Software Project Management

Software Engineering
CS 130
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Content adapted from Essentials of Software Engineering 3rd edition by Tsui, Karam, Bernal Jones and Bartlett Learning

Software Project Management Process

is not the same as

- **Software Development Process or**
- **Software Life Cycle**

The techniques of doing POMA

- Requires social skills

- Requires technical knowledge

Some Project Management Techniques

- **Planning : Project Effort Estimation**
  - **General view:**
    - **Units of effort = a + b $(\text{size})^c + \Sigma(\text{factors})$**

      where a, b, and c set of estimated constants,

      size is the estimated size of the project

      and factors are additional factors of concern

  - **Most of the estimating techniques use some form of this general "formula"**
    - ***COCOMO I and COCOMO II* models**
    - ***Function Point model***

◄ pages 354-364 of your textbook

Effort Estimation

- a, is like overhead
  - fixed cost
- size, is a measure of scale of project, maybe LOC
- b translates size into the correct unit
- c allows size to affect outcome non-linearly

Some Project Management Techniques (cont.)

- **Planning and Organizing: Work Breakdown Structure**
  - – Estimation of the complete project by
    - Deliverables
    - Tasks required to develop the deliverables
    - Resources required to perform the tasks

Work Breakdown Structure (WBS) Steps

1. Examine and determine the *external deliverables* of the project.

2. *Identify the steps and tasks* required to produce each of the deliverables, including the tasks that are required to produce any intermediate internal deliverables

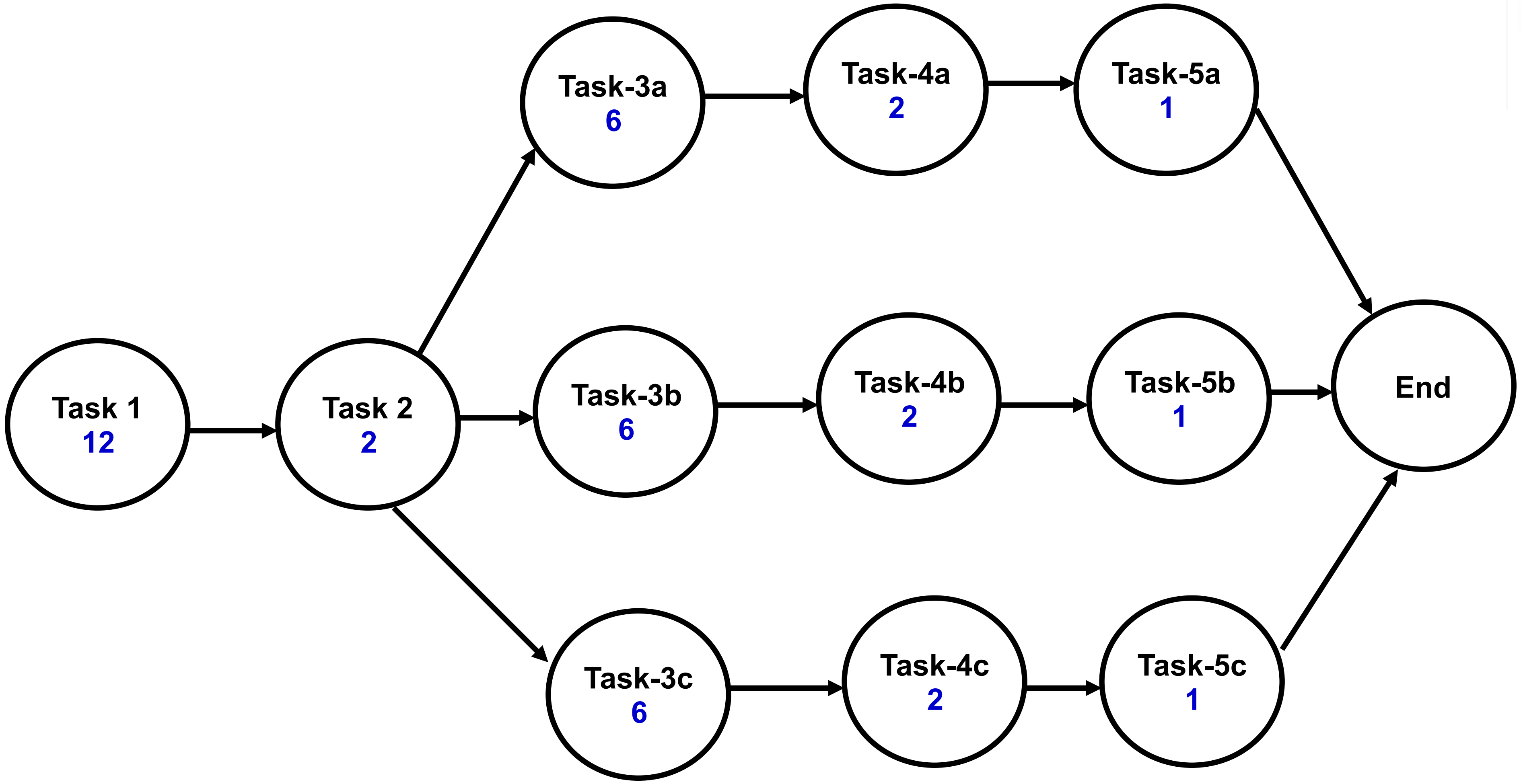
3. *Sequence the tasks*, showing any potential for parallelism

