



Ed-Fi Extension and Semantic Analysis: Arizona

Purpose and Brief of the Analysis

The purpose of this report is to work with the Arizona Department of Education (ADE) as the partner of Ed-Fi Alliance (Ed-Fi) and share Ed-Fi's findings for the assessment of extensions and semantic alignment of the state's usage of data elements in Ed-Fi's core data standard.

Our analysis has concluded that Arizona is well aligned with Ed-Fi core semantically, which means the data elements in the Ed-Fi core are almost always used by the State as intended.

Arizona has used the extension mechanism in Ed-Fi for areas where the core data standard did not meet specific needs of the state in areas that include school and section enrollments, course offering and section, external provider teachers, student need for program services, student program evaluation, SPED assessment outcomes, dropout recovery program, school and program attendance, and discipline. As found in the section below, the extension analysis looked at areas where there are current options available in the core; where there might be better alternatives for extension; and where extensions should be considered by Ed-Fi for inclusion into the core data model.

Body of the State Analysis

The Ed-Fi Alliance is committed to sustaining the Ed-Fi data standard to support the capture, usage, reporting, and exchange of educational data. As such the Ed-Fi data standard promotes data interoperability in the industry, enables data-driven decision making, and hence contributing to the advancement of educational outcomes.

In a continuing effort to better serve the community of users, this analysis is the first of a periodic evaluation of how the various Ed-Fi states are using and extending the Ed-Fi data model. In particular, the analysis is meant to investigate the following questions:

- Is the State using the core Ed-Fi data model as semantically defined and intended?
- Does the State follow good practices in extending the Ed-Fi data model, adhering to the overall conventions embodied in the data standard?
- Do extensions duplicate what could be reflected in the Ed-Fi core model, or are there subsequent updates to the core that now cover what previously required an extension?
- Are there extensions that point to common needs across states and/or potential model changes that would benefit the community at large?



The analysis findings specific to Arizona are summarized in the following sections: *extension analysis* has a focus on the extensions the state introduced, and the *semantic analysis* evaluates the usage of the core data standard any deviations from the original purpose of the data element. The intent of this analysis is to improve the Ed-Fi data standard and its usage in the community. The analysis should be taken as an *opinion* based upon published materials by Ed-Fi and the states to stimulate further collaboration.

Extension Analysis

The Arizona extensions comprise seven new entities, one new association, and 124 attributes as outlined below.

- Two attribute extensions are made to the Calendar:
 - CalendarExtension.TotalInstructionalDays
 - CalendarExtension.TrackLocalEducationAgency
- The following extensions are made to CourseOffering:
 - An attribute extension
CourseOfferingExtension.EndOfCourseAssessmentCodeDescriptorId
 - A new entity CourseOfferingCourseSchedule with the following attributes:
 - Reference to CourseOffering (LocalCourseCode, SchoolID, SchoolYear, and SessionName)
 - CourseOfferingCourseSchedule.ScheduleDate
 - CourseOfferingCourseSchedule.InstructionalMinutesPlanned
- Attribute extensions to CourseTranscript are as follows:
 - CourseTranscriptExtension.FinalLetterGradeDescriptorId
 - CourseTranscriptExtension.CourseAttemptResultDescriptorId
- Attribute extensions are made to DisciplineAction, as follows:
 - DisciplineActionExtension.DisciplineEndDate
 - DisciplineActionExtension.ParentDeclinedServices
 - DisciplineActionExtension.ServicesProvided
- Working with the Ed-Fi Alliance, four entity extensions are made for students' program evaluations:
 - New entity ProgramEvaluation with attributes:
 - Program reference (EducationOrganizationId, ProgramName)
 - ProgramEvaluation.ProgramEvaluationPeriodDescriptorId
 - ProgramEvaluation.ProgramEvaluationProgramTypeDescriptorId
 - ProgramEvaluation.ProgramEvaluationTitle
 - ProgramEvaluation.ProgramEvaluationTypeDescriptorId



