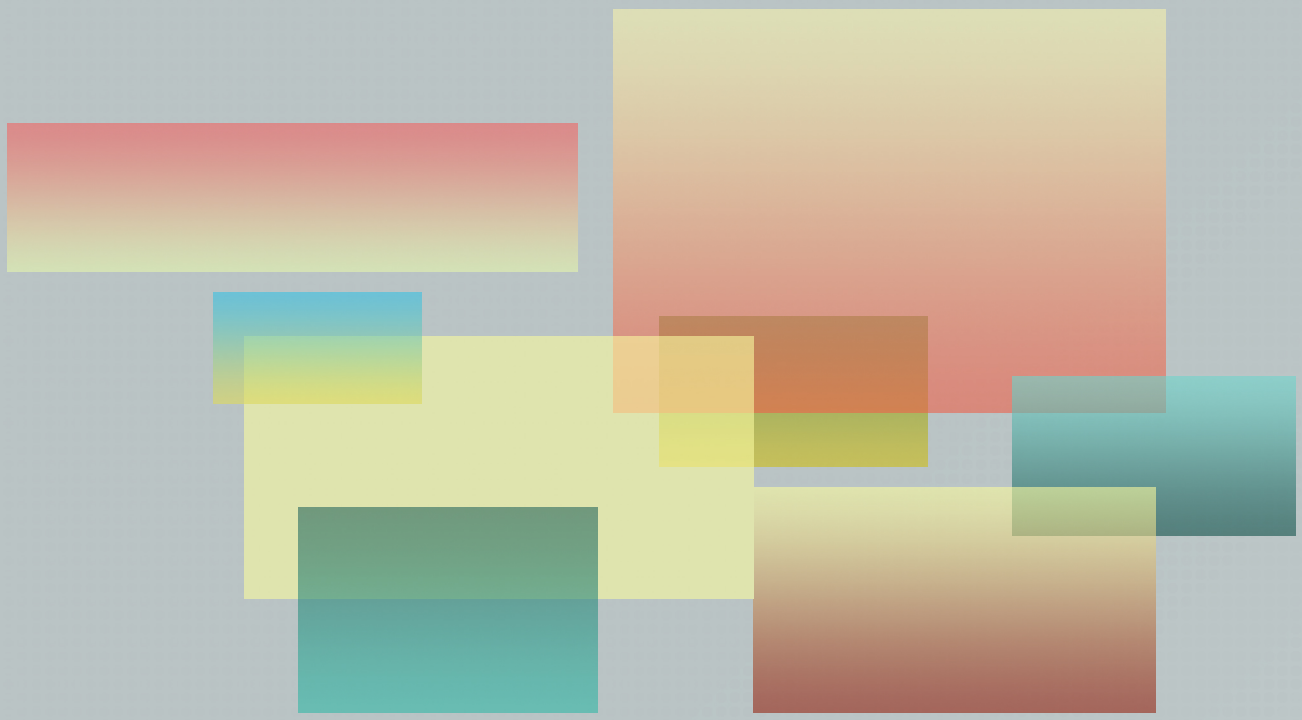
FORUM GUIDE TO

School Courses for the Exchange of Data (SCED) Uses and Benefits



National Forum on Education Statistics

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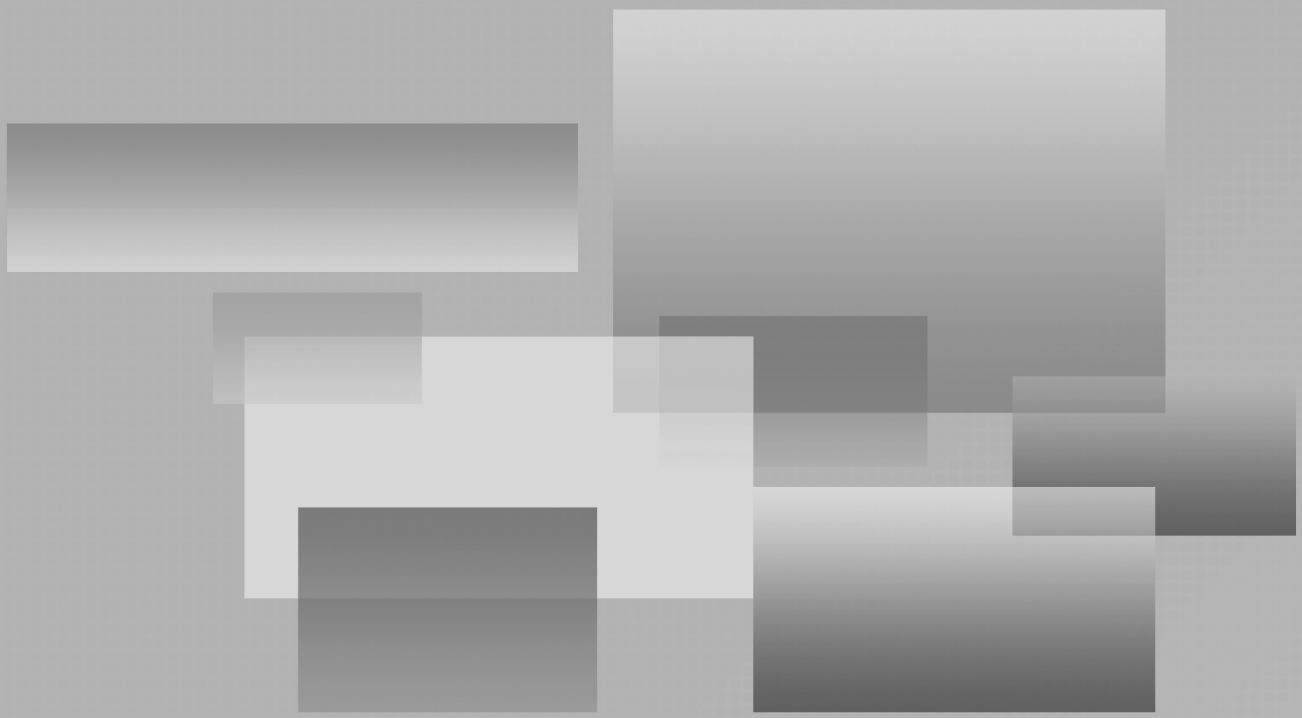

National Forum on Education Statistics

National Cooperative Education Statistics System

The National Center for Education Statistics (NCES) established the National Cooperative Education Statistics System (Cooperative System) to assist in producing and maintaining comparable and uniform information and data on early childhood, elementary, and secondary education. These data are intended to be useful for policymaking at the federal, state, and local levels.

The National Forum on Education Statistics (Forum) is an entity of the Cooperative System and, among its other activities, proposes principles of good practice to assist state and local education agencies in meeting this purpose. The Cooperative System and the Forum are supported in these endeavors by resources from NCES.

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January 2021

This publication and other publications of the National Forum on Education Statistics may be found at the websites listed below.

The NCES Home Page address is http://nces.ed.gov

The NCES Publications and Products address is http://nces.ed.gov/pubsearch

The Forum Home Page address is http://nces.ed.gov/forum

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Technical Contact

Ghedam Bairu

(202) 245-6644

ghedam.bairu@ed.gov

Foreword

The National Forum on Education Statistics (the Forum) is pleased to present the *Forum Guide to School Courses for the Exchange of Data (SCED) Uses and Benefits*. The purpose of this document is to provide timely and useful best practice information to help education agencies understand the different uses and benefits of SCED. This guide was developed to provide a brief overview of SCED, highlight the research application and benefits of SCED to users, and illustrate SCED uses with case studies.

Members of the Forum establish working groups to develop best practice guides in data-related areas of interest to federal, state, and local education agencies. The SCED Working Group consists of representatives of state and local education agencies (SEAs and LEAs) who are familiar with SCED implementation. The group convenes multiple times a year to determine the scope and timeline for SCED Course Code revisions, review proposed updates to SCED, and prepare user materials and tools. The Working Group also develops and maintains SCED tools and resources such as videos, SCED Finder, and use cases. The Working Group is assisted by a wide network of SCED users and subject matter experts at the national, state, and local levels who propose new and updated courses and provide suggestions for SCED resources.

About this Guide

SCED is a voluntary, common classification system for prior-to-secondary and secondary school courses. It can be used to compare course information, maintain longitudinal data about student coursework, and efficiently exchange coursetaking records. SCED is based on a five-digit Course Code that provides a basic structure for classifying course content. Additional SCED elements and attributes provide descriptive information about each course.

SCED is a free resource intended for federal, state, and local education agencies. SCED is updated and maintained by a National Forum on Education Statistics (Forum) Working Group that comprises state and local education agency (SEA and LEA) representatives. The Working Group receives suggestions and assistance from a wide network of subject matter experts at the national, state, and local levels. As a result, SCED is designed to be flexible enough for education agencies to modify it to meet their needs.

There are many benefits to using SCED codes:

- The SCED coding structure can be widely shared and easily understood.
- The SCED coding structure is flexible and can accommodate diverse course offerings and curricula.
- SCED can streamline data reporting processes and promote the collection of useful, high-quality data.
- SCED provides a structured method for transferring course information as students relocate or advance from one education setting to the next.
- SCED is free.

This guide was developed by the National Forum on Education Statistics (Forum) to supplement the suite of SCED resources currently available at http://nces.ed.gov/forum/SCED.asp (and detailed in Appendix A). The content of this guide builds on previous work, including the 2014 *Forum Guide to School Courses for the Exchange of Data (SCED) Classification System* and several case studies and videos highlighting how to use SCED.

