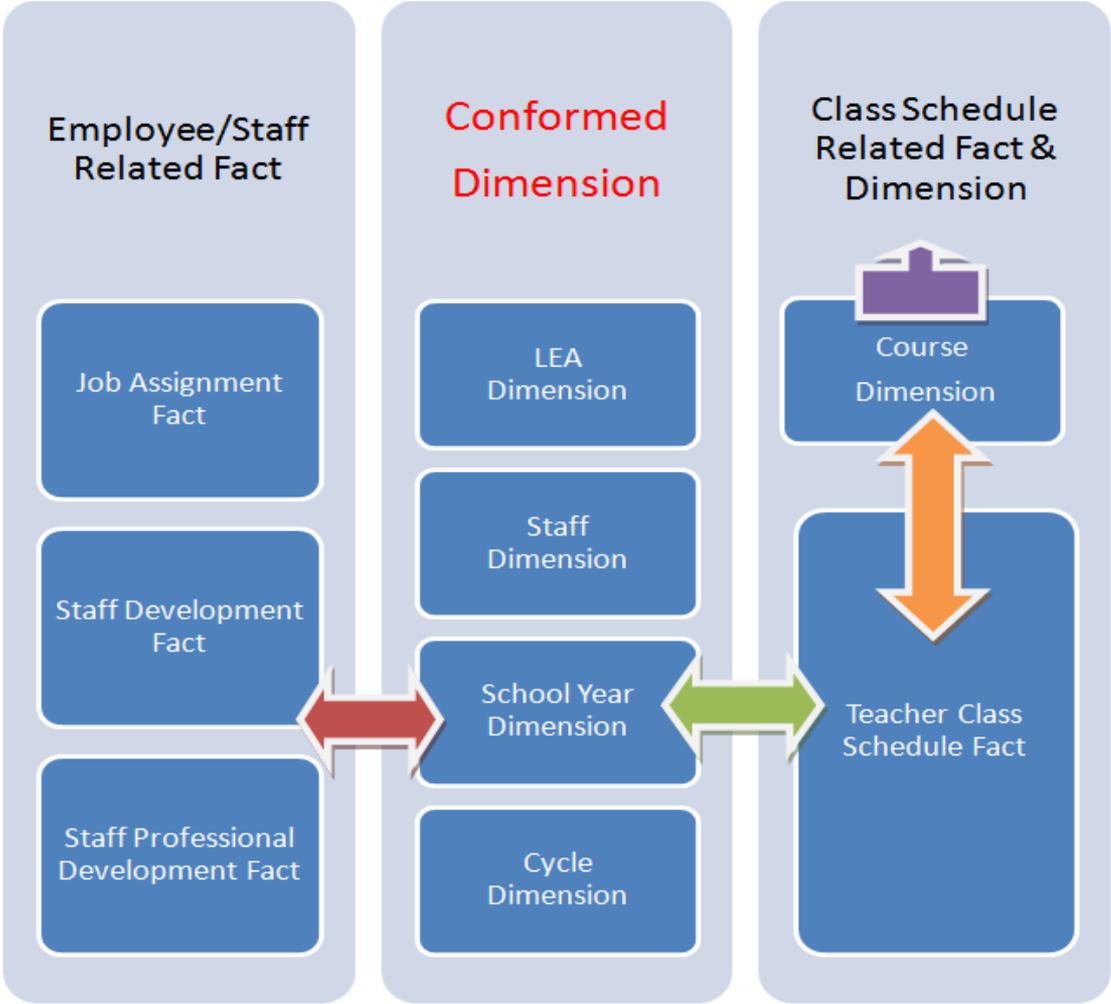
Summarized Facts & Dimensions Table for TSDL Data Model



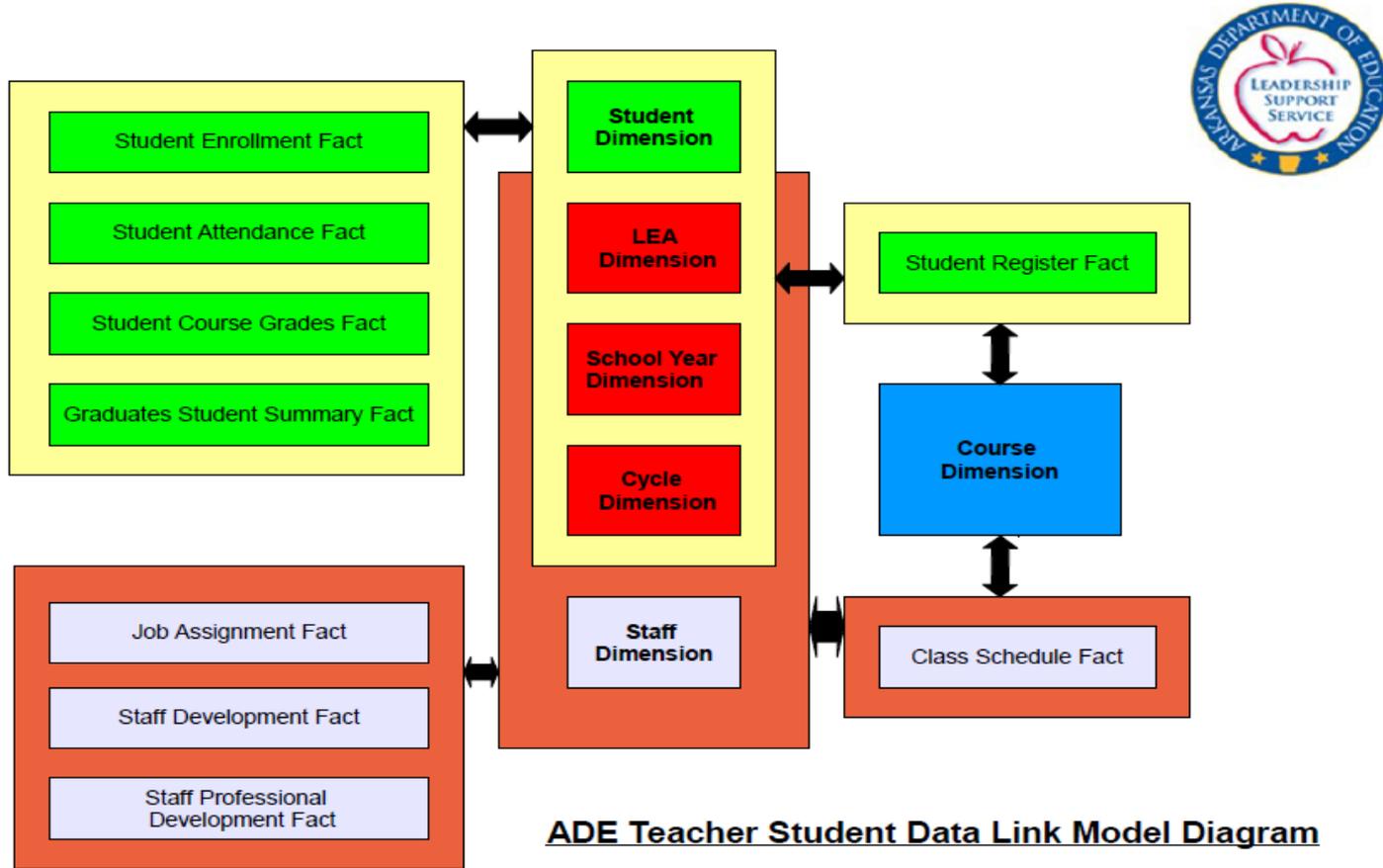
# Dimensional Conformity in TSDL Reporting Data Model: Student & Course



# Dimensional Conformity in TSDL Reporting Data Model: Teacher & Course



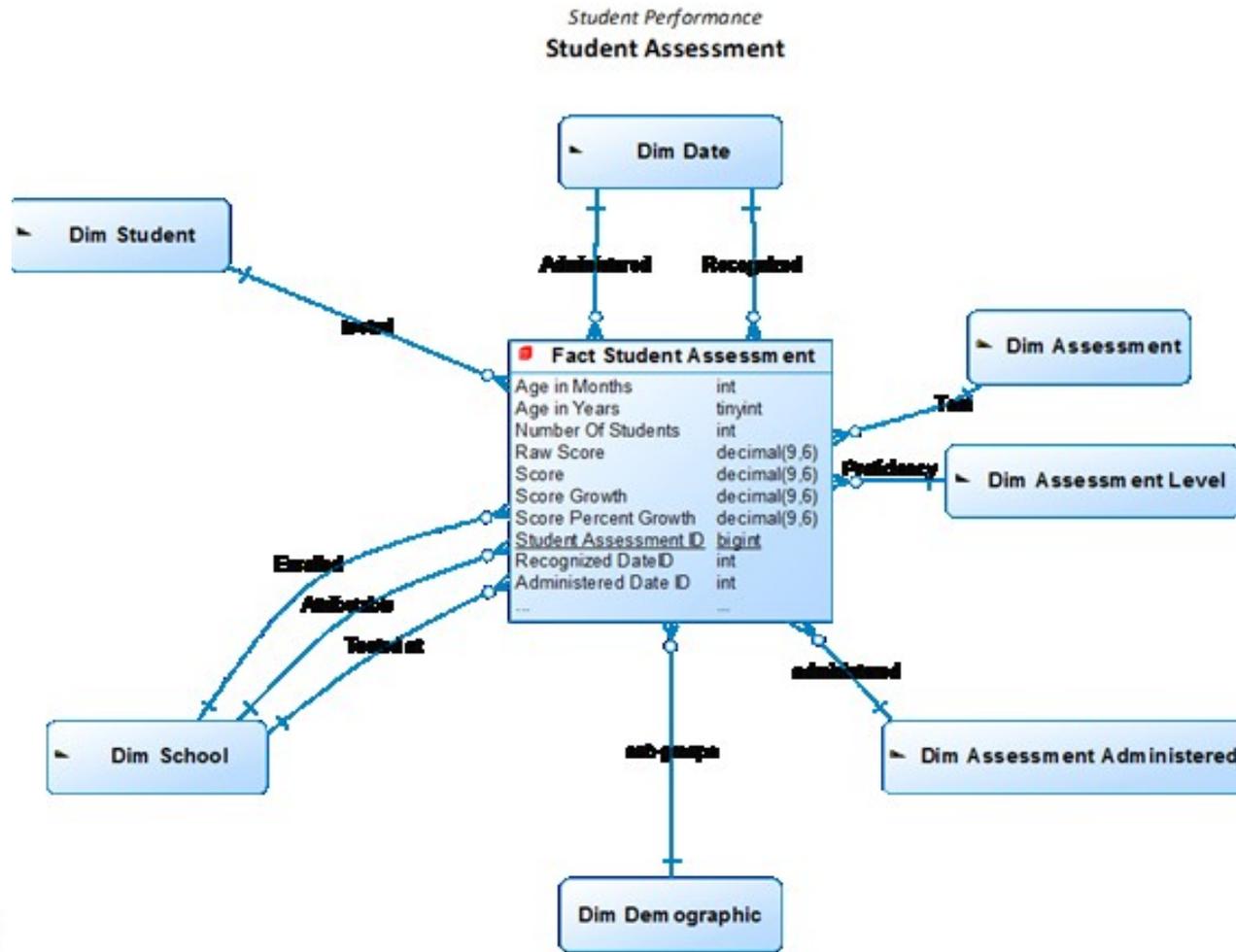
# ADE TSDL Reporting Data Model Diagram



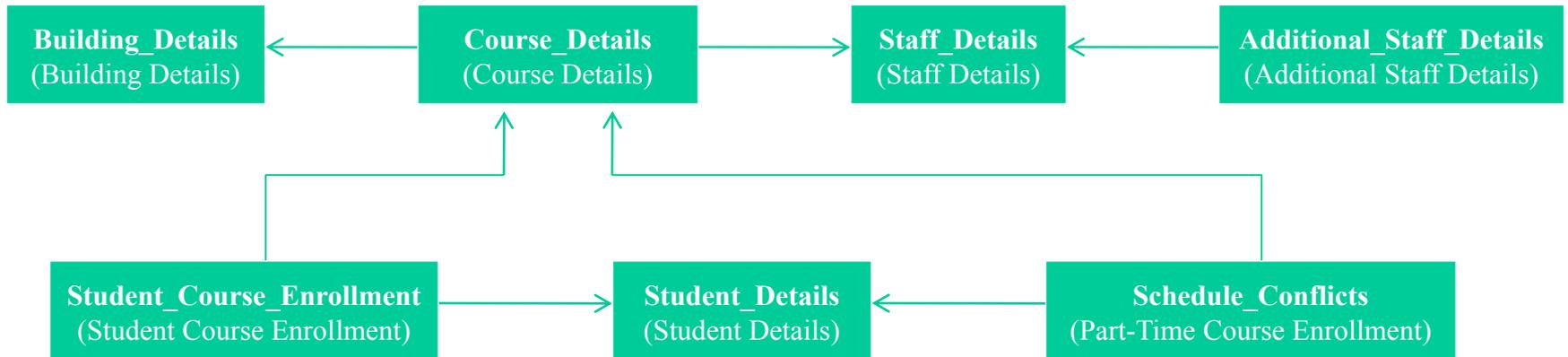
**ADE Teacher Student Data Link Model Diagram**



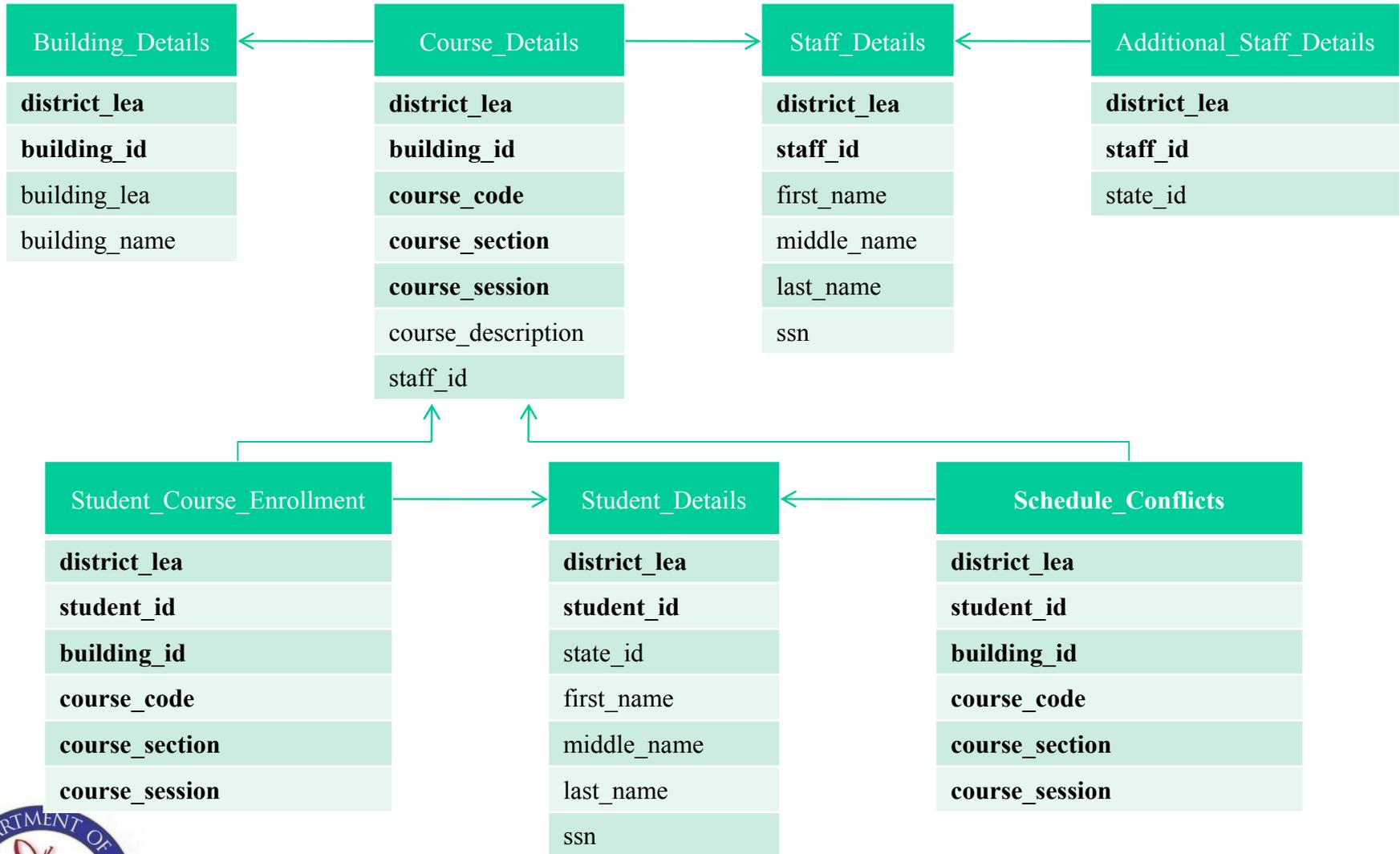
# Sample Student Assessment Fact



# Operational Data Model (Simple)



# Operational Data Model (Detailed)



# Website

The screenshot shows a web browser window with the URL `http://localhost:61865/classrosters/classroster.aspx`. The page title is "ADE Data Center" and the user is logged in as `teacher@arkansas.gov`. The main heading is "Class Rosters".

**Select a Roster**

District: MALVERN SCHOOL DISTRICT

School: MALVERN ELEM SCHOOL

Staff Member: KR---, DI---

Course: LANG. ARTS 03

Section: 5 Session: 0

**LANG. ARTS 03** KR---, DI---

Course: 233110 Section: 5 Session: 0 District: MALVERN SCHOOL DISTRICT School: MALVERN ELEM SCHOOL

Snapshot: Live Data from APSCN [Verify this roster is accurate](#) | [Report errors on this roster](#)

	LAST NAME	FIRST NAME	MIDDLE NAME	STATUS
1	BA---	JA--	CH---	FULL-TIME
2	BA--	AP--	MI----	FULL-TIME
3	BE----	KA----	DA----	FULL-TIME
4	BE---	CO--	SC--	FULL-TIME
5	BU----	JA----	DA--	FULL-TIME
6	FA--	ME----	DE-----	FULL-TIME
7	GA---	SH--	PA----	FULL-TIME
8	GA----	SU----	B.	FULL-TIME
9	GO----	DI----	MO----	FULL-TIME

**Verify this Roster**

To ensure data quality, please regularly verify the students on your class rosters. Each time you verify your roster, a historical snapshot is saved for your reference.

Course: LANG. ARTS 03 (Course: 233110, Section: 5, Session: 0)

Your Name: KR---, DI---



# Permission Levels

The screenshot displays the ADE Data Center interface in Mozilla Firefox. The browser address bar shows the URL: `http://localhost:61865/classrosters/classroster.aspx`. The page header includes navigation links: `All Tools`, `Tools by Role`, `Newsroom`, and a login status: `Logged in as teacher@arkansas.gov | Logout`. There are four overlapping yellow boxes, each representing a 'Select a Roster' form for a different user role:

- Teacher:** District: MALVERN SCHOOL DISTRICT; School: MALVERN ELEM SCHOOL; Staff Member: KR---, DI---; Course: LANG. ARTS 03; Section: 5; Session: 0.
- Principal:** District: MALVERN SCHOOL DISTRICT; School: MALVERN ELEM SCHOOL; Staff Member: BA---, SU--; Course: LANG. ARTS 03; Section: 1; Session: 0.
- Superintendent:** District: MALVERN SCHOOL DISTRICT; School: MALVERN ELEM SCHOOL; Staff Member: BA---, SU--; Course: LANG. ARTS 03; Section: 1; Session: 0.
- State Department Staff:** District: MALVERN SCHOOL DISTRICT; School: MALVERN ELEM SCHOOL; Staff Member: BA---, SU--; Course: LANG. ARTS 03; Section: 1; Session: 0.



# Verification

ADE Data Center - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:61865/classrosters/classroster.aspx

ADE Data Center

Section: 5 Session: 0

5	BU----	JA----	DA--	FULL-TIME
6	FA--	ME----	DE-----	FULL-TIME
7	GA---	SH---	PA----	FULL-TIME
8	GA----	SU----	B.	FULL-TIME
9	GO----	DI----	MO----	FULL-TIME

### Verify this Roster

To ensure data quality, please regularly verify the students on your class rosters. Each time you verify your roster, a historical snapshot is saved for your reference.

Course: LANG. ARTS 03 (Course: 233110, Section: 5, Session: 0)

Your Name: KR---, DI--

Your Email: teacher@arkansas.gov

I hereby certify that the class roster on this page is currently accurate.

Verify Roster

### Report Roster Errors

If you have located an error on your class roster, please notify your school office or registrar.

Course: LANG. ARTS 03 (Course: 233110, Section: 5, Session: 0)

Your Name: KR---, DI--

Your Email: teacher@arkansas.gov

Office/Registrar

Email:



# Reporting Errors

ADE Data Center - Mozilla Firefox  
http://localhost:61865/classrosters/classroster.aspx

I hereby certify that the class roster on this page is currently accurate.

Verify Roster

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If you have located an error on your class roster, please notify your school office or registrar.

Course: LANG. ARTS 03 (Course: 233110, Section: 5, Session: 0)

Your Name: KR--, DI--

Your Email: teacher@arkansas.gov

Office/Registrar Email:

Students to be Removed:	Students to be Added:	Additional Notes:
BA---, JA-----		
BA---, AP-----		
BE---, KA-----		
BE---, CO-----		
BU---, JA-----		
FA--, ME-----		

Submit Error Report

**Support & Feedback**

Your Name

Your Email



ARKANSAS DEPARTMENT OF EDUCATION



# Verified Snapshots

ADE Data Center - Mozilla Firefox  
 http://localhost:61865/classrosters/classroster.aspx

**ADE DATA CENTER** All Tools Tools by Role Newsroom Logged in as teacher@arkansas.gov | Logout

## Class Rosters

**Select a Roster**

District: MALVERN SCHOOL DISTRICT

School: MALVERN ELEM SCHOOL

Staff Member: KR---, DI---

Course: LANG. ARTS 03

Section: 5 Session: 0

**LANG. ARTS 03** KR---, DI---

Course: 233110 Section: 5 Session: 0 District: MALVERN SCHOOL DISTRICT School: MALVERN ELEM SCHOOL

[Verify this roster is accurate](#) | [Report errors on this roster](#)

Snapshot: Live Data from APSCN  
Live Data from APSCN  
**Verified Snapshot: 2011 Feb 15**  
Verified Snapshot: 2010 Nov 20