4. *Provide an estimate size* of each of the *tasks*

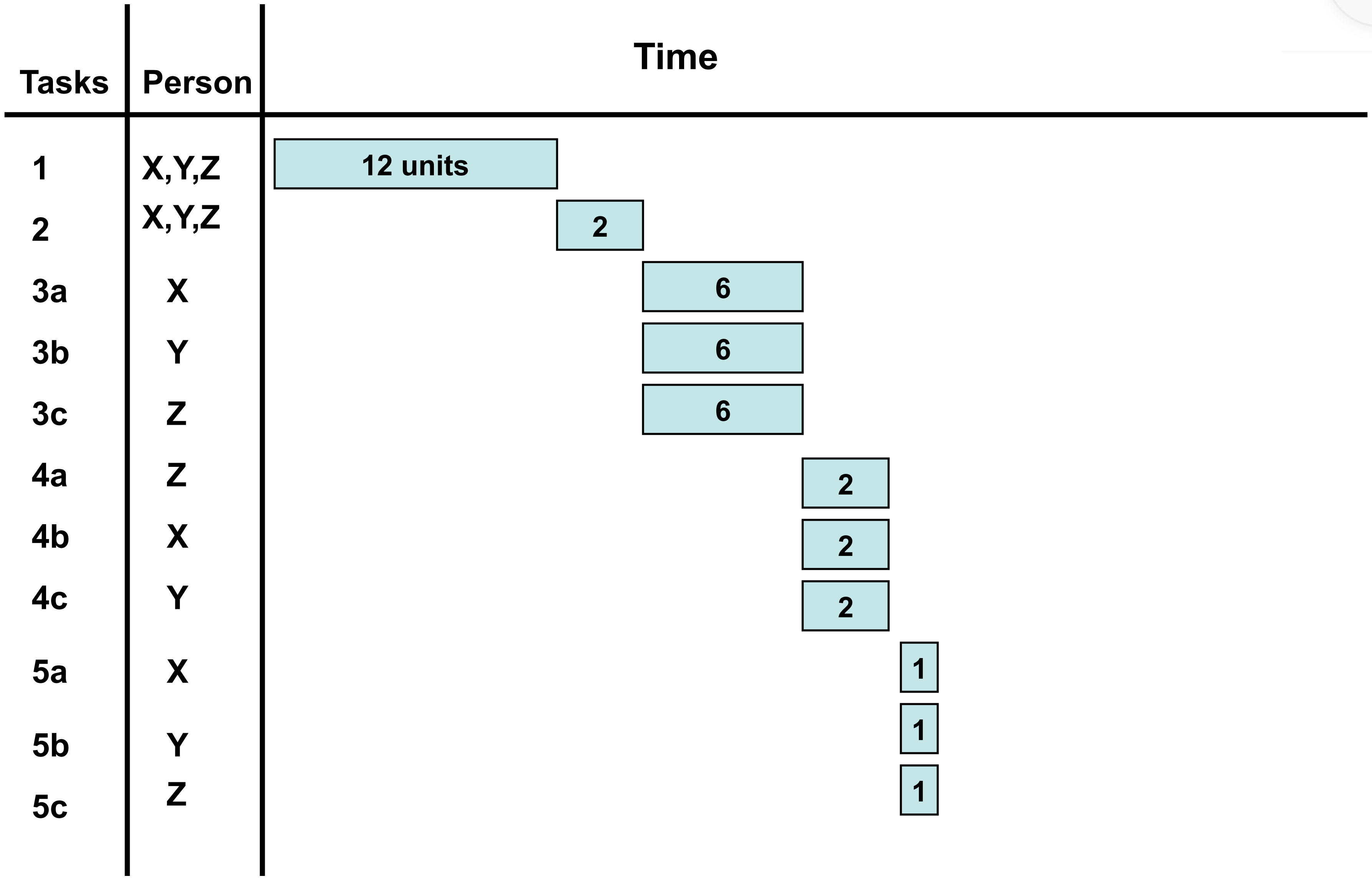
5. Provide an *estimate of the productivity of the personnel* that is most likely to be assigned to each of the tasks