This guide was developed to provide a brief overview of SCED, highlight the research application and benefits of SCED to users, and illustrate SCED uses with case studies.

Additional resources in this guide are presented in the following appendices:

- **Appendix A:** Forum SCED Resources
- **Appendix B:** Case Study References
- **Appendix C:** Academic Research Studies that use SCED
- **Appendix D:** Research Uses of SCED in National Center for Education Statistics Survey and Studies
- **Appendix E:** SCED Resources by State and Local Education Agencies

Intended Audience

The audience for this document includes

- staff in SEAs and LEAs responsible for implementing and maintaining course codes, establishing data governance practices, tracking teacher schedules and qualifications, and data reporting;
- federal agencies such as NCES that review national course offerings and produce transcript studies, monitor programs, and determine federal funding allocations;
- content-area organizations that set professional standards for course offerings;
- organizations that conduct education research;
- colleges and universities that review transcripts for student admissions or evaluate teacher preparation programs; and
- education software vendors that provide tools for education agencies to track and manage student course information.

National Forum on Education Statistics

The work of the National Forum on Education Statistics (Forum) is a key aspect of the National Cooperative Education Statistics System (Cooperative System). The Cooperative System was established to produce and maintain, with the cooperation of the states, comparable and uniform education information and data that are useful for policymaking at the federal, state, and local levels. To assist in meeting this goal, the National Center for Education Statistics (NCES) within the Institute of Education Sciences (IES)—a part of the U.S. Department of Education (ED)—established the Forum to improve the collection, reporting, and use of elementary and secondary education statistics. The Forum includes approximately 120 representatives from state and local education agencies, the federal government, and other organizations with an interest in education data. The Forum deals with issues in education data policy, sponsors innovations in data collection and reporting, and provides technical assistance to improve state and local data systems.

Development of Forum Products

Members of the Forum establish working groups to develop guides in data-related areas of interest to federal, state, and local education agencies. They are assisted in this work by NCES, but the content comes from the collective experience of working group members who review all products iteratively throughout the development process. NCES provides final review and approval before online publication. The information and opinions published in Forum products do not necessarily represent the policies or views of the U.S. Department of Education (ED), Institute of Education Sciences (IES), or National Center for Education Statistics (NCES). Readers may modify, customize, or reproduce any or all parts of this document.

SCED Version 9 Working Group Members

This online publication was developed through the National Cooperative Education Statistics System and funded by NCES within IES—a part of ED. The SCED Working Group of the National Forum on Education Statistics is responsible for the content.

Chair

Susan Williams, Virginia Department of Education

Members

Ken Hutchins, Brandywine School District (DE)

Marilyn King, Bozeman School District #7 (MT)

Rachel Kruse, Iowa Department of Education

Kristina Martin, Macomb Intermediate School District (MI)

Raymond Martin, Connecticut State Department of Education

Karen Millette, Minnesota Department of Education

Demi Moon, Sioux Falls Public Schools (SD)

Jan Petro, Colorado Department of Education

Robin Utz, U.S. Department of Education

Jon Wiens, Oregon Department of Education

Consultants

Beth Young and Alexandra Henning, Quality Information Partners, Inc. (QIP)

Project Officer

Ghedam Bairu, National Center for Education Statistics

Acknowledgments

The SCED Version 9 Working Group would like to thank the four agencies that agreed to participate as a case study in this document.

Case Study Contributors

Iowa Department of Education
Rachel Kruse, Education Consultant

Minnesota Department of Education
Karen Millette, Program Manager

REL Appalachia
Dr. Deborah Jonas, Director

REL Northwest
Dr. Havala Hanson, Manager

Milwaukee Public Schools
Dr. Melanie R. Stewart, Director of Research

Contents

Chapter One: Introduction

School Courses for the Exchange of Data Structure

School Courses for the Exchange of Data (SCED) is designed for use in student record systems, master course schedules, transcripts, and reporting by school districts and state education agencies (and their nonpublic school equivalents). The 12-character SCED Identifier consists of five elements:

- Course Subject Area
- Course Number
- Course Level
- Available Carnegie Unit Credit (or Grade Span for prior-to-secondary courses)
- Sequence of Course

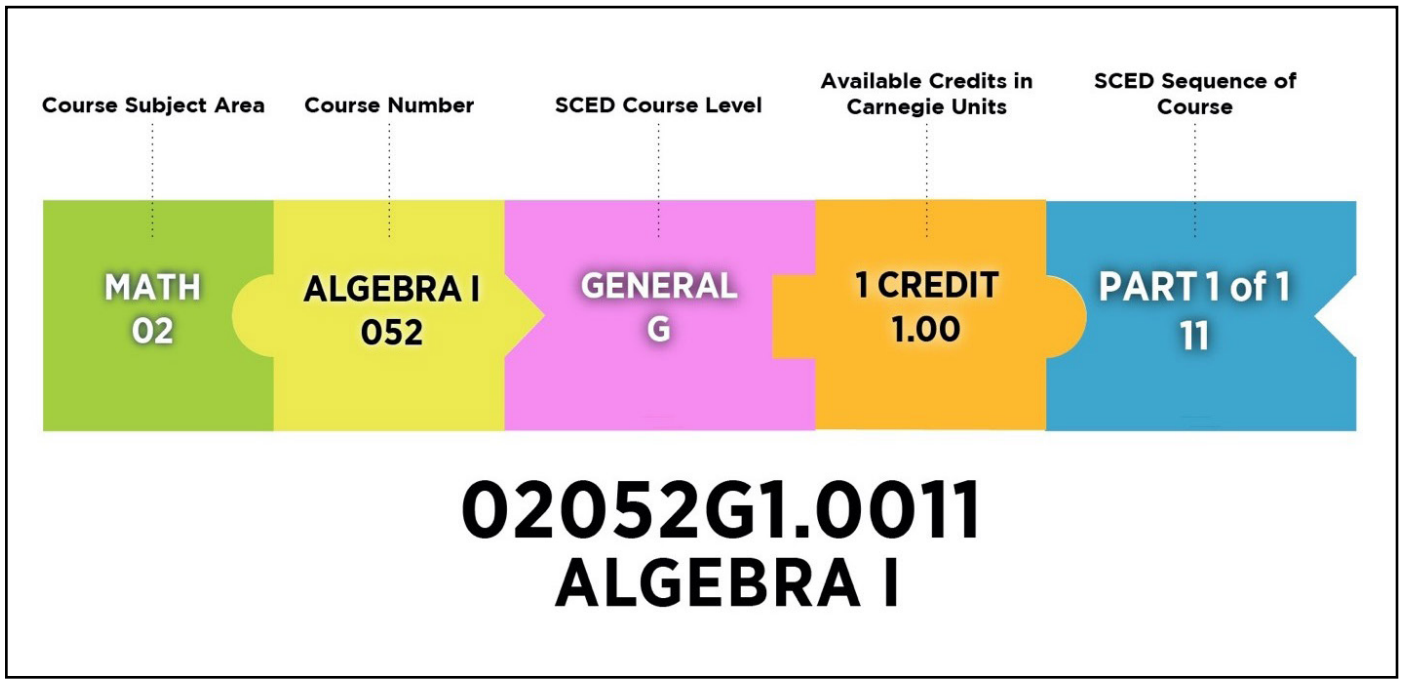


Figure 1. The 12-character SCED Identifier includes the five-digit SCED Course Code (Course Subject Area and Course Number), followed by the Course Level, Available Carnegie Unit Credit (or Grade Span for prior-to-secondary courses), and Sequence of Course.

Each element imparts complementary pieces of information about the particular course being offered. The five-digit SCED Course Code is based on two digits for the Course Subject Area and three digits for the Course Number. The elements are described in detail in chapter 2 of the *Forum Guide to School Courses for the Exchange of Data (SCED) Classification System* (2014) (https://nces.ed.gov/forum/pub_2014802.asp) and in the video *School Courses for the Exchange of Data (SCED): An Introduction* (https://nces.ed.gov/forum/sced_videos.asp).

Even the 12-character SCED Identifier provides only a basic framework for classifying and tracking courses. A comprehensive overview of a course includes much more information, ranging from the course description to the language of the course and the type of curriculum framework employed. Optional attributes can be added to the SCED Identifier to improve the usefulness of the standard. Attributes are elements widely used by state and local education agencies (SEAs and LEAs) to provide more information on courses, but they are not essential to basic SCED classification. These attributes are described in detail in chapter 1 of the *Forum Guide to School Courses for the Exchange of Data (SCED) Classification System* (2014) (https://nces.ed.gov/forum/pub_2014802.asp).

