Learning from VARIATION

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

FALL CONVENING
OCTOBER 20, 2021

content adapted from improvement for equity by Design

HTH Graduate School of EDUCATION

PREDICTING VARIATION
P-CHART HYPOTHESIS

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

improvement for equity by Design

HTH Graduate School of EDUCATION

Do you think there are schools in your district who are **bright spots** when it comes to serving students in your equity groups? *List them, and note why you predict this.*	
Do you think there are schools in need of **special support**? List them, and note why you predict this.	

LEARNING FROM VARIATION
PROTOCOL

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

improvement for equity by Design

HTH Graduate School of EDUCATION

Individual Reflection before Protocol:

What is "GOOD" for your key metric?

Express it as a
mean percentage that is
"Electrifying, not Electrocuting"
(i.e. 85% complete the FAFSA/CADA)

Note: Define "good" based on what you would be PROUD of. For now, ***rely on your vision for our kids,*** *not on current data.*

Agreements:

- **Stay curious...** focus on learning, not judging
- **Share the air...** step up, step back, use the chat
- **Lean info discomfort...** that is where the learning happens

The Facilitator leads the group through the following steps:

1. Defining "Good" (2 minutes)
Each person shares what they think "good" would be for your network's key metric (in 30 seconds or less). You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.

2. Individual Review of Data (4 minutes)
What do you notice about the mean? What do you notice about the variation - is it all normal/random or are there schools above or below the control limits? Which schools are bright spots? Which schools need extra support?

3. Noticings (5 minutes)
Each person shares one thing that they notice about the chart.
Helpful Sentence Frame: I notice...

LEARNING FROM VARIATION
PROTOCOL (continued)

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

improvement for equity by Design

HTH Graduate School of EDUCATION

4. Equity Pause (3 minutes to individually journal)
How does the data match or challenge your predictions?

What **emotions** come up for you when you look at your data? What is evoking these emotions?	
Reflect on a school that **matched your predictions**. What do you attribute that to?	
Reflect on a school that **didn't match your predictions**? Why do you think that is?	
Take some time to reflect on **what was behind your hunches** about who would be a bright spot or not. How might your own identity markers, bias, or assumptions about the students/team/school/system have influenced your predictions?	

5. Equity Pause (3 minutes to share)
Each person shares any feelings that arose and assumptions that may have been at play during their predictions.
Helpful Sentence Frame: I felt... I realized...

6. Wonderings (1 minute of think time, then 5 minutes to share)
Each person shares a question that emerged for them about this data.
Helpful Sentence Frame: I wonder...

7. Hypotheses (1 minute of think time, then 5 minutes to share)
Each person shares possible explanations for the data, careful to *identify multiple explanations and focus on systems/conditions rather than teams/individuals.*
Helpful Sentence Frame: This could be because... OR it could be because...

LEARNING FROM VARIATION
DECISION TREE

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

improvement for equity by Design

HTH Graduate School of EDUCATION

NEXT STEPS
TEAM TIME

TxNSI
TEXAS NETWORK FOR SCHOOL IMPROVEMENT

improvement for equity by Design

HTH Graduate School of EDUCATION

Twist the Rubik's Cube: What questions could you explore with p-charts to understand how different students experience your schools - and to take action?

Bright Spots: Who are the bright spots you need to learn from? What are your next steps for learning?

Sites to Support: Which schools need extra support right now? What might you do *with* them, not *to* them?

New Ideas: If your network was all common cause (i.e. random variation), what new ideas might you introduce?

LEARNING FROM VARIATION
PROTOCOL FOR PRACTICE
PART 1

improvement for equity by Design

HTH Graduate School of EDUCATION

Individual Reflection Before Protocol When thinking about your key metric, what would be a good outcome? Express it as a percent/mean. ***Note**: Define "good" based on what would really be good, NOT based on the current reality or what seems feasible at the moment. Rely on your vision for our kids, not on current data.*	
1. Defining "Good" (5 minutes)	
The facilitator asks and drops in the chat:	"What would your key metric look like if a school is doing well? When thinking about your metric, what is a "good" result?"
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.
2. Individual Review of Data (5 minutes)	
The facilitator asks and drops in the chat:	"Do you see any bright spots or schools who need extra support? Is the variation all normal or is there some meaningful variation?"
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.
3. Notice & Wonder (5 minutes)	
The facilitator asks and drops in the chat:	"What do you **notice** about the data in your chart? Stick to what you see, and avoid interpretation at this point in the protocol. What **questions** emerge for you about this data?"
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.

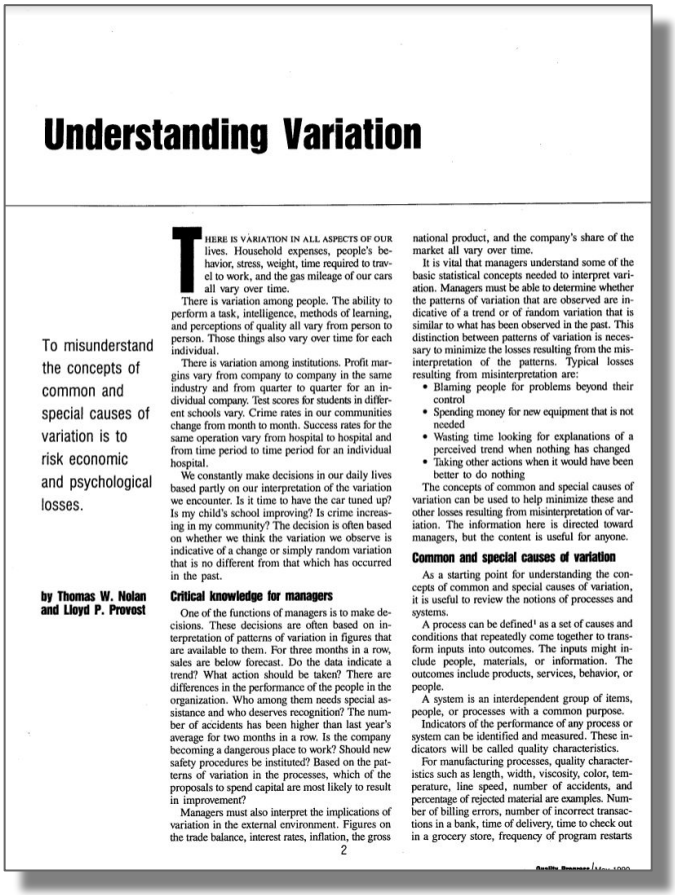
LEARNING FROM VARIATION
PROTOCOL FOR PRACTICE
PART 2

improvement for equity by Design

HTH Graduate School of EDUCATION

4. Equity Pause (5 minutes)	
The facilitator asks and drops in the chat:	"What **emotions** come up for you when you imagine this is your data? What is evoking these emotions?"
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.
5. Hypotheses Part 1 (5 minutes)	
The facilitator asks and drops in the chat:	"What might explain the data we see? Focus on systems and conditions, rather than teams and individuals."
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.
6. Hypotheses Part 2 (5 minutes)	
The facilitator asks and drops in the chat:	"How do you think that data from our own system would compare to the data in the system represented on this chart? What makes you think that? What might you do to check your hypothesis?"
Waterfall Chat (1 minute)	Each person types their response into the chat. After one minute, the facilitator cues everyone to press "enter" at the same time.
Verbal Share-Out (4 minutes)	Facilitator invites some folks to expand on their responses. You don't need to arrive at a shared understanding of this right now - the purpose is just to share and notice.

RESOURCES
TO LEARN MORE



Understanding Variation

To misunderstand the concepