



Science of Improvement

Definition

Healthcare continually aims to deliver safer, more efficient, more equitable, quicker, and more patient-centered care. The study of how to improve the quality of care is known as improvement science. It is the scientific study of how to systematically and rigorously explore what works to improve quality in healthcare and the best ways to measure and disseminate this to ensure positive change. Improvement science connects the academic and healthcare worlds, focusing on maximizing learning from improvement and often involves small changes at a local level that contribute a larger positive impact.

Profound Knowledge

A helpful way to practice improvement science is by using Deming's system of profound knowledge which provides a framework to help leaders improve organizational performance. It is made up of four parts:



1. **Appreciation of a system**
2. **Understanding variation**
3. **Building knowledge**
4. **Human side of change**

Deming argues leaders need an understanding of each part and how they interact in order to enact positive change in their organizations and acquiring this knowledge is essential for improvement activities. The benefits of the system of profound knowledge for leaders include setting an example, being a good listener but not compromising, continually teaching other people, and helping people constructively change their beliefs and practices.

1. Appreciation of a system

The first step to improving a system is understanding it. Deming emphasizes that leaders should appreciate that systems are what need improving, not the people that interact with them. A system is a network of interdependent components working together to achieve the system's aim. If there is no aim, then there is no system to improve. The role of management is to optimize the system and ensure

each component is working to achieve its aim. Optimizing the system depends on the integration of each component, not necessarily the individual performance of components. Therefore, when managers are planning changes, taking into consideration interdependence will increase the accuracy of predicted outcomes. There are two types of changes that leaders can implement:

- **First-order change** which returns a system to normal performance but does not change the system itself.
- **Second-order change** which changes the system itself and results in a new level of performance.

2. Understanding variation

The next key step is being able to understand that everything we measure varies such as our performance, patient satisfaction, health outcomes, income etc. Leaders need to understand the significance of this variation in order to know what appropriate action to take. This involves being able to differentiate between two different causes of variation within systems:

- **Common causes** which are inherent in processes and affect both people and outcomes. They cause stable processes whose variation is predictable and require fundamental system change to achieve improvements.
- **Special causes** causes are not part of processes all the time and do not affect everyone in systems. They arise because of certain circumstances and lead to unstable processes which vary unpredictably. Only once corrective action is taken to remove this cause will the system return to its original performance.

Two common mistakes for leaders are to confuse common and special causes and react inappropriately which may make things worse. The first is to treat common cause variation as if it is due to special causes and adjust or reset the system, when in fact the only way to improve the system is by fundamentally changing it. The second mistake is to accept special cause variation as if it were all due to common causes and miss an opportunity to fix a problem.

Reading Material

- Deming WE. The New Economics for Industry, Government, Education. 2nd ed. Cambridge, Mass: The MIT Press; 2000.
- Langley GJ, et al. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance. 2nd ed. San Francisco, Calif: Jossey-Bass. 2009.
- Roehrs S. Building of profound knowledge. Curr Probl Pediatr Adolesc Health Care. 2018;48:196-7.



W. Edwards Deming 1900 -1993



ABC of Governance

aims at

creating an awareness of issues related to health governance;

providing a core of knowledge that is practice-based;

encouraging communication between advocates of governance.

Produced by
Health Governance Unit
Medical Research Institute
Alexandria University

www.healthgovernanceunit.com
admin@healthgovernanceunit.com

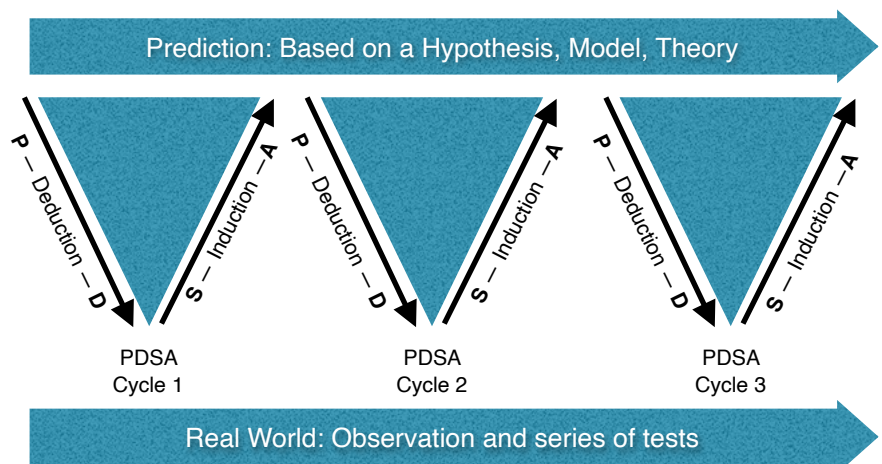
Science of Improvement cont.

3. Building Knowledge

The foundation of system improvement is the ability to make changes, measure the results, and compare them with what was expected. This lets leaders build greater understanding and knowledge of how systems function which then allows them to implement better changes in the future that are more likely to result in improvement.

In order to make changes, which are essentially predictions about how systems could improve if they functioned differently, theories are required. Theories represent leaders' current knowledge about how a system work, from individual components to entire systems. A leader will propose a change and how to test it using their theories about how a system operates. The change is then tested and the results either validate current theories or allow them to be modified and refined.

This learning cycle of proposing changes, testing them, measuring the results, and learning from what was produced is a key source of learning. Repeating the cycle allows theories to be made more useful by finding out where they are valid and where they fall short. For example, if a change does not lead to improvement, leaders can use the results to improve their theories and understanding of how the system performs. This process is demonstrated in the figure below.



Plan-Do-Study-Act (PDSA) Cycles are a continuous deductive and inductive approach to system improvement. The Plan to Do stages are deductive: predictions are made, theories tested, observations recorded, and variations from predictions noted. The Do to Study stages are inductive: variations from predictions are analyzed and theories updated. In the final Action stage, leaders decide whether to implement the new change or propose another one based on what has been learned.

4. Human Side of Change

Managers of people need to appreciate that all people are different, they learn differently, their needs are different and they are motivated in different ways. The most important thing a manager can do is understand what is important to individuals and how they interact with each other and with a system. This stakeholder engagement is crucial to the success or failure of improvement projects. Therefore, managers should involve people in change processes to increase the likelihood of success. People are more likely to adopt new behaviors if proposed changes match their values and beliefs and those of the organization. People should also be given the chance to test and try change projects and observe successful change efforts with others.