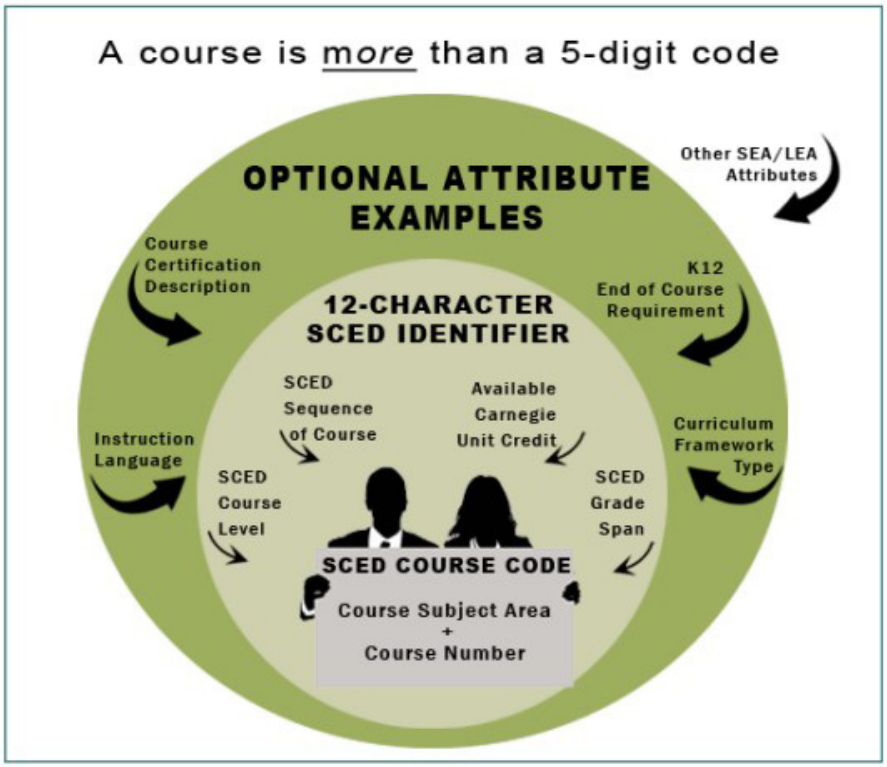


Figure 2. The 12-character SCED Identifier provides additional information beyond the basic five-digit code needed to identify a course within the SCED system. Optional attributes can also be added to the SCED Identifier to improve the usefulness of the standard.

SCED Development and Update Process

Since SCED is developed and updated by the SCED working group, which receives suggestions and assistance from a wide network of subject matter experts, SCED is designed with flexibility for education agencies to modify it to meet their needs. The working group regularly reviews and updates SCED based on the needs of SCED users. To remain relevant, SCED must reflect up-to-date course offerings, and updates must be implemented in a manner that maintains the structure and integrity of the established SCED. The review process includes the following major milestones:

1. **Recommendations:** SCED users are encouraged to submit recommendations for improvement through the National Forum on Education Statistics (Forum) website. Updates are based on the recommendations of a wide network of stakeholders, including Department of Education staff, representatives of SEAs and LEAs, national organizations, education researchers, practitioners, and other SCED users.
2. **Review:** The Forum SCED Working Group considers recommendations and suggestions submitted by SCED users and determines the scope of each update. After identifying a set of priorities, the Working Group contacts subject matter experts in SEAs and LEAs to review and comment on proposed updates as applicable. The Working Group may choose to expand the review process to include focus groups or feedback from national subject area content organizations.
3. **Publication:** Updated SCED codes and attributes are reviewed by the Forum members, as well as the National Center for Education Statistics (NCES), and subsequently released on the Forum's website.

With each update, SEAs and LEAs engage in ongoing maintenance by aligning newly developed local courses with SCED Course Codes, implementing new versions of SCED, or adopting SCED attributes. SEAs and LEAs that prepare for ongoing maintenance as part of SCED implementation help to prevent SCED from becoming outdated and provide SCED users with established procedures for adding courses to SCED.

SCED Versions and Access

SCED is updated annually and released as downloadable files and in a searchable tool called SCED Finder. The annual releases of SCED are numbered consecutively, with the 2020 version numbered 8.0. Users can access SCED in four different ways:

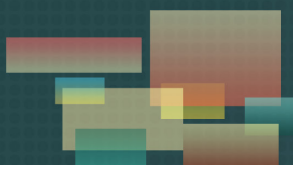
- **SCED Current Downloadable Version File** (https://nces.ed.gov/forum/Current_SCED_File_Version_8.0.asp)—For each version release, SCED is made available as a downloadable file. This file includes:
    - a comprehensive list of all five-digit SCED Course Codes, including the course title, SCED course code, course description, and change status;
    - a list of the older SCED version course codes that have been archived and suggested alternative course codes;
    - names and definitions of the SCED Elements that make up the 12-character SCED Identifier and optional attributes that can be applied to the Identifier to provide a more robust description of courses; and,
    - a list of SCED Course Codes commonly included in one of the 16 Career Clusters® or as part of a Family and Consumer Sciences plan of study.

- **SCED Master List** (https://nces.ed.gov/forum/Master_List.asp)—This downloadable, sortable file contains a list of every SCED Course Code published in every version of SCED. This master list is intended to assist state and local education agencies with implementing or updating SCED.
- **SCED Finder** (https://nces.ed.gov/scedfinder)—SCED Finder is an online tool that assists users to quickly and efficiently identify SCED codes, select codes, and save downloadable lists of courses. This tool is revised annually as each major version is released.
- **Common Education Data Standards** (CEDS) (https://ceds.ed.gov/Default.aspx)—Once a new version of SCED codes is released, CEDS incorporates the codes into the CEDS standards, models, and tools.

SCED/Classification of Secondary School Courses (CSSC) mapping

SCED is one of several NCES course code taxonomies. Among other taxonomies commonly used by NCES is the CSSC (https://nces.ed.gov/surveys/hst/courses.asp). This secondary course taxonomy provides a general inventory of courses taught nationwide at the secondary school level (grades 9 through 12). The CSSC is based on the NCES High School Transcript Studies, which are conducted as part of the National Assessment of Educational Progress (NAEP). The CSSC has been used in transcript studies (research on course offerings and students' coursetaking behavior) since the 1970s. SCED courses have been compared to the CSSC courses, and NCES transcript studies now use SCED. For more details, see *Considerations for Using the School Courses for the Exchange of Data (SCED) Classification System in High School Transcript Studies: Applications for Converting Course Codes from the Classification of Secondary School Courses (CSSC)* (https://nces.ed.gov/pubs2019/2019417.pdf).

Chapter Two:
SCED Uses and Benefits



School Courses for the Exchange of Data (SCED) can be used to compare course information, maintain longitudinal data about student coursework, and efficiently exchange coursetaking records. State and local education agencies (SEAs and LEAs) that implement or incorporate SCED into their communication of student data can improve accuracy and efficiency across multiple areas, including data collection and reporting, transcript transmission, longitudinal data systems, and communication with postsecondary institutions. SCED also has been used to clarify education data for research studies, both within and beyond SEAs. Benefits of SCED to these studies have included improved efficiency and reduced costs, as well as increased data accuracy. Across multiple domains, SCED offers users a way to communicate large amounts of complicated education data in ways that are efficient and precise.

Common SCED uses by Local Education Agencies

Like their SEA counterparts, many local education leaders have described using SCED in varied ways to improve their systems and processes. The following list summarizes common SCED uses by LEAs:

- **Mapping LEA courses to the state-level framework**

  Many states require LEAs to use state course codes when submitting their enrollment and coursetaking data. If an SEA has implemented SCED, LEAs in the state can map existing codes into SCED. LEAs also can choose to implement SCED while still keeping customized LEA codes or local course names. Because SCED is designed to be flexible, SEAs and LEAs may implement the course-coding system according to their unique needs and standards. It is a good practice for LEAs to review state-specific coding practices with their SEA.

- **Establishing teacher-student data links**

  In most cases, the Teacher-Student Data Link (TSDL) is constructed most simply using the core data elements needed to schedule students and teachers within the context of a class (course section). The common components include:

  - unique student ID;
  - unique teacher/staff ID;
  - state and local course identifiers;
  - data to uniquely identify the course section for the time period being collected or reported (for example, school or LEA section identifier and academic year);

- data that link both a student and educator to the course section for a specific time period (for example, start and end dates); and
- data that further describe the nature of the link (such as the educator's role as a lead or co-teacher).

Any uses of the TSDL beyond the local level require SCED for comparability across LEAs. This can be achieved by LEAs keeping the state/standardized course codes in the source system or by mapping local course codes to state/SCED codes as part of the reporting process.

- **Managing teacher assignments**

  In larger school systems, SCED Course Codes may be used for assigning staff to courses that best suit their teaching qualifications and credentials. Each course is assigned a SCED Course Code, and staff members are assigned a list of SCED Course Codes that correspond to courses that they are certified and highly qualified to teach. A program that aligns courses with the appropriately qualified and certified teachers can help determine the best fit for teachers.

- **Understanding types and variety of courses offered through the district**

  The effort to map district courses to SCED often is a significant undertaking. However, this effort is worthwhile because the effort requires districts to review their course mapping for accuracy. In this process, many LEAs discover a variety of local practices that make alignment difficult or impossible. These discoveries provide LEAs an opportunity to adjust their guidelines to ensure better compliance with business rules.

- **Reducing data burdens**

  Across all these varied uses of SCED at the local level, a common benefit is the reduction of data burdens. Many states have hundreds of LEAs, each with an incredible amount of data that needs to be collected, maintained, used, and analyzed. SCED offers a clear coding system that LEAs can implement fully or adapt to meet their local needs. This prevents individual agencies from having to figure out a complicated and comprehensive system on their own and encourages consistency across LEAs.

  > **Using the Subject Area + Course Number**
  >
  > While SCED comprises 12 digits, using just the first five alone, the subject area and course number, helps districts meet several reporting mandates, as well as course offering analysis, ensuring data quality and data comparability, and in assisting in student placement decisions.

- **Identifying data for local district analysis, research, and state and federal data collections**

  Research using SCED codes has widespread applications, including identifying trends in coursetaking and students' access to educational experiences, examining links between practice and desired outcomes, and analyzing differences among subsets of students. SCED offers a standard system for describing courses, allowing SEAs to conduct longitudinal research that assesses student performance, program participation, and academic outcomes across time. Using SCED in this type of research also can reduce significantly the time it takes researchers to review course information.