6. *Calculate the time required* to accomplish each task

7. For each of the external deliverable, *lay out the timeline* of all the tasks needed to produce that deliverable and label the resources that will be assigned to the tasks.



Example of: Task Network with Estimated Time Units



Tasks	Person	Time
1	X,Y,Z	12 units
2	X,Y,Z	2
3a	X	6
3b	Y	6
3c	Z	6
4a	Z	2
4b	X	2
4c	Y	2
5a	X	1
5b	Y	1
5c	Z	1

End result of WBS = Initial Schedule Estimate

Some Project Management Techniques (cont.)

- **Monitoring**: **Earned Value**
  - – A technique to track the project status by comparing (at some specific time):
    - How much effort has been expended

      versus
    - How much effort was planned to have been expended

Definitions for Earned Value

- Budgeted Cost of Work (BCW) : estimated effort for each of the work tasks
- Budgeted Cost of Work Scheduled (BCWS): sum of estimated effort of all the tasks that were planned to be completed (by a specific date)
- Budget at Completion (BAC): estimate of the total project effort or sum of all the BCWs
- Budgeted Cost of Work Performed (BCWP): The sum of the estimated efforts of all the tasks that have been completed (by a specific date)
- Actual Cost of Work Performed (ACWP): The sum of the actual efforts of all the tasks that have been completed (by a specific date)
- Earned Value (EV) indicates how much of the estimated work is completed on a specific date.

$$\mathrm{EV} = \mathrm{BCWP} / \mathrm{BAC}$$

Earned Value Example

Date : 4/5/2011

Note the status checking date

Work Tasks	Estimated Effort in Pers-days	Actual Effort spent so far in Pers-days	Estimated Completion date in mm/dd/yy*	Actual Completion date in mm/dd/yy*
1	10	10	2/5/11	2/5/11
2	15	25	3/15/11	3/25/11
3	30	15	4/25/11	
4	25	20	5/5/11	4/1/11
5	15	5	5/25/11	
6	20	15	6/10/11	

** mm/dd/yy is month/ day/ year format*

Earned Value Example (cont.)

- For work task 4, BCW is 25 person-days; for task 6, BCW is 20 person-days.
- BAC is the sum of the estimated efforts for all the tasks or

  BAC = (10+15+30+25+15+20 = 115 person-days)
- BCWS for the date 4/5/06 is the sum of the estimated effort of all the tasks which were schedule to be completed on or before 4/5/06 or

  BCWS = (10 + 15 = 25 person days)
- BCWP for the date 4/5/06 is the sum of the estimated effort of all the tasks which were actually completed on or before 4/5/06 or

  BCWP = (10 + 15 + 25 = 50 person-days)
- ACWP for the date 4/5/06 is the sum of the actual efforts expended for all the tasks that have been completed on or before 4/5/06 or

  ACWP = (10 + 25 + 20 = 55 person-days)

- EV = BCWP / BAC = 50/115 = .434 or
the project is estimated to be 43% complete as of 4/5/06

Earned Value Example (cont.)

- There are two more measurements we look at:
  - Cost Variance = BCWP – ACWP = 50 – 55 = - 5
  - Schedule Variance = BCWP - BCWS = 50 – 25 = 25

Goal-Question-Metric (GQM)

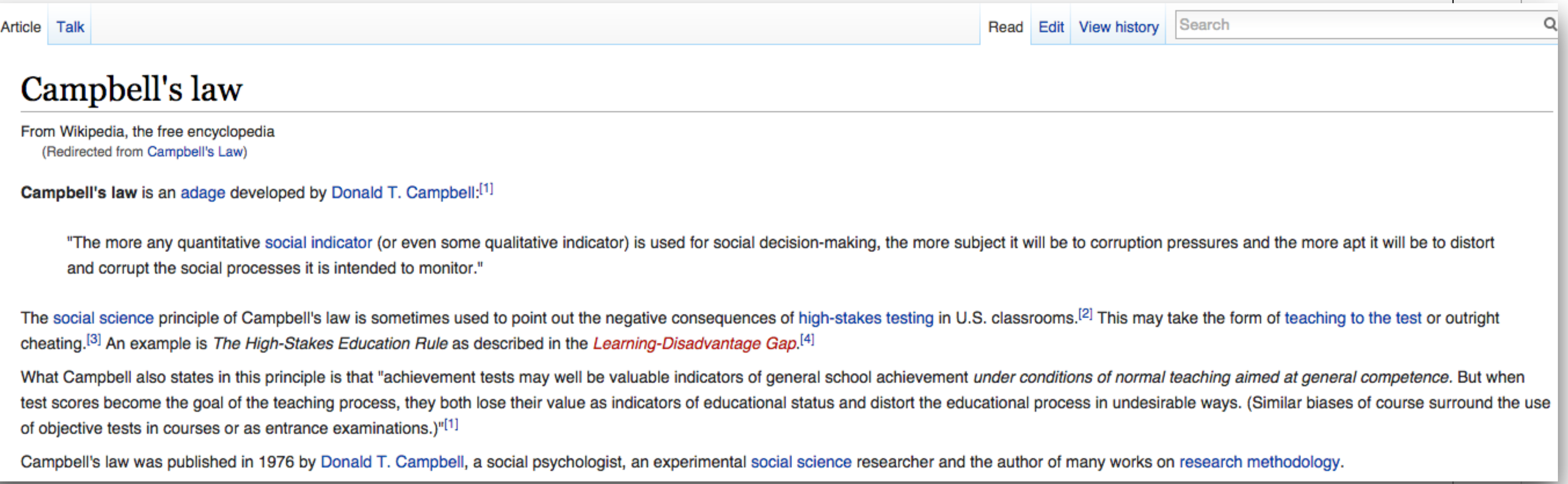
- First Introduced by Basili & Weiss (Univ. of Maryland)

- Provides an organized approach to measuring a software property via 3 levels of steps:

  – Conceptual Level : formulate the desired goal of some software property
  – Operational Level: formulate a set of questions related to that goal
  – Quantitative Level: develop metrics that may be used in answering the questions that are related to attaining the goal

Applying GQM

- In order to apply the GQM methodology one needs to spent some time at the “Conceptual Level”:
  - Conceptualize the property of interest
  - Develop clear definitions of possible sub-attributes related to the conceptualized property
  - Determine if these sub-attributes can take on any numeric values --- if not then it would be difficult to get to the Quantitative Level ---- may need to re-look at the definitions and/or reconsider the sub-attributes



Campbell's law

From Wikipedia, the free encyclopedia
(Redirected from Campbell's Law)

Campbell's law is an adage developed by Donald T. Campbell:[1]

> "The more any quantitative social indicator (or even some qualitative indicator) is used for social decision-making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it is intended to monitor."

The social science principle of Campbell's law is sometimes used to point out the negative consequences of high-stakes testing in U.S. classrooms.[2] This may take the form of teaching to the test or outright cheating.[3] An example is *The High-Stakes Education Rule* as described in the *Learning-Disadvantage Gap*.[4]

What Campbell also states in this principle is that "achievement tests may well be valuable indicators of general school achievement *under conditions of normal teaching aimed at general competence*. But when test scores become the goal of the teaching process, they both lose their value as indicators of educational status and distort the educational process in undesirable ways. (Similar biases of course surround the use of objective tests in courses or as entrance examinations.)"[1]

Campbell's law was published in 1976 by Donald T. Campbell, a social psychologist, an experimental social science researcher and the author of many works on research methodology.

Exercise

- Consider a software project that asks you to track the grades of the entire freshman class at Westmont, by major, by gender, and by region. Put together a plan for this software project, including the work needed to clarify the requirements and deliverables.

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