Effective Data Mining Protocols to Enhance Student's Learning

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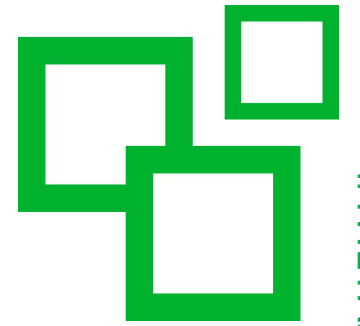
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Presentation Agenda
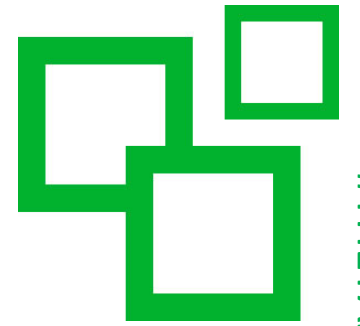
1. Definition of Data-driven decision-making (DDDM)
2. Needs of data mining in education
3. Types of data systems
4. Issues of DDDM for teaching
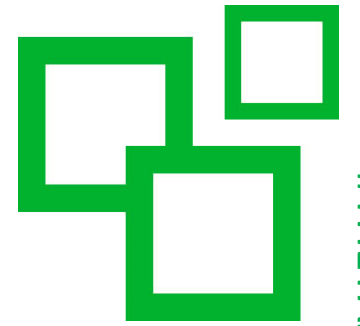5. Data mining protocols

Definition

Data-driven decision-making (DDDM), a systematic process to gather, store, analyze, and apply data to make decisions for increasing performance.
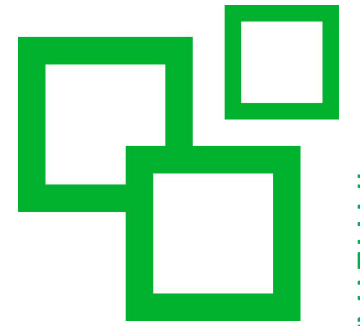
Needs and Importance

- Hundreds and thousands of data is available in education.
- Few teachers are able to use the data to improve their teaching and students' learning

Types of Data Systems in US

- Data systems are prerequisites for Data-Driven Decision Making.
- In US, there are numerous educational data systems, such as Aeries, Destiny, OARS, Cruncher, etc.

Four Main Types of Data Systems

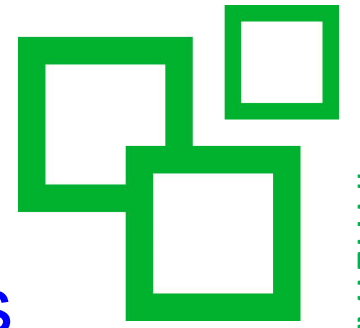1. Student information systems
   This type of data systems collect student data such as attendance, demographics, test scores, grades and schedules.
1. Data warehouses
   This type of data systems collect and store data.

Four Main Types of Data Systems

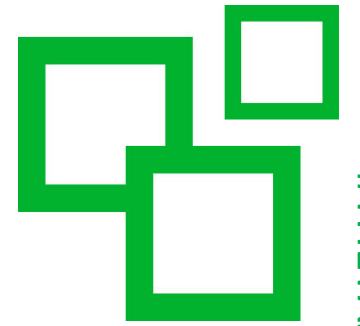3. Instructional or curriculum management systems
Data systems with instructional / curriculum resources, such as lesson plan samples, linkage to state content standards, communication and collaboration tools.

4. Assessment systems
This type of data system focuses on collecting and analyzing assessment scores, such as state assessment.

Popular Educational Data Systems in US School Districts
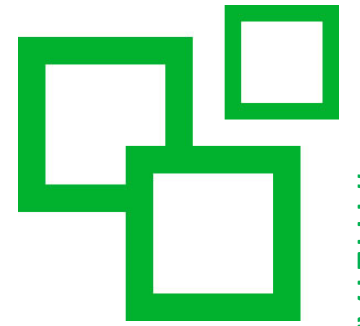
- prefer data systems with the ability to collect student demographics and test scores to the data systems with the ability to link instructional resources.

Student Information System >
Instructional/Curriculum Management System
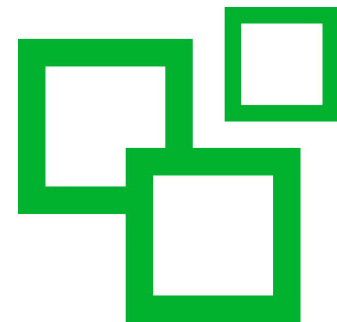
Advantage of DDDM for Teaching

1. Better performance

   School districts implementing an assessment system show an increase in teacher's use of data from year to year than other schools do not have an assessment system.
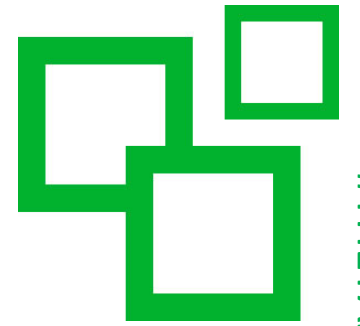
Advantage of DDDM for Teaching

2. Improve Instruction

Teachers can react to problems more effectively and apply new skill sets or teaching methods easier if they use data to drive their decisions and plans.