- **Providing a common vocabulary**

  When researchers are conducting the types of studies noted above, SCED codes provide them with a common language to understand course codes used by different education systems. Researchers who "speak" the language of SCED do not need extensive training to use data from LEAs and SEAs that have implemented SCED. The use of SCED Course Codes facilitates SEA and LEA partnerships with researchers by establishing common terminology.

- **Providing standardized transcripts**

  Many education organizations use electronic exchanges of transcripts (e-transcripts) to improve data security and efficiency. SCED provides a structure for exchanging course data via e-transcripts that can be expanded and altered to meet the needs of different information systems. The five-digit SCED Course Code transfers basic information that can be used to identify courses and compare course content. The 12-character SCED Identifier provides additional commonly used transcript information in a structured manner that allows a closer comparison of courses. Attributes can be included, as needed, to convey additional transcript information, or the school or district can add other elements that convey locally required information. Standardized transcripts also provide information about students to postsecondary institutions in a format that is easy to understand and allows for the comparison of transcripts from many SEAs and LEAs.

- **Assisting with student placement**

  A student's pathway is critical to ensure that they receive the needed courses for graduation, and beyond. LEA staff can use SCED when advising students and ensuring the proper academic placement of the students in the courses that meet their educational needs.

- **Improving data quality**

  Keeping track of courses without a standardized system can get confusing and result in many different errors. Using SCED codes to analyze the district course catalog will result in improved data quality, such as avoiding duplicate courses, ensuring continuity within a district with multiple buildings, and easily identifying updates needed in the language of the course title and content.

Wisconsin District Implementation of SCED at Milwaukee Public Schools (MPS)

The Wisconsin Department of Public Instruction implements the SCED codes for all districts. MPS imbeds the SCED codes into its Student Information System (SIS). Members of MPS's Curriculum and Instruction Team maintain and update SCED course mappings on a regular basis. When new local courses are added, MPS staff add to the master course list in the SIS and then map to SCED. Mapped courses serve as connectors for data on students, teachers, and pedagogy. Examples of SCED code uses at MPS:

Using Course Codes in a District Accountability System
MPS uses its course codes as part of the district's accountability system. In doing so, MPS can report the number of students:

- completing Advanced Placement (AP) and International Baccalaureate (IB) courses;
- participating in dual enrollment program;
- earning industry-side credentials by course; and
- participating in courses classified as work-based learning.

MPS also uses the course codes to verify teacher qualifications by linking the teachers and their certification, licensures, and endorsements to the teacher's assigned courses.

Supporting Federal Data Studies
MPS participates in the Trial Urban District Assessment (TUDA) (https://nces.ed.gov/nationsreportcard/tuda/), a study by the National Assessment of Educational Progress (NAEP) to report district-level NAEP assessment with a focus on urban education. MPS participated in a middle school study and provided coursetaking information for MPS students, which then was compared to NAEP results to find any commonality or correlation between courses taken and NAEP results.

Common SCED uses by State Education Agencies

State education leaders have described multiple ways in which their agencies use SCED to improve their processes. The following list summarizes common SCED uses by SEAs:

- **Implementing SCED as the statewide standard for course codes**

  When students transfer between schools, their course histories transfer with them. The receiving school evaluates a student's transcript to determine if the courses listed are consistent with courses offered in the new school. SCED's common course descriptions enable school staff to compare courses easily when reviewing transcripts of transferred students and to assess course alignment more accurately.

- **Mapping courses to SCED as one of several course code systems**

  SCED implementation varies according to the needs of SEAs and LEAs, with some agencies choosing to implement SCED as the standard for course codes and others choosing to map courses to SCED as one of several course code systems. The SCED structure is designed to be flexible enough to meet the different needs of education agencies, and each SCED course description provides enough specificity to identify the course topic and distinguish the course from other courses without needing to define every aspect. Mapping to SCED can reduce an agency's overall data burden, in that once the system is mapped the agency can use the map in future years and only make adjustments as needed.

- **Implementing SCED as part of Statewide Longitudinal Data Systems (SLDSs)**

  Considerable variation in course standards and coding systems can exist among LEAs within a state or even between schools within an LEA. SCED helps states develop SLDSs by allowing them to maintain and compare data from diverse systems without compromising the integrity of locally developed course descriptions or coding systems. Once the SLDS exists, districts often can improve the alignment of courses internally after discovering similar courses with different codes.

- **Designing the master course schedule**

  Master course schedules define course offerings, teacher assignments, course requirements, and student assignments for a school year or semester. This process requires considerable data, with each entity included encompassing multiple data points. Using SCED to design the master course schedule can simplify the process for administrators, in that SCED provides a clearly defined coding system that covers course type, description, level, and credit, as well as grade span and sequence.

- **Developing course catalogs**

  States with an SLDS that standardizes their course codes and descriptions can more easily pull course IDs and descriptions from the state system and use these data to create state and school district course catalogs. Moreover, when SEAs enable districts to view course catalogs of other LEAs, this can facilitate transcript analysis by helping districts assess courses taken and credits earned.

- **Standardizing reporting**

  Individual schools, LEAs, and SEAs often report course enrollment and outcome data to other organizations, including local, state, and federal agencies. These organizations may use these data to determine funding and resource allocations or to monitor accountability for specific programs. The use of standardized codes allows schools to collect information once for multiple reports. Without a standardized system, collecting and interpreting student coursetaking information from different schools or LEAs can be burdensome.

- **Facilitating communication/interoperability between educational data systems**

  Interoperability in data management systems means that information can be transferred among systems with minimal effort. In a school district, interoperable software applications ensure that once entered, the name and address of a new student appear in the district's library, class assignment, transportation, food service, student information management, and other relevant systems. SCED provides a standard course-coding framework for vendors of school information systems that are working toward interoperability. As SCED implementation increases, the course-coding structure and definitions can be included in student information systems or used to form a crosswalk from one system to another.

- **Facilitating student credit transfers**

  SCED is a widely used standard in the K-12 education data community because it facilitates the exchange of transcript information. The SCED framework and attributes make feasible including detailed course information on electronic student transcripts with standard course descriptions that are widely understood. In some cases, SEAs and LEAs may need to capture state- or district-specific information about courses and student outcomes, but SCED provides a consistent foundation that then can be built upon to suit local needs.

- **Supporting education research**

  Research agencies, such as the Institute of Education Sciences (IES) Regional Educational Laboratories (RELs), partner with SEAs on research projects that incorporate SCED classification into the study design. Recent studies have investigated coursetaking pathways in relation to a variety of student outcomes, including academic achievement gaps and postsecondary readiness. Using SCED allows researchers to standardize secondary course codes across districts or study programs to create comparable and reliable predictor variables, saves time and resources, and improves validity of the results.

Research Uses of SCED in NCES Survey and Studies

Several recent NCES studies have included SCED when assessing the use and effectiveness of course-coding systems in research that analyzes students' coursetaking patterns and high school transcripts. These studies have addressed

- coursetaking patterns and academic achievement of different student groups;
- coursetaking patterns as predictors in early warning systems; and
- state college- and career-ready requirements for high school.

These studies successfully used SCED for course-coding and were able to create crosswalks between SCED and other course classification systems used by NCES. See Appendix D for the full annotated list of publications. Each source includes a short description summarizing the research goals and methodology and focused on how the study used SCED.

Research Uses of SCED – Academic Resources

To date, most of the academic research studies that have incorporated SCED into their design are related to enrollment and coursetaking and used SCED codes to clarify their data. These studies investigated relationships among courses taken and a variety of educational outcomes, including

- science, technology, engineering, and math (STEM) achievement;
- dual enrollment; and
- overall academic achievement.

See Appendix C for the full annotated list of academic sources. This list includes research articles, dissertations, and theses. Each source includes a short description summarizing the research goals, study design, and methodology and focused on how the study used SCED.

Benefits of Using SCED

Student populations are increasingly mobile, and coursetaking information systems must be able to transfer data as students move among programs, institutions, districts, or states; or advance from within the education system or to the workforce. SEAs and LEAs must be able to accurately place students in the courses that meet their educational needs and track the achievements of students in local education systems in a manner that is easily understood, compared, and exchanged across systems, without compromising the content and structure of the local system. Without course code standards for communicating information, the transfer of student data may be slow, laborious, and fraught with errors, and can increase staff burden (for example, time spent deciphering data). All of these issues may potentially compromise student outcomes.

The use of standardized course codes within SEAs and LEAs can streamline data reporting processes and promote the collection of high-quality data. For example, when LEAs throughout a state accurately and consistently map their courses to SCED, LEA data stewards can access data quickly from multiple schools in a format preferred by the SEA. In turn, the SEA can easily and quickly process data submissions from multiple LEAs, compare courses in individual schools across the state, and compile data for federal reporting. A standardized system such as SCED establishes a coding structure that can be shared widely and understood easily, thereby reducing the need for multiple rounds of data translation and data checking.

Moreover, SCED implementation can help SEAs and LEAs minimize the cost and staff time required to develop standardized course classification systems. Many SEAs have implemented SCED as part of their statewide longitudinal data systems, and the accurate implementation of SCED ensures that an LEA's or SEA's course-coding data will be understood widely and that data will be comparable.

Chapter Three:
SCED Case Studies

The examples below were provided by the Forum stakeholders at state and local education agencies (SEAs and LEAs) and Regional Educational Laboratories (RELs) to illustrate how different education entities have used School Courses for the Exchange of Data (SCED) to meet the specific needs of their education systems or to fulfill researchers' and policymakers' data requests. Each SCED example highlights a particular state's approach to SCED implementation and use, including one or more best practices and SCED use cases. Links to cited studies can be found in Appendix B.

Case Study One: Iowa Department of Education

The Iowa Department of Education (IDOE) implemented SCED beginning with Version 1 and updates course codes each time a new version of SCED is released. From the beginning, IDOE has been using SCED classification for statewide course coding, and all school districts in Iowa use SCED to report student data. Data on all students and courses (coded with SCED codes) are submitted annually to the state. After each submission period, Iowa performs extensive data quality checks. Once the data checks are completed, districts' data are uploaded into the State Longitudinal Data System (SLED).

Practical and Research Uses of Coursetaking Data

IDOE uses SCED course codes on a day-to-day basis for a wide variety of purposes. Here are some examples of how Iowa uses SCED:

- **Collecting data for the Iowa Condition of Education (COE) Report (PK-12)** (https://educateiowa.gov/data-and-reporting/education-statistics/annual-condition-education-report-pk-12)

  The Annual Iowa Condition of Education (COE) provides information to education stakeholders about the success and challenges of Iowa's education system. The COE includes information about Iowa's students, schools, and educators, including student enrollment and performance data.

  - As a part of the data reporting, Iowa COE reports course data on courses taught and taken. The IDOE began collecting coursetaking data at the student level in 2004-05.
  - The Iowa COE staff pull the necessary data, including coursetaking indicators.

- The COE report includes percentages of students taking key courses across all areas, including world language courses, high-quality computer science, algebra II, higher-level mathematics, world languages, chemistry, and physics across different demographic categories.
- Iowa COE also reports on the number of students taking different Advanced Placement (AP) courses and total AP enrollment.

- **Determining automatic admissions to Iowa public universities**

  Iowa's Board of Regents uses a Regent Admission Index (RAI) score to automatically admit Iowa high school students into Iowa State University, the University of Iowa, and the University of Northern Iowa. In addition to meeting the Regent Admission Index requirement, students must complete the minimum number of high school courses specified by the RAI. SCED codes are used in many different ways to support this process:

  - Regent Universities use SCED as an integral part of the RAI. SCED defines the core courses at each high school that contribute to student RAI scores. The Board of Regents evaluated the RAI to ensure its validity for admissions decisions. The IDOE updates the Board of Regents each time there is a change in any applicable SCED codes.
  - Guidance counselors use SCED codes to determine if interested students are on track to receive automatic admissions into the Regent universities. They can use codes at any time in a student's high school career, and track pathways and other coursetaking patterns to ensure an interested student takes the necessary courses.
  - Students can use the Board of Regent's free RAI calculator (https://www.iowaregents.edu/institutions/higher-education-links/regent-admission-index/rai-calculator) to determine if they will get the score needed for automatic admissions. Part of this score is ensuring that certain courses have been taken in high school.

- **Supporting teacher licensure endorsements**

  After the issuance of a teaching, administrative, or school service personnel license, an individual may add other endorsements to that license upon proper application, provided they have met current requirements for that endorsement. The Iowa Board of Educational Examiners (BOEE), which houses teacher licensure and endorsements, has taken the SCED codes and has created a crosswalk between endorsements and SCED.

  - The IDOE partners with BOEE so when districts submit staff data, the state performs a licensure compliance check. If a teacher doesn't have the correct endorsements, the system automatically generates an error message.
  - BOEE is notified when new SCED codes are created, and those are added to the endorsement crosswalk.

- **Responding to data requests**

  IDOE receives data inquiries from legislators, researchers, and the public. Public data requests can be submitted to IDOE directly or online through an online Data Request Form (https://forms.gle/eGwQR7FanB3ayMMv9); anyone can fill out the form and ask for information. (Media requests are handled through the communications department.) Recent data requests include

  - computer science courses—legislators and private researchers have requested data on how many students have been taking computer science courses ahead of legislation on computer science education; and
  - coursetaking data—Iowa's Regent Universities (Iowa State University, the University of Iowa, and the University of Northern Iowa) asked for data to analyze how coursetaking pathways in high school relate to students taking remedial courses in their first semester of college.

- **Reporting data for the Civil Rights Data Collection (CRDC)** (https://ocrdata.ed.gov)

  The Civil Rights Data Collection (CRDC) is a biennial data collection required by the U.S. Department of Education's (ED) Office for Civil Rights (OCR) since 1968. OCR collects data from school districts on leading civil rights indicators related to access and barriers to educational opportunity at the early childhood through grade 12 levels. The CRDC also is a longstanding and critical aspect of the overall enforcement and monitoring strategy used by OCR to ensure that recipients of ED's federal financial assistance do not discriminate on the basis of race, color, national origin, sex, and disability.

  - CRDC data include course enrollment and outcomes, such as the number of students who have taken and passed various science, technology, engineering, and mathematics (STEM) courses.
    - CRDC Subjects used for reporting course enrollment in 2017-18 (https://educateiowa.gov/sites/files/ed/documents/1718 SCED codes used for Classes%2C Course Enrollment section of the CRDC report.xlsx) included Algebra I, Geometry, Algebra II, Advanced Mathematics, Calculus, Biology, Chemistry, Physics, IB Diploma Program, AP Mathematics, AP Science, Other AP subjects, Other AP subjects/AP Computer Science, and Computer Science.
  - OCR provides a list of CRDC Subjects and a suggested map between five-digit SCED codes used for classes and CRDC Subjects, which makes the reporting process straightforward and reduces the chance of data quality issues.
  - Iowa submits the CRDC data about students, including their coursetaking, to OCR on behalf of their districts, reducing the federal reporting burden for their districts.

- **Verifying "Offer and Teach" Statute compliance**

  According to Rule 281—Iowa Administrative Code (IAC) Chapter 12 rule interpretation matrix (https://educateiowa.gov/sites/files/ed/documents/Chapter12%20Matrix%20Public%202018-09-10_0.pdf), a number of curricular areas must be offered annually and taught in grades 9 through 12. "Offer and teach" means that the school or school district must make students aware of the offering and must employ an appropriately licensed teacher to teach the course. "Offer and teach" also means that the appropriately licensed teacher must instruct the students (see above for details on the licensure compliance check).

  - The legislation regulates how many units of math, science, social studies, and foreign language accredited educational institutions must offer and teach.
  - IDOE uses the SCED Course Codes to make sure the legislation is being followed. Iowa annually prepares "district accreditation reports" where it uses SCED codes to group courses appropriately by content area. IDOE then reviews these reports with the districts to ensure that school districts meet their accreditation in all content areas.

Summary and Future Directions

Early statewide adoption of SCED enabled Iowa to greatly simplify the process of education data collection and dissemination. This in turn improved the effectiveness of the state's data governance at the district and state levels, enabled more efficient response to federal data collections, facilitated the implementation of automated teacher licensure compliance checks, and reduced response time to fulfill data requests.

Case Study Two: Minnesota Department of Education

Minnesota Department of Education (MDE) has been using the SCED classification for statewide course coding since the 2010-11 school year, and coursetaking data are kept in its statewide longitudinal data system. MDE noted that the use of SCED as its course code system will be made even easier as MDE begins to use the Ed-Fi API collection of the Common Education Data Standards (CEDS) implementation starting in the 2021-22 school year.

The Minnesota Common Course Catalogue (MCCC) is the state's course-coding system, based on SCED. The MCCC is a course classification and data collection system intended to provide uniform information about courses that are taught by Minnesota teachers and completed by Minnesota students.

There are four data collections associated with the MCCC:

1. Local Course Index
2. Calendar Information
3. Staff Course Records
4. Student Course Records

The latest MCCC (released in 2019) is based on SCED version 6.0. The state is in the process of updating to SCED version 7.0 for the next school year; the state updates course coding with SCED versions during the summer. As part of preparation for SCED 7, MDE cleaned up the information in the latest version of the MCCC, created a crosswalk for the courses that Minnesota coded differently from SCED, created training materials for the districts, and prepared reference materials for the state's student information system vendors. In the past, with each SCED version update, the MDE had similarly helped school districts adjust to the course-coding changes by arranging workshops and training.

Once school districts report data through their SIS, the state reviews the data and then, twice a year, uploads a subset of the data to the Minnesota Statewide Longitudinal Education Data System (SLEDS). SLEDS data then can be queried and used for a variety of purposes. MDE provides anonymized coursetaking data, coded with SCED, to approved researchers upon request. Each year, MDE receives dozens of requests from researchers for its coursetaking data. The researchers have been interested in Minnesota's data in part because the data have been coded consistently with SCED, which simplifies comparing students' coursetaking pathways across the state and over time.

Practical and Research Uses of Coursetaking Data

Here is a sampling of the different uses of Minnesota coursetaking data:

- **Girls Who Code**–The Girls Who Code program is using the Minnesota course data to collect information on equitable gender participation in computer coding courses.
- **Perpich Foundation**–Researchers have been analyzing data on the arts courses, which were coded using SCED and collected at the state level. This study examines which arts courses (for example, visual performance, media, and dance) K-12 students take and whether those courses meet academic standards. The foundation is heading this research in the state. The foundation also is participating in a federal study so that the data collected will be used for analyses at the national level, as well.

- **Mobile data reports**–MDE has looked at the relationship between students' math, reading, and writing courses taken in high school and their subsequent enrollment in remedial courses in college. The state also has looked at the connection between electives in high school and ACT scores (using both high school and dual enrollment courses).
- **Private universities**–College administrators have been using course codes to better understand public high school transcripts.
- **High School Transcript Study (HSTS)**–NCES periodically surveys coursetaking patterns of high school students through HSTS. Minnesota helped NCES evaluate the usability of SCED classification for HSTS.
- **Program evaluation**–To evaluate if the goals for achievement and integration of a specific program were met; for example, researchers looked at students' characteristics by STEM coursetaking. MDE would like to see this use case expanded to more programs because the findings were very useful.

