

DIGITAL LEARNING

Instructional Strategy Guide

DATA-INFORMED
INSTRUCTION WITH
COURSEWARE

every learner
everywhere

Achieving
the Dream

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WHAT IS DATA-INFORMED INSTRUCTION?

Imagine if you could assess your students and quickly provide them with relevant instruction at the right time based on their individual and collective needs - What would your classroom look like? What would it sound like? What would your students be doing? How would they demonstrate content mastery?

One of the benefits of teaching with digital courseware is that it enables data-informed instruction by providing a wealth of learning analytic data in real time. **Data-informed instruction** (DII) is the process of varying instruction based on information garnered from student work and assessment.

Many digital learning coursewares use student responses to create reports that faculty can use to make instructional decisions and choose teaching strategies based on content students have mastered and content with which students struggle.

Who does data-informed instruction benefit?



Students

Digital courseware features provide students with immediate personalized feedback and the ability to track their own progress towards mastery of the course learning objectives. Students may use data dashboards and feedback mechanisms to study more efficiently and retain knowledge to a greater degree.



Instructors

The information provided by digital courseware can help instructors track where students are struggling and where they have mastered the material. Instructors can use learning analytics (student level learning data) to vary content delivery, instructional process, assignments, and/or learning environment to meet student needs. The data provided can also be used to identify individual students who need additional support and to pinpoint challenging concepts so that they can refocus on those topics during class sessions.

DII allows instructors to focus on a student-centered approach to teaching. Data dashboards in digital courseware provide consistent learning metrics that allow faculty to make informed decisions related to content mastery,

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provide opportunities for review, address misconceptions, and recommend supplemental materials. The pre-assessment, often offered at the start of the term or semester, is a way to conduct a needs assessment and identify students in need of support as well as identify content misconceptions. This data provides an opportunity for an instructor to proactively address these challenges at the start of the course.



Institutions

When instructors use learning analytics data to drive instructional decisions, their institutions benefit because faculty are equipped with consistent student data to identify individual and collective student, departmental or institutional growth areas. Equipping faculty with data and support faculty in developing DII teaching strategies can contribute to retention and institutional-wide student success outcomes.

Data Disclosures

It is good practice, when there is learning analytics data available in the digital courseware you choose, to let your students know that you will be monitoring their data to support their learning by capturing any gaps in understanding and shift what is taught in class to align with any misconceptions.

Since you are monitoring your students' data, it is important to make them aware of your ethical use of that data. Review any vendor-provided data disclosure statements to get clear on who owns the data to ensure its ethical use and to protect your students. Seek out this awareness for yourself, your institution and your students. Often, IT departments and Chief Information Officers can be resources since they are responsible for monitoring and tracking vendor agreements and disclaimers.



How to use data to inform learning and instruction

Data driven reports from the digital courseware equip instructors with the data to make decisions about class activities and assignments based on individual and collective student needs.

Data dashboards typically show aggregated student data that can be used to identify trends as well as individual student scores for each assignment. While each courseware is different, the following instructor reports are found in most platforms:



Digital Courseware platforms are designed to capture a wide range of student data including time on task, topic difficulty, topic mastery, and student confidence with the material. These data points provide reports that allow faculty to:

Identify concepts that may need further discussion or resources

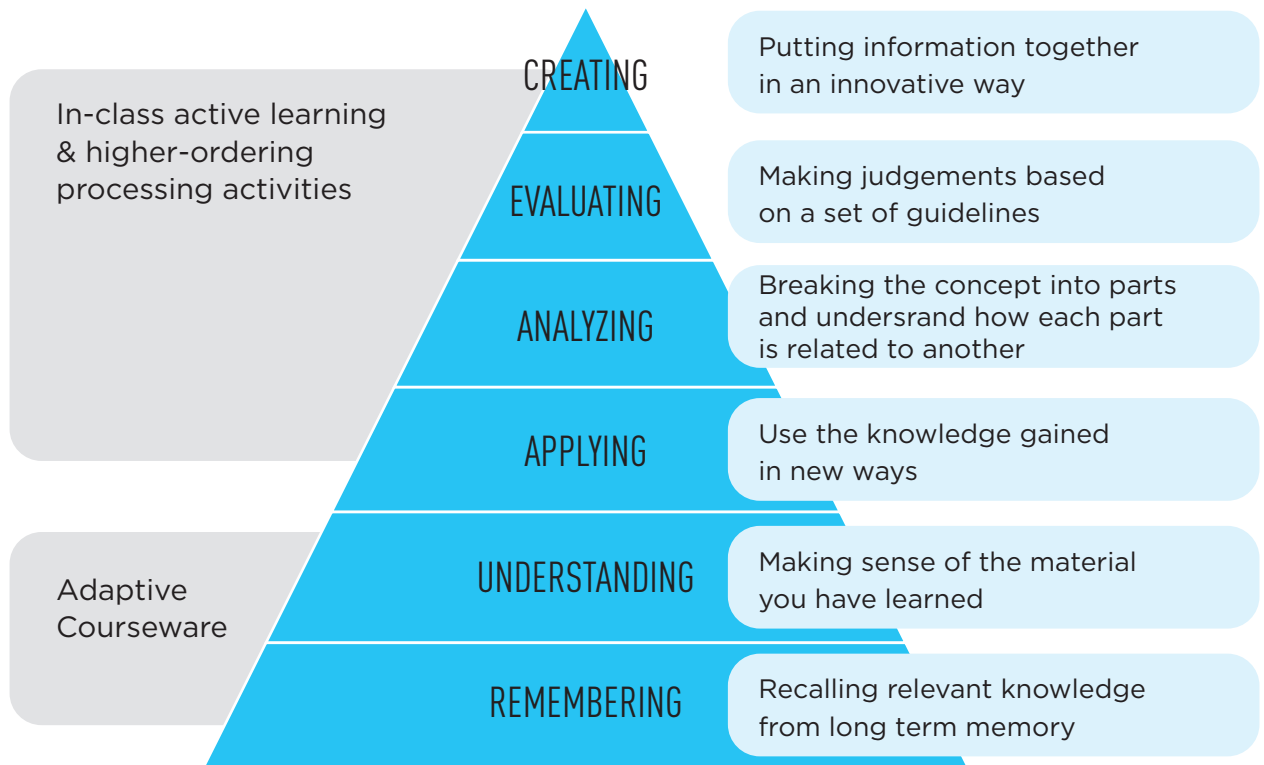
Determine which students are on track and which are struggling and would benefit from a different instructional approach, targeted outreach or academic support.

Use formative feedback to support students throughout their learning journey (Buchan, et al., 2020).

Using data prior to class: prepare students for in-class active learning and application

Instructors can assign digital courseware pre-work so that students are prepared to engage more deeply with foundational content during class time. For example, many digital courseware platforms will continue to deliver content until the instructor-specified mastery threshold is attained, ensuring that students will come to class prepared with the basic knowledge needed to engage in active learning and higher-order thinking during class.

Digital courseware typically addresses content at a lower level of Bloom's Taxonomy which creates time during class for students to engage with content in the upper half of Bloom's Taxonomy (Gebhardt, 2018).



Many adaptive courseware platforms are designed to address foundational knowledge and skills while simultaneously collecting individual student data. This data can be used by three distinct users: the courseware algorithm, the instructor, and the student.

Adaptive courseware interventions determined by the system algorithm

Adaptive digital courseware produces data that is used by the built-in algorithms to redirect students. When a student successfully completes a prior knowledge assignment the courseware sets their pace through the content accordingly.

Adaptive courseware will also prompt students to review missed concepts by directing them to the chapter (and even paragraph) in which the missed content was originally discussed. Some adaptive platforms will assign new assignments for students who miss content to ensure that a predetermined degree of mastery is reached before students move on to the next set of material. For example, adaptive digital courseware platforms collect data as students answer practice questions while progressing through the material.

These adaptive digital courseware systems typically have a proprietary algorithm to process student data and produce instructor dashboards containing individual and course-level student performance data.

Instructor dashboard to understand where the class and individual students are in their learning

The data provided by digital courseware is organized into reports on a provided dashboard. While each vendor dashboard looks different and uses its own specific algorithm to organize performance data, dashboards help instructors identify the whole class and student-specific strengths and challenges. For example:



Class-level considerations. Determine the learning objectives and concepts where students struggle, have misconceptions, or may benefit from further instruction, review, or clarification. This information provides an opportunity for instructors to make instructional decisions for the upcoming class activities as well as course design decisions for subsequent courses. These can include shifting pacing to meet students succeeding more rapidly or designing customized group work for students.