Issues of DDDM in Education

1. teachers' time constraint in analyzing and using the collected data to improve instruction.
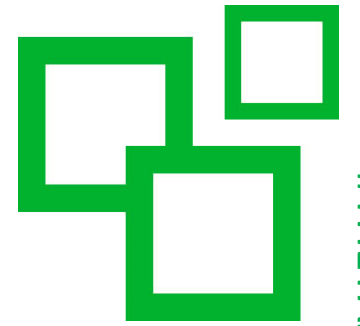
1. The collected data

   a. quantitative data - does not tell why students do not do well

   b. overwhelming data - too much data to read
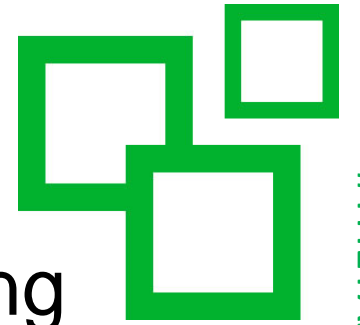
Data Mining Strategies in Education

1. Capacity-building interventions

2. Datnow and Hubbard's 11-step protocol

Capacity-building Interventions (CBIs)
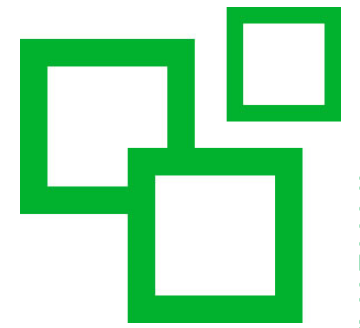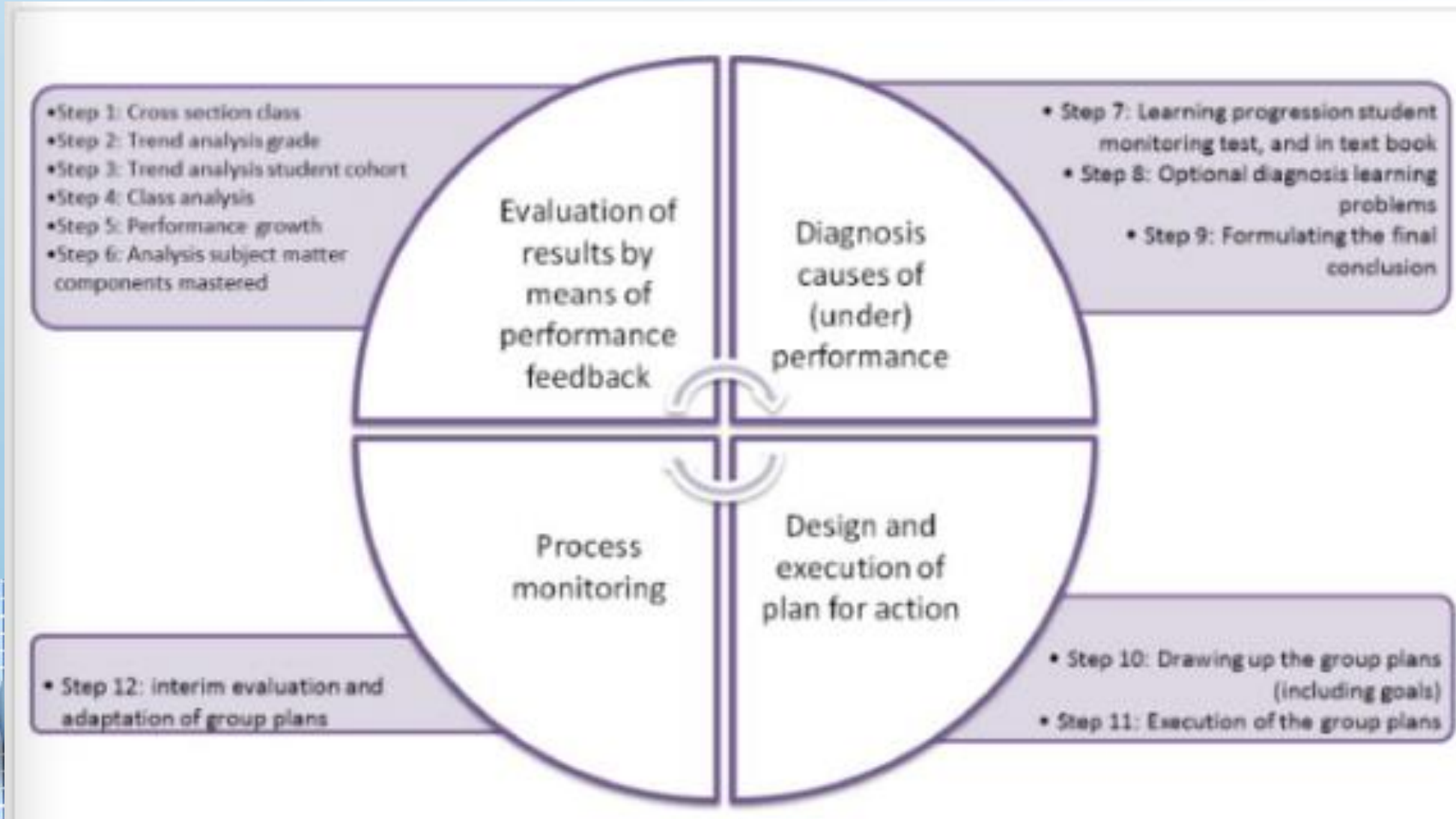
- It means to help teachers build capacity in applying DDDM based instruction to increase their teaching skills (Marsh & Farrell, 2015)

- School leaders play a key role.
  - build a common vision
  - encourage a school culture with open sharing and creating structure for teaching
  - support staff to analyze data, organize strategic planning, and implement their ideas.
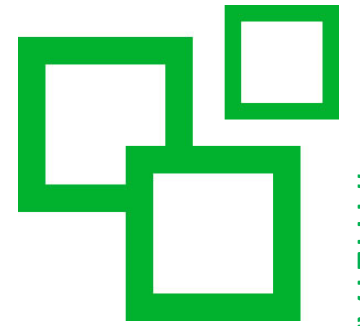
Datnow & Hubbard's 11-Step Protocol (2016)

- Step 1: Cross section class
- Step 2: Trend analysis grade
- Step 3: Trend analysis student cohort
- Step 4: Class analysis
- Step 5: Performance growth
- Step 6: Analysis subject matter components mastered

Evaluation of results by means of performance feedback

Diagnosis causes of (under) performance

- Step 7: Learning progression student monitoring test, and in text book
- Step 8: Optional diagnosis learning problems
- Step 9: Formulating the final conclusion

Process monitoring

Design and execution of plan for action

- Step 12: interim evaluation and adaptation of group plans

- Step 10: Drawing up the group plans (including goals)
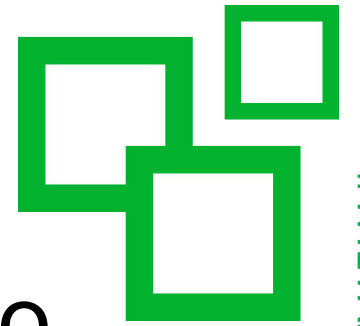- Step 11: Execution of the group plans

Datnow & Hubbard's 11-Step Protocol (2016)

Critique:

❖ The process is not simple.
❖ Many stakeholders must be involved, including the student themselves.
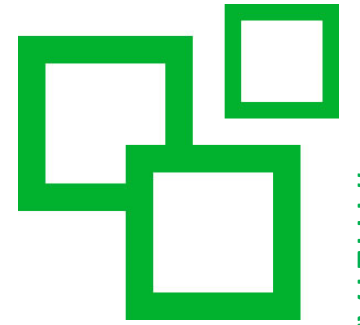❖ The task seems daunting.

Data Gallery Walk Protocol

- In the gallery walk, staff is assigned into small groups.
- Each group is given multi-year data on a particular topic. e.g., school suspension rates, or a particular test score
- Then, each group makes a summary poster for that topic (Kennedy, Mimmack, & Flanney, 2012).
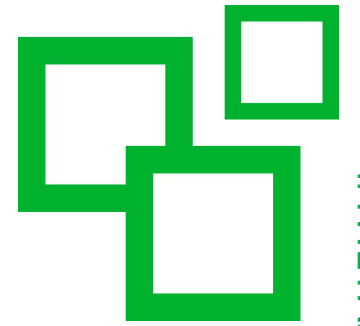
Data Gallery Walk Protocol

- Advantages:
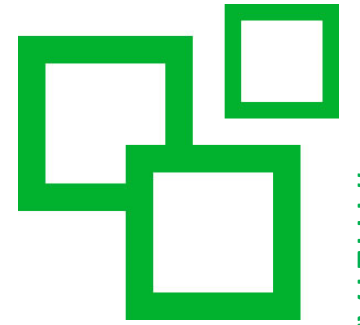   - less daunting
    - easy access
    - more interesting

Conclusion

- Teachers need easy to read and up-to-date data that is readily accessible.

- Schools need to assign time to analyze the data, to set goals, to plan strategies, to implement the plan, and to re-evaluate the goal and plan.
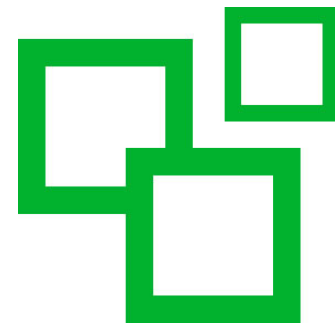
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Ongoing Research Plan

A research study investigating how two middle school teachers in CA applying DDDM strategies to improve their teaching in two math intervention programs.

Thank you very much for listening.