Summary and Future Directions

MDE would like to see the use of its SLEDS/MCCC data further expanded to evaluate differences in students' access to certain courses (especially in the STEM domain) and experienced teachers. This information would help educators and policymakers to make informed decisions and to come up with strategies to reduce achievement gaps. The use of SCED codes is critical for such large-scale data analyses as they involve large volumes of data and enable researchers to conduct comparisons faster and more efficiently.

Additionally, MDE has been expanding the use of SCED to better understand early education data. The state is looking at ways to help improve school readiness at pre-schools. As a part of this effort, Minnesota would like to analyze coursetaking patterns of special education and English learner students, including which courses they are taking and how much instruction time they are getting for all standards required course content.

Finally, Minnesota educators have been focused on improving the quality of Career and Technical Education (CTE) and training. To further facilitate this effort, MDE plans to begin implementing SCED career clusters in its classification codes beginning with the 2021-22 course codes. The data elements of Virtual Indicator and Delivery Mode as defined by CEDS also will be added to the data collection.

Case Study Three: Regional Educational Laboratory (REL) Appalachia

In recent years, Regional Educational Laboratory (REL) Appalachia has partnered with Virginia on research projects that incorporate SCED classifications into the study design. These studies primarily looked at coursetaking pathways in relation to a variety of student outcomes, such as academic achievement gaps, postsecondary readiness, and the need for remedial courses in college.

The main applications of SCED in REL Appalachia's research have involved standardizing secondary course codes across districts or study programs to create comparable and reliable predictor variables. Using SCED codes provided a relatively quick, standardized way to compare coursetaking progressions across dozens of districts and has improved the validity of the results. Using SCED enabled the researchers to document the reasoning and business rules behind decisions made to code the courses and group them according to course levels. By using SCED as its coding system, REL Appalachia was able to significantly reduce the burden of manually classifying millions of observations and to efficiently compare students' coursetaking pathways across many districts.

REL Appalachia's most recent project is a follow-up study to the *2020 Understanding Mathematics Course-Taking Pathways for Algebra I* project. This follow-up study is being conducted in partnership with five school divisions and the Virginia Department of Education. A brief description of the study goals and methodology, highlighting the ways the study is using SCED, is provided below.

Understanding Mathematics Coursetaking Pathways for Algebra I: Follow-up study

The study currently in progress is a follow-up to *Understanding Mathematics Course-Taking Pathways for Algebra I*. The initial study's goal was to describe the prior performance, student background characteristics, and outcomes of students taking Algebra I in grades 7, 8, and 9. This descriptive study used Virginia's administrative data to identify when students took Algebra I and other student variables.

The follow-up study focuses on the experiences of students who were advanced in math achievement early on (identified as of fifth grade) and went on to take Algebra in either seventh or eighth grade. The research investigates the progress of these students through high school and on to graduation, to determine whether students who take advanced mathematics courses early continue to take higher-level mathematics in high school. Although moving students at an accelerated pace is thought to better prepare them for college, there are questions as to whether students realize these benefits when they complete Algebra I in seventh grade.

To standardize the coursetaking data, REL Appalachia is using 12-digit SCED codes to identify these students' mathematics coursetaking progressions in high school. Not all Virginia mathematics courses align to SCED codes, but each course can be determined to be at a particular level, which then can be coordinated with SCED. Working with math educators and the data team to logically identify levels for each course that aligned with SCED codes, the researchers could determine student coursetaking pathways using these levels. The research team at REL Appalachia found the SCED Finder tool to be very useful in this process. REL Appalachia used the SCED codes with the SCED description of the math course when creating math pathway levels. The SCED descriptions were helpful in their discussions with district and state partners to determine the course levels. These levels have allowed them to work with the data in a way that was not efficient with state and local coursetaking codes, as these data were too complicated within the SLDS. Using SCED to simplify and streamline the information thus made in-depth and accurate analysis possible.

Summary

The key benefits that REL Appalachia saw from applying SCED to these data analysis projects were improved efficiency and reduced costs, including reduced time for course coding, reduced costs for data standardization, and improved data accuracy. The researchers noted that without SCED, they would have had to spend far more time aligning course codes from different school districts and had greater difficulty validating results. Using the validated set of course codes with SCED course numbers, standardized level credits, and sequences improved efficiency and precision for researchers.

Moving forward, the research team is working with districts to identify any anomalies in their data. They note that the steps taken on this project potentially could lead to Virginia districts improving the quality and accuracy of their data, as they see how they can incorporate SCED codes to be more consistent. Future projects will be able to use the methods identified here to see longitudinal progressions between seventh grade and graduation for various student cohorts.

Case Study Four: Regional Educational Laboratory (REL) Northwest

In recent years, Regional Educational Laboratory (REL) Northwest has partnered with the state of Washington to collaborate on research projects that used SCED-coded coursetaking data to identify predictors of students' academic outcomes. These studies also have used coursetaking information to evaluate the success of various grants and initiatives, including the English Language Learners (ELL) grant and implementation of new graduation credit requirements.

For this work, the REL has been using a variety of resources to facilitate course mapping, such as state course manuals and school district course catalogs. REL Northwest also has developed new manuals and training materials, which include business rules that can be applied to improve the efficiency of local course code mapping to SCED. Moreover, the REL has been providing coaching to states on how to standardize their course codes by sharing business rules and lessons learned from their work with Washington's data. Washington uses state course codes, which are based on SCED with a few additional Washington-specific codes.

Some of the recent partnerships between REL Northwest and the Washington Department of Education are described below. Each of these research studies used SCED course codes, as well as sequence and level, to code coursetaking data across different districts in the state to develop standardized and reliable predictors of student outcomes.

In the 2017 study *Advanced Course Enrollment and Performance among English Learner Students in Washington State*, the researchers examined patterns in advanced coursetaking among current and former English learner students compared to non-English learner students, using state data about Washington public school students between 2009-2013. Because English learners must devote some of their course time to acquiring English proficiency, they may not be able to enroll in advanced courses at the same rate as non-English learners. The researchers used SCED and other NCES codes to determine coursetaking patterns, as well as student location and demographics. The study found that students' academic preparation accounted for much of the difference in advanced course enrollment and performance among the different groups. The researchers suggested that the study findings may help state, district, and school decisionmakers develop policies or strategies that increase English learner students' enrollment in advanced courses.

In the 2017 study *Advanced Course Enrollment and Performance in Washington State: Comparing Spanish-Speaking Students with Other Language Minority Students and English-Only Speakers*, the researchers addressed the relationship between advanced high school coursetaking and college performance, and looked at patterns in advanced coursetaking among three groups of students: Spanish-speaking students, other language minority students, and English-only speakers. The analysis used demographic, assessment, and course enrollment data from the Washington Office of Superintendent of Public Instruction for more than 1 million students enrolled in Washington state high schools. The study found systemic gaps in both course enrollment and performance for Spanish-speaking students, regardless of their English learner status.

For the 2017 study *Are Two Commonly Used Early Warning Indicators Accurate Predictors of Dropout for English Learner Students? Evidence from Six Districts in Washington State*, REL Northwest partnered with the Road Map Project (an initiative intended to double the number of students on track to graduate from college or earn a career credential) to compare graduation and dropout rates of students identified as English learner students at any point during K-12 to those of students who were never English learners. It also compared outcomes across subgroups of the English learner student population and examined whether early warning indicators used to predict dropout, such as failing a course, were accurate and useful indicators for different groups of English learner students compared to non-English learner students.

In the 2020 study *Implementation of Career- and College-Ready Requirements for High School Graduation in Washington*, REL Northwest assessed districts' progress toward implementing the career- and college-ready (CCR) graduation credit requirements recently developed by the Washington State Board of Education. The study compared the percentages of graduates who met the requirements to those who did not across student groups (by socioeconomic status, English learner status, race/ethnicity, and prior achievement). The study found that the percentage of districts that had implemented all the CCR graduation requirements increased from 9 percent for the class of 2018 to 56 percent for the class of 2019. The Washington State Board of Education and the Washington Office of Superintendent of Public Instruction asked REL Northwest to conduct this study to gain insight into the conditions that might facilitate future implementation of the requirements.

Summary

In each of these studies, REL Northwest was able to save valuable time and resources by incorporating SCED codes and business rules to classify the data. While the researchers could have completed the studies using a custom course code classification approach, it would have been far less efficient and potentially allowed for errors. For example, REL researchers noted that due to the overwhelming amount of data, just the data cleaning for a longitudinal file took 1000 staff hours. Additionally, using SCED improved the credibility of the research, which otherwise could have been challenged due to a custom classification system that has not been validated to the same level as SCED.

Appendix A:
Forum SCED Resources

Forum SCED Resources

School Courses for the Exchange of Data (SCED) website

https://nces.ed.gov/forum/SCED.asp

The website for the School Courses for the Exchange of Data (SCED) classification system where users can download the latest SCED files and find supplementary information on SCED, including videos, Working Group information, and case studies.

Current Downloadable Version File

https://nces.ed.gov/forum/Current_SCED_File_Version_8.0.asp

This file includes:

- A comprehensive list of all five-digit SCED Course Codes included in SCED Version 8.0. This list includes the Course Title, SCED Course Code, Course Description, and Change Status.
- A list of SCED Version 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, and 7.0 Course Codes that have been archived, as well as suggested alternative Course Codes.
- Names and definitions of the SCED Elements that make up the 12-character SCED Identifier and optional attributes that can be applied to the Identifier to provide a more robust description of courses.
- A list of SCED Course Codes commonly included in one of the 16 Career Clusters® or as part of a Family and Consumer Sciences plan of study. This spreadsheet is an example of how the Career Cluster attribute and the Family and Consumer Sciences Indicator can be used to identify courses from different Course Subject Areas that are part of a plan of study.

SCED Master List

https://nces.ed.gov/forum/Master_List.asp

This downloadable, sortable file contains a list of every SCED Course Code published in every version of SCED. This master list is intended to assist state and local education agencies with implementing or updating SCED.

SCED Videos

https://nces.ed.gov/forum/sced_videos.asp

The Forum has created online videos to provide an overview of SCED, demonstrate how to use it to code courses, and to review available SCED resources:

- School Courses for the Exchange of Data: An Introduction, First in the Series (https://www.youtube.com/watch?v=7T498jdkbYU&feature=youtu.be)
- School Courses for the Exchange of Data: Course Coding, Second in the Series (https://www.youtube.com/watch?v=2onkhUTdITY&feature=youtu.be)
- School Courses for the Exchange of Data: Using SCED Resources, Third in the Series (https://www.youtube.com/watch?v=ObkdQ3woh6o&feature=youtu.be)

SCED Finder

https://nces.ed.gov/scedfinder

SCED Finder is an online tool that assists users to quickly and efficiently identify SCED codes, select codes, and save downloadable lists of courses. This tool is revised annually as each major version is released.

Forum SCED Publications:

- National Forum on Education Statistics. (2014). *Forum Guide to School Courses for the Exchange of Data (SCED) Classification System*. (NFES 2014-802). U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/forum/pub_2014802.asp
- National Forum on Education Statistics. (2011). *Prior-to-Secondary School Course Classification System: School Codes for the Exchange of Data (SCED)* (NFES 2011-801). U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/forum/pub_2011801.asp
- Henke, R.R., Spagnardi, C., Chen, X., and Bradby, D. (2019). C*onsiderations for Using the School Courses for the Exchange of Data (SCED) Classification System in High School Transcript Studies: Applications for Converting Course Codes from the Classification of Secondary School Courses (CSSC)* (NCES 2019-417). U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019417
- Bradby, D., Pedroso, R., and Rogers, A. (2007). *Secondary School Course Classification System: School Codes for the Exchange of Data (SCED)* (NCES 2007-341). U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/forum/pub_2007341.asp

Forum/Other Resources

Forum website

https://nces.ed.gov/forum/index.asp

The main website for the National Forum on Education Statistics (Forum) where users can find the latest information about the projects, publications, online courses, and other resources.

Forum Online Courses

https://nces.ed.gov/forum/online_courses.asp

The Forum has created online courses based on some of its best practice publications. These courses include multimedia videos and other supporting materials and offer the education community an opportunity to learn about important education data issues.

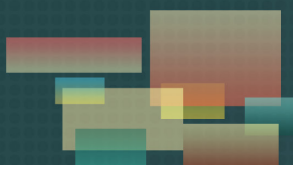
- The Forum Guide to Data Visualization Online Course
  https://nces.ed.gov/forum/dv_course.asp
- The Forum Guide to Data Ethics Online Course
  https://nces.ed.gov/forum/dataethics_course.asp
- Data Quality: Improving Education Data Part 1
  https://nces.ed.gov/forum/dataqualitycourse/dataquality.asp
- Data Quality: Improving Education Data Part 2
  https://nces.ed.gov/forum/dataqualitycourse/dataquality.asp

Common Education Data Standards (CEDS)

https://ceds.ed.gov/

CEDS is an education initiative to streamline the understanding of data within and across P-20W institutions and sectors. The CEDS initiative includes a common vocabulary, data models that reflect that vocabulary, tools to help education stakeholders understand and use education data, an assembly of metadata from other education data initiatives, and a community of education stakeholders.

Appendix B:
Case Study References



Case Study One: Iowa's Use of SCED in Research and Program Support

- *RAI-Approved SCED Codes 2020: Individual List*. Retrieved October 30, 2020 from https://www.iowaregents.edu/media/cms/sced-pdf198A8E2F.pdf
- Student Reporting in Iowa. Retrieved October 30, 2020 from https://educateiowa.gov/data-and-reporting/data-reporting/student-reporting-iowa#20192020

Case Study Two: Minnesota's Use of SCED in Research and Program Support

- *The Minnesota Common Course Catalogue* (2019). Retrieved October 30, 2020 from https://education.mn.gov/mdeprod/idcplg?IdcService=GET_FILE&dDocName=MDE072887&RevisionSelectionMethod=latestReleased&Rendition=primary
- The Minnesota Statewide Longitudinal Education Data System (SLEDS) research publications. Retrieved October 30, 2020 from http://sleds.mn.gov/#data

Case Study Three: REL Appalachia's Use of SCED in Research

- Yamaguchi, R. *Understanding Mathematics Course-Taking Pathways for Algebra I*. (Projected Release Date: 2020). Research Lead, Student Success in Mathematics Partnership, Plus Alpha Research & Consulting. Retrieved October 30, 2020 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4577

Case Study Four: REL Northwest's Use of SCED in Research and Coaching Activities

- Deussen T., Hanson, H., & Bisht, B. (2017). *Are two commonly used early warning indicators accurate predictors of dropout for English learner students? Evidence from six districts in Washington state* (REL 2017-261). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved October 30, 2020 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=337
- Hanson, H., Bisht, B., & Greenberg Motamedi, J. (2016). *Advanced course enrollment and performance among English learner students in Washington state* (REL 2017-187). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved October 30, 2020 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=432

- Hanson, H., Bisht, B., & Greenberg Motamedi, J. (2016). *Advanced Course Enrollment and Performance in Washington State: Comparing Spanish-Speaking Students with Other Language Minority Students and English-Only Speakers*. (REL 2017–220). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved October 30, 2020 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4560
- Hanson, H., & Fantz, T. (2020). *Implementation of career- and college-ready requirements for high school graduation in Washington* (REL 2020–020). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved October 30, 2020 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4594

Appendix C: Academic Research Studies that Use SCED

Articles

Asunda, P. A., Kim, E. S., & Westberry, R. (2015). Technology Student Characteristics: Course Taking Patterns as a Pathway to STEM Disciplines. *Journal of Technology in Education, 27*(1). Retrieved October 30, 2020 from https://doi.org/10.21061/jte.v27i1.a.1

- This article used High School Transcript Study data to examine and compare the patterns of science, technology, engineering, and mathematics (STEM) courses taken by technology students and those of high school students as a whole, the patterns of other courses taken by technology students and those of high school students as a whole, and the grade point averages (GPAs) of technology students with the GPAs of other high school students.
- The authors used School Courses for the Exchange of Data (SCED) codes provided in state course catalogs to map the Classification of Secondary School Courses (CSSC) codes in the Transcript study to track enrollment.

Byun, S. Y., Irvin, M. J., & Bell, B. A. (2015). Advanced Math Course Taking: Effects on Math Achievement and College Enrollment. *The Journal of Experimental Education, 83*(4), 439-468. Retrieved October 30, 2020 from http://dx.doi.org/10.1080/00220973.2014.919570

- This study investigated the effects of advanced math coursetaking on math achievement and college enrollment, and how such effects varied by socioeconomic status and race/ethnicity.
- The author assessed advanced mathematics coursetaking across high school using a mathematics pipeline measure. This measure uses SCED codes.

Kwon, J.B., DeBruler, K., & Kennedy, K. (2019). A Snapshot of Successful K-12 Online Learning: Focused on the 2015-16 Academic Year in Michigan. *Journal of Online Learning Research, 5*(2), 199-225. Retrieved October 30, 2020 from http://files.eric.ed.gov/fulltext/EJ1229422.pdf

- The purpose of this study was to provide a snapshot of successful K-12 online learning in one of the frontrunner states in the field—Michigan.
- The total enrollment cases in the study sample were split into groups based on the course classification system used by SCED.

Rosen, J. A., Porter, S. R., & Rogers, J. (2017). Understanding Student Self-Reports of Academic Performance and Course-Taking Behavior. *AERA Open*, *3*(2), 1-14. Retrieved October 30, 2020 from https://journals.sagepub.com/doi/pdf/10.1177/2332858417711427

- This study investigated the accuracy of students' survey responses to questions about their coursetaking and grades in mathematics during high school and analyzed which student and survey characteristics influenced accuracy.
- The authors used SCED course codes to analyze the data.

Dissertations/Theses

Freeman, D.M. (2019). *An Investigation of the Impact of High School Student Fine Arts Course Accumulation on Mathematics Course Achievement*. (Publication No. 13895186) [Master's Thesis, Portland State University]. Proquest Dissertations and Theses Global.

- This thesis explored the impact of taking fine arts courses on mathematics achievement in high school.
- The study used a National Center for Education Statistics (NCES) mathematics achievement measure that was created using SCED codes. The study also measured course accumulation in fine arts education using a variable constructed by NCES via student transcript data.

Grinstead, M. L. (2013). *Which advanced mathematics courses influence ACT score? A state level analysis of the Iowa class of 2012*. Graduate Theses and Dissertations. Retrieved October 30, 2020 from https://lib.dr.iastate.edu/etd/13622/

- This dissertation explored the relationship between specific advanced mathematics courses and college readiness (as determined by ACT score).
- The author determined enrollment in particular courses using SCED codes.

Ramp, L.K. (2016). *Pursuing STEM and related careers: The role of math self-efficacy and high school math and science courses in building momentum*. (Publication No. 10194097). [Doctoral Dissertation, Florida State University. Proquest Dissertations and Theses Global.

- This dissertation explored how students' momentum taking STEM courses builds in high school and carries into postsecondary enrollment and occupations.
- The author determined the highest level of math and science courses taken by students using the math pipeline composite variable and the science pipeline composite variable developed by the NCES from student high school transcripts, with courses sequenced in accordance with SCED.

Appendix D: Research Uses of SCED in NCES Survey and Studies

Dalton, B., Ingels, S.J., and Fritch, L. (2015). *High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcript Study: A First Look at Fall 2009 Ninth-Graders in 2013* (NCES 2015-037). U.S. Department of Education. Washington, DC: National Center for Education Statistics. (https://nces.ed.gov/pubs2015/2015037rev2.pdf)

This report provides a first look at selected findings from the 2013 Update and the High School Transcript Study of the High School Longitudinal Study of 2009 (HSLS:09). It includes lists of the School Courses for the Exchange of Data (SCED) codes for multiple subject areas.

Henke, R.R., Spagnardi, C., Chen, X., and Bradby, D. (2019). *Considerations for Using the School Courses for the Exchange of Data (SCED) Classification System in High School Transcript Studies: Applications for Converting Course Codes from the Classification of Secondary School Courses (CSSC)* (NCES 2019-417). U.S. Department of Education. Washington, DC: National Center for Education Statistics. (https://nces.ed.gov/pubs2019/2019417.pdf)

The National Center for Education Statistics (NCES) began collecting high school transcripts with the High School and Beyond (HS&B) longitudinal study of students who were in the 10th grade in 1980. NCES has continued to collect transcripts for a secondary-level cohort in each subsequent decade. This report describes the two high school course-coding systems used by NCES and the development of a crosswalk that allows data coded with the first system to be translated into the second system. It then provides tables with estimates generated using the two different systems.

Hudson, L. (2019). *Development of the 2018 Secondary School Course Taxonomy* (NCES 2019-046). U.S. Department of Education. Washington, DC: National Center for Education Statistics. (https://nces.ed.gov/pubs2019/2019046.pdf)

This report documents a new taxonomy (Secondary School Course Taxonomy, or SSCT) for classifying and analyzing students' coursetaking in different subject fields, using high school transcripts coded with the SCED coding system. The report documents the rationale for the development of the SSCT, the development process, and how the SSCT compares to the subject-field classification system embedded within the SCED.

Appendix E: SCED Resources by SEAs and LEAs

Colorado Department of Education. (2017). *Student Course Participation and Achievement Report Guidance*. Retrieved October 30, 2020 from https://www.cde.state.co.us/cdegen/studentcourseparticipationguidance

- This is a guidance document from the state education agency (SEA), designed to help local education agencies (LEAs) analyze student coursetaking (such as that provided in the Course Reports) and take action if any disparities are discovered within local Unified Improvement Plans (UIPs).
- The School Courses for the Exchange of Data (SCED) was used for linking students to courses completed.

Community High School of Vermont. (2012-2013). *Annual Report*. Retrieved October 30, 2020 from http://www.chsvt.org/reports/annual-report-2012-2013.pdf

- This annual report describes the development of the Curriculum Framework by the school.
- The Curriculum Framework development was based on the SCED classification system and resulted in some changes in the process and procedure for assigning credit and determining course content.

Henneberger, A.K., Cohen, M.K., Shipe, S.L., & Shaw, T.V. (2016). *Dual Enrollment in Maryland: A Report to the Maryland General Assembly and Governor Larry Hogan*. Baltimore, MD: Maryland Longitudinal Data System Center. Retrieved October 30, 2020 from https://mldscenter.maryland.gov/egov/publications/MLDSDualEnrollmentReport_2016.pdf

- This annual report on dually enrolled students described a requirement of the College and Career Readiness and College Completion Act (CCR-CCA) of 2013. The report was submitted to the Governor and the General Assembly by the Maryland Longitudinal Data System Center. Course information for dually enrolled students was identified using the student, course, grade, teacher data file, and the course catalog from the Maryland State Department of Education.
- Each course was classified by the public school district using the School Courses for the Exchange of Data (SCED) classification system.

Illinois Longitudinal Data System. (2010). ***Illinois Longitudinal Data System (ILDS): The Transcript Coding Project*****. [PowerPoint presentation] Retrieved October 30, 2020 from https://www.isbe.net/Documents/transcript_coding_pres111610.pdf**

- This webinar presentation described a project in which district staff in Illinois matched local course numbers to the corresponding Illinois Secondary Course Code Catalog.
- The mapping process relied on the SCED codes to create a crosswalk between local and state courses.

Kim, S., Wallsworth, G., Xu, R., Schneider, B., Frank, K., Jacob, B., & Dynarski, S. (2016). ***The Impact of the Michigan Merit Curriculum on High School Math Course Taking*****. East Lansing, MI: Michigan Consortium for Educational Research. Retrieved October 30, 2020 from https://aefpweb.org/sites/default/files/webform/42/The%20Impact%20of%20the%20Michigan%20Merit%20Curriculum%20on%20High%20School%20Math%20Course%20Taking%2012%2016%2016.pdf**

- Using Michigan high school transcript data, this paper examines the effect of the Michigan Merit Curriculum (MMC), a statewide college preparatory curriculum that increased graduation requirements with the intent to promote college attendance for the high school graduation class of 2011.
- Course title and content were assigned by SCED. In addition to identifying the course titles, the authors assigned SCED codes based on course description information using school-specific catalog data, which enabled them to measure the depth of the course.

Minnesota Department of Education. (2019). ***How to Create a Local Course Index: Early Education*****. Retrieved October 30, 2020 from https://education.mn.gov/mdeprod/idcplg?IdcService=GET_FILE&dDocName=022004&RevisionSelectionMethod=latestReleased&Rendition=primary**

This resource provides guidance to LEAs creating course classifications for early education courses based on the Minnesota Common Course Catalogue (MCCC). The MCCC is a course classification and data collection system that describes the courses offered in Minnesota schools, the teachers who taught those courses, and the students who completed them.

- The course classification system is based on SCED. It has been adapted to align more closely with Minnesota school systems.

Ostrom, C. (2012). ***Minnesota Common Course Catalogue: Schools for Equity in Education*****. [PowerPoint presentation]. Minnesota Department of Education. Retrieved October 30, 2020 from http://www.schoolsforequity.org/files/51965014.pdf**

- This PowerPoint presentation summarizes the Minnesota Common Course Catalogue (MCCC), which describes local courses offered, teachers who taught them, and students who completed them, including students' marks and credits at the transcript level.
- The MCCC is based on SCED.

Schoelkopf, J. (2009). ***Wyoming Career and Technical Education Policy Analysis*****. Portland, OR: MPR Associates. Retrieved October 30, 2020 from https://eric.ed.gov/?id=ED537832**

- This policy analysis examined federal and state policy related to career and technical education (CTE) to determine whether existing policy (in the form of statutes, rules, regulations, and guidance) could either promote or impede implementation of the May 2007 Wyoming strategic plan for CTE.

- The analysis references SCED when recommending greater uniformity and consistency within the CTE Programs of Studies curriculum structure. The paper also notes that the Wyoming Department of Education's (WDE's) adoption of the secondary CTE common course SCED codes for program development provides a foundation for the Wyoming's Professional Teaching Standards Board to align appropriate teacher licensure requirements.

Policy Analyses

Bromberg, M., & Theokas, C. (2016). *Meandering Toward Graduation: Transcript Outcomes of High School Graduates*. Washington, DC: Education Trust.

- Noting high rates of postsecondary students needing remedial courses upon program entry, this study evaluated the coursetaking of high school students, using high school transcripts.
- The authors reference the use of SCED in defining career-prep curricula.

Data Taskforce of the State Education Agencies Directors of Arts Education and Quadrant Arts Education Research. (2010). *Secondary School Course Classification System, School Codes for the Exchange of Data: Course Codes Review and Suggested Revisions for the Visual and Performing Arts*. Retrieved October 30, 2020 from https://www.artseddata.org/wp-content/uploads/2013/12/Secondary_ArtsCourse_Codes_Final.pdf

- The review was initiated by State Education Agencies Directors of Arts Education to provide NCES with the most updated information regarding the range of courses in the visual and performing arts and to suggest recommendations that would aid the organization's effort to revise the course codes and descriptors to better reflect current practice in the field.
- This document provides a comprehensive review of SCED codes in the subject areas covered by the category Visual and Performing Arts (dance, music, theater, and visual arts).

Zhu, P., Garcia, I., Boxer, K., Wadhera, S., & Alonzo, E. (2019). *Using a Growth Mindset Intervention to Help Ninth-Graders: An Independent Evaluation of the National Study of Learning Mindsets*. MDRC. Retrieved October 30, 2020 from https://cdn.givingcompass.org/wp-content/uploads/2019/11/25131349/Growth_Mindset_final.pdf

- The National Study of Learning Mindsets (NSLM) implemented a low-cost growth mindset intervention specifically designed for ninth-graders; this study used a student-level randomized controlled trial design to gauge the impacts of this intervention on students' mindsets about intelligence, their own behaviors, and their academic achievements. The authors reviewed the data from the NSLM and conducted an independent evaluation of this growth mindset intervention.
- To the extent possible, the authors relied on course descriptions and course names in a school's course catalogs to identify core classes offered by each school. For schools with no available catalog, the team compiled a generic list of required courses for each subject area based on SCED codes.