- ProgramEvaluation.ProgramEvaluationDescription
- New entity ProgramEvaluationElement with attributes:
 - Reference to ProgramEvaluation (ProgramEvaluationEducationOrganizationId, ProgramEvaluationPeriodDescriptorId, ProgramEvaluationProgramName, ProgramEvaluationProgramTypeDescriptorId, ProgramEvaluationTitle, ProgramEvaluationTypeDescriptorId)
 - ProgramEvaluationElement.ProgramEvaluationElementTitle
 - ProgramEvaluationElement.ProgramEvaluationElementDescription
 - ProgramEvaluationElement.ElementMaxRating
 - ProgramEvaluationElement.ElementMinRating
- New entity EvaluationRubricDimension with attributes:
 - Reference to ProgramEvaluationElement (ProgramEvaluationEducationOrganizationId, ProgramEvaluationPeriodDescriptorId, ProgramEvaluationProgramName, ProgramEvaluationProgramTypeDescriptorId, ProgramEvaluationTitle, ProgramEvaluationElementTitle)
 - EvaluationRubricDimension.EvaluationRubricRating
 - EvaluationRubricDimension.EvaluationCriterionDescription
- New entity StudentProgramEvaluation with attributes:
 - Reference to Student (StudentUniqueID)
 - Reference to Reference to ProgramEvaluation (ProgramEvaluationEducationOrganizationId, ProgramEvaluationPeriodDescriptorId, ProgramEvaluationProgramName, ProgramEvaluationProgramTypeDescriptorId, ProgramEvaluationTitle, ProgramEvaluationTypeDescriptorId)
 - StudentProgramEvaluation.EvaluationDate
 - StudentProgramEvaluation.EducationOrganizationID
 - StudentProgramEvaluation.StaffID
 - Reference to ProgramEvaluationElement (reference to Program Evaluation, ProgramEvaluationElementTitle)
 - StudentProgramEvaluation.EvaluationElementRating
- Attribute extensions are made to Section, as follows:
 - Section.SiteLocationSchoolId
 - SectionExtension.Note
 - SectionExtension.MinutesPerWeek
 - SectionExtension.TimetableDayIdentifier



- New entity SectionExternalProviderTeacher with attributes:
 - Reference to Section (SchoolID, LocalCourseCode, SchoolYear, SectionIdentifier, SessionName)
 - SectionExternalProviderTeacher.ExternalProviderName
 - SectionExternalProviderTeacher.ProviderTeacherLastName
 - SectionExternalProviderTeacher.ProviderTeacherFirstName
 - SectionExternalProviderTeacher.ClassroomPositionDescriptorID
 - SectionExternalProviderTeacher.BeginDate
 - SectionExternalProviderTeacher.EndDate
- New association and entity to support the student dropout recovery program:
 - StudentDropOutRecoveryProgramAssociation, a specialization of the GeneralStudentProgramAssociation, with attribute StudentDropOutRecoveryProgramAssociation.WrittenLearningPlanDate.
 - StudentDropOutRecoveryProgramMonthlyUpdates, with attributes:
 - Reference to StudentDropOutRecoveryProgramAssociation (StudentUniqueID, ProgramTypeDescriptorId, ProgramEducationOrganizationID, BeginDate, ProgramName, EducationOrganizationID)
 - StudentDropOutRecoveryProgramMonthlyUpdates.MonthDescriptorID
 - StudentDropOutRecoveryProgramMonthlyUpdates.RevisedWrittenLearningPlanDate
 - StudentDropOutRecoveryProgramMonthlyUpdates.SatisfactoryProgress
- Extension attribute to StudentEducationOrganizationAssociation.TribalAffiliation for StudentEducationOrganizationAssociationAZTribalAffiliation.IsEnrolled.
- New entity StudentNeed to record a student's need for program services, with attributes:
 - Reference to Student (StudentUniqueID)
 - Reference to EducationOrganization (EducationOrganizationID)
 - StudentNeed.IsAncillary
 - StudentNeed.PrimaryStudentNeedIndicator
 - StudentNeed.StudentNeedDescriptorID
 - StudentNeed.StudentNeedEntryDate
 - StudentNeed.StudentNeedExitDate
- Extension attributes to the StudentParentAssociation, as follows:
 - StudentParentAssociationExtension.BeginDate
 - StudentParentAssociationExtension.EndDate
 - StudentParentAssociationExtension.IsIDEAParent
- Extensions to the StudentSchoolAssociation are as follows:



- StudentSchoolAssociationExtension.ExitWithdrawReasonDescriptorID
- StudentSchoolAssociationExtension.MembershipTypeDescriptorID
- StudentSchoolAssociationExtension.TotalCommunityCollegeEnrolledCredits
- StudentSchoolAssociationExtension.TotalPlannedInstructionalHours
- StudentSchoolAssociationMembershipFTE.FTEEndDate
- StudentSchoolAssociationMembershipFTE.FTEStartDate
- StudentSchoolAssociationMembershipFTE.MembershipFTEDescriptorID
- StudentSchoolAssociationLocalEducationAgency.EndDate
- StudentSchoolAssociationLocalEducationAgency.MembershipResponsibilityDescriptorID
- StudentSchoolAssociationLocalEducationAgency.StartDate
- StudentSchoolAssociationLocalEducationAgency.LocalEducationAgencyID
- StudentSchoolAssociationSpecialEnrollment.SpecialEnrollmentDescriptorID
- StudentSchoolAssociationSpecialEnrollment.SpecialEnrollmentEndDate
- StudentSchoolAssociationSpecialEnrollment.SpecialEnrollmentStartDate
- StudentSchoolAssociationTuitionPayer.PayerEndDate
- StudentSchoolAssociationTuitionPayer.PayerStartDate
- StudentSchoolAssociationTuitionPayer.TuitionPayerDescriptorID
- Attribute extension to the StudentSchoolAttendanceEvent with StudentSchoolAttendanceEventExtension.InstructionalMinutes.:
- Attribute extensions to the StudentSectionAssociation are as follows:
 - StudentSectionAssociationExtension.ConcurrentEnrollment
 - StudentSectionAssociationExtension.CourseEntryDescriptorID
 - StudentSectionAssociationExtension.CourseExitDescriptorID
 - StudentSectionAssociationExtension.DualCredit
 - StudentSectionAssociationExtension.Note
- Attribute extensions to the StudentSpecialEducationProgramAssociation are as follows:
 - StudentSpecialEducationProgramAssociation.MainSPEDSchool
 - StudentSpecialEducationProgramAssociationAssessmentOutcome.AssessmentOutcomesSummaryDescriptorID
 - StudentSpecialEducationProgramAssociationAssessmentOutcome.IsProgressMade
 - StudentSpecialEducationProgramAssociationAssessmentOutcome.AssessmentPeriodDescriptorID
 - StudentSpecialEducationProgramAssociationAssessmentOutcome.AssessmentCategoryDescriptorID
- Attribute extensions to the StudentProgramAttendanceEvent are as follows:
 - StudentProgramAttendanceEventActivityTimeLog.ActivityCode



- StudentProgramAttendanceEventActivityTimeLog.ActivityDescriptorID
- StudentProgramAttendanceEventActivityTimeLog.AttendanceBeginTime
- StudentProgramAttendanceEventActivityTimeLog.AttendanceEndTime.

Semantic Analysis

Arizona is well aligned with the Ed-Fi data standard with 190 of 192 data elements precisely aligned semantically with the Ed-Fi core. The exception data elements are listed in the following section.