Student-level considerations. Identify individual students who are struggling and could benefit from instructor intervention. Interventions might include individual messaging with suggested supplemental content materials in a different modality (video, simulation, text), study recommendations, or referring them to student support services on campus. It can also mean identifying successes to offer rewards and incentives.

Student dashboard to facilitate self-directed learning

Many digital courseware platforms offer a student-facing dashboard. While the student dashboard primarily shows assignment progression, it also may provide individual activity and assessment scores along with automated learning tips. When digital courseware is integrated into a course as a low-stakes, formative feedback tool, it allows students to consistently monitor content mastery and can invite a sense of ownership of their own learning.

Table: Four Strategies for Using Data-Informed Instruction

STRATEGY	RECOMMENDATIONS
<p>Review your syllabus, course outcomes and content sequence to ensure clear alignment with the digital courseware outcomes and sequence.</p>	<ul style="list-style-type: none"> Remove extraneous outcomes or content (if allowed by the platform). Align in-class activities, learning objectives and content within the digital courseware content so they are synced. This means ensuring that framing of a given concept in the digital courseware matches what is being presented in class.
<p>Collaborate with an instructional designer or the vendor to review the reports and determine which report will best serve to help you support students and your teaching practice.</p>	<ul style="list-style-type: none"> When first using digital courseware that offers a dashboard and reporting features, identify one or two common report topics to inform instruction (see Table 1: Potential Instructional Interventions by Report for ideas). <ul style="list-style-type: none"> Time on Task Topic Difficulty Topic Mastery Student Confidence (pair with another report) Review the digital courseware report regularly to make instructional decisions. Regular review of the dashboard and its reporting will help you identify patterns to make needed teaching moves and instructional changes.
<p>Intentionally use digital courseware as a formative assessment tool.</p>	<ul style="list-style-type: none"> Assign a pre-assessment in week 1 and in week 2 to accommodate for add/drops and orienting students to the courseware. The pre-assessment will help identify challenging content and areas with misconceptions. Be proactive by identifying when and how you will address this content throughout the course. Formative assessments provide students and instructors with feedback. Assigning frequent, low stakes lessons to ensure access to consistent feedback throughout the course also provides opportunities for the instructor and student to take corrective actions before completing a high-stakes, summative assessment.
<p>Help students understand how they can use digital courseware to self-direct their own learning.</p>	<ul style="list-style-type: none"> Inform students early in the course that digital courseware programs are grounded in the science of learning principles. Incorporate thoughtful cadence and pacing of activities. Invite students to provide feedback when the system moves too fast or requires more effort than anticipated. Show students how to access their learning data in the courseware and help them understand that they can use their data to identify topics where they struggle. Encourage them to and bring those topics to tutoring centers or to you, the instructor and/or study groups. Offer multiple ways to connect with you as an instructor, email, text, and/or hours you will be available.

How to make meaning of the learning analytics dashboard

Table: Potential Instructional Interventions by Report Type

COMMON DATA REPORTS	POTENTIAL INSTRUCTIONAL INTERVENTIONS
<p>TIME ON TASK How long students spend on a given topic or activity.</p>	<ul style="list-style-type: none"> Review the pace of course material to determine if it's too fast or too slow. Encourage students to review their own scores and make a learning plan to address concerns. Give examples of what a learning plan can look like or invite them to meet with you to collaboratively craft a learning plan together.
<p>TOPIC DIFFICULTY Whole class or individual student reports on the level of difficulty completing an activity or topic.</p>	<ul style="list-style-type: none"> Review the pace of course material to determine if it's too fast or too slow. Ask your students about their perception of the pace of the course. Re-teach difficult concepts during class time and provide supplemental resources.
<p>TOPIC MASTERY Examine student proficiency in any given topic or activity.</p>	<ul style="list-style-type: none"> Send a supportive note to individual students using and constructive feedback that maintains student motivation. This is particularly helpful early- and mid-semester to reinforce good practices or suggest evidence-based learning strategies. Review the pace of course material to determine if it's too fast or too slow. Re-emphasize difficult concepts during class time and/or provide supplemental resources. Form teams for class activities and group assignments by intentionally and confidentially grouping students with high, medium, and low topic mastery. Provide differentiation opportunities for students who quickly mastered material or need further review. Address common student misconceptions (and why they occur) during class time. Encourage students to review their own scores and make a learning plan to address concerns. Invite them to craft a learning plan with you.

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