ID	NAME	MIDDLE NAME	STATUS
1	BA--- JA--	CH---	FULL-TIME
2	BA-- AP--	MI----	FULL-TIME
3	BE---- KA----	DA----	FULL-TIME
4	BE--- CO--	SC--	FULL-TIME
5	BU---- JA----	DA--	FULL-TIME
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8	GA---- SU----	B.	FULL-TIME
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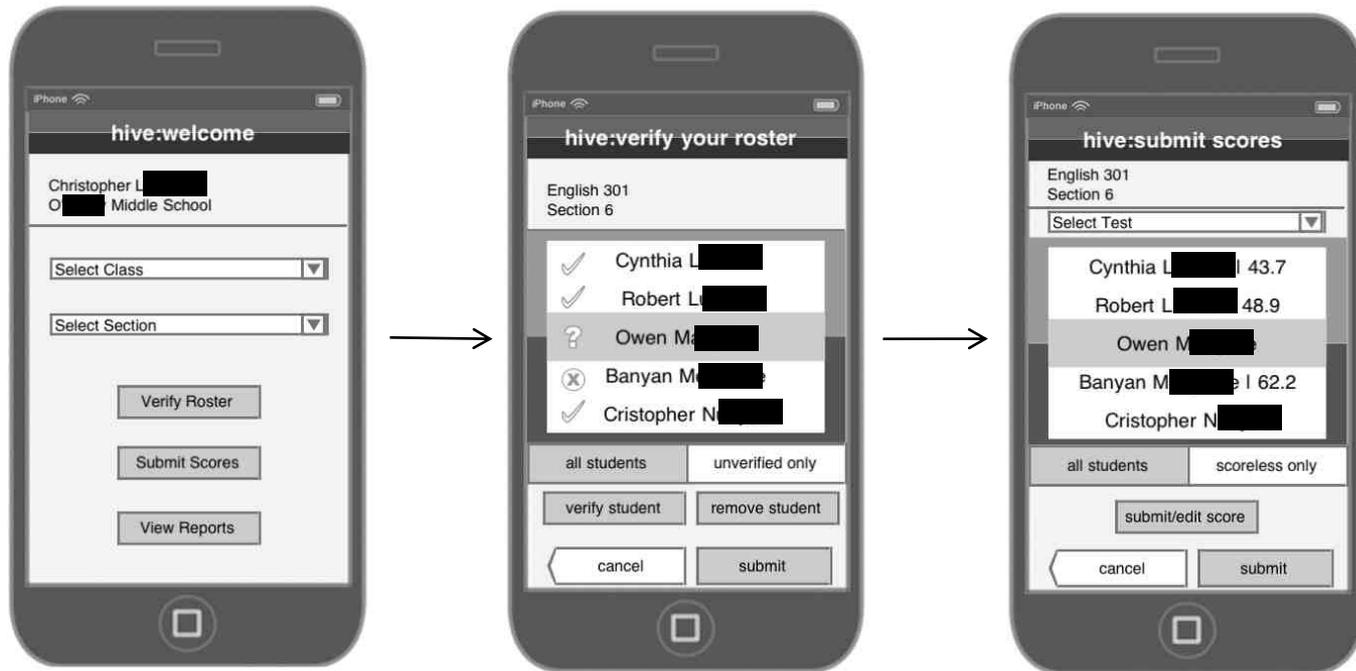
# Next Steps

- Further Integration into SLDS Reporting Model
- Professional Development/Training
- TSDL Policy Development
- Appeals Process



# What Else Arkansas is Doing for a Quality Teacher-Student Data Link

- Roster Verification as Part of Classroom Assessments Upload Process (web or mobile device application)



(Names shown are fictitious.)



# What Else Arkansas is Doing for a Quality Teacher-Student Data Link

- Roster Verification Linked to Educator Use of Data Cognos Reporting, “Quick Looks,” Hive Data Visualization (Giving Something Back)

See Also...

**The Student Growth Paradox**

*Neal Gibson*

**Concurrent Session XI**

**8:30 - 9:30 Friday**



# Summary of Roster Verification

(not necessarily either-or)

Event Based	Embedded Process
“Certifying” Data	“Verifying Data”
For a Specific Purpose	For Multiple Purposes
Once a Year (or collection cycle)	Frequently (Daily Grain)
Called out as separate process	Embedded within daily tasks
Longitudinal changes may be collected as part of the process	Longitudinal history collected via nightly snapshots
Purpose: fulfills compliance/policy, establishes trust in the TSDL	Purpose: improves data quality at the source, establishes trust in the TSDL
Supports an appeals process	Uses of TSDL help drive adoption and data quality

# Key Points for TSDL Data Model

(not necessarily either-or)

1. Different structures for OLTP, OLAP, other
2. High stakes uses require more granular longitudinal data captured, verified, and certified
3. Design must support policy and practice

- Proceed with caution: An impeachable data link may cause more harm than good.

## Contacts:

- Cody Decker (ADE) - [Cody.Decker@arkansas.gov](mailto:Cody.Decker@arkansas.gov)
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<http://www.TSDL.org>