- The StaffEducationOrganizationAssignmentAssociation.EmploymentEducationOrganizationID replaces the Ed-Fi reference StaffEducationOrganizationAssignmentAssociation. StaffEducationOrganizationEmploymentAssociation because Arizona does not use the StaffEducationOrganizationEmploymentAssociation. While this is equivalent in purpose, it is not semantically aligned to the standard. The definition for this element is also erroneous.
- There is a structural and semantic difference in the handling of StudentSchoolAttendanceEvent.EventDuration, which Arizona defines as a descriptor with options for fractional values of the school day 0.25, 0.50, 0.75 and 1.0. By contrast, Ed-Fi defines two places for event duration:
 - StudentSchoolAttendanceEvent.SchoolAttendanceEventDuration – an INT for duration in minutes
 - StudentSchoolAttendanceEvent.AttendanceEvent.EventDuration – a DECIMAL(3.2) for fractional values of the school day.

Summary of Finds and Next Steps

The analysis found that Arizona created a moderate number of extensions to the Ed-Fi core in the areas that include school and section enrollments, course offering and section, external provider teachers, student need for program services, student program evaluation, SPED assessment outcomes, dropout recovery program, school and program attendance, and discipline. Specific suggestions for the State are as follows.

- Migrate the four entity extensions (ProgramEvaluation, ProgramEvaluationElement, EvaluationRubricDimension, and StudentProgramEvaluation) to the Ed-Fi version 5.X core. Since Arizona is working with Ed-Fi in this model, the extensions are already well-aligned (with only minor differences) with the new core elements.

In terms of the usage of the data elements in the Ed-Fi core model (aka semantic alignment), Arizona is found to be well aligned, with 2 data elements structurally misaligned. Communication of these deviances with the Ed-Fi Alliance for stronger alignment is recommended.



There are several elements where definitions should be re-examined:

- The definition for SchoolID has an erroneous definition: “A unique alpha-numeric code assigned to a student by the state.” in the following:
 - ClassPeriod.SchoolID
 - SectionExternalProviderTeacher.SchoolID
- There were several cases where the definition for a descriptor was cryptically stated as “A unique identifier used as Primary Key, not derived from business logic, when acting as Foreign Key, references the parent table.” Use of the Ed-Fi definition is recommended.:
 - StaffSectionAssociation.ClassroomPositionDescriptorID
 - StudentSchoolAssociation.EntryTypeDescriptorID
 - StudentSchoolAssociation.ExitWithdrawTypeDescriptorID
- The definition for StudentOtherName.OtherNameTypeDescriptorId is cryptic but aligned – the Ed-Fi definition would be better suited.

This analysis also provided Ed-Fi information on a need for the review of current design of some data elements listed below:

- There were a number of definitions for Ed-Fi elements that Arizona provided an alternative, equivalent, but *better* definition that resulted in recommendations for updates to the Ed-Fi definitions.
- The Ed-Fi definition for Section.AvailableCredits indicates that the unit of measurement is “Carnegie units.” There is an indication that the industry may be moving away from this measure. Ed-Fi should monitor and consider dropping the Carnegie unit reference in favor of specifying using the units specified by the State.
- The Ed-Fi data type for StaffSectionAssociation.PercentageContribution is DECIMAL (5,4) indicating it is a decimal between 0 and 1 (e.g., 0.3) rather than a percentage (e.g., 30%) – the Arizona definition clarified that – the Ed-Fi definition needs to do the same.
- The handling of event duration in two ways in the StudentSchoolAttendanceEvent (discussed above) should be re-examined in light of practices in the field. Consider collapsing the inline common StudentSchoolAttendanceEvent .AttendanceEvent for a simpler structure.

Based on these findings of the analyses, Ed-Fi would like to work closely with the Arizona Department of Education as a part of its commitment to sustaining data standards. The following are opportunities for next steps for this collaboration between the State and Ed-Fi.

- As common a need across states becomes evident, leverage the extension entities defined for external provider teachers, student need for program services, SPED assessment outcomes, and dropout recovery program.



Analysis across states may identify specific common extension attributes for consideration into core where cross-state collaboration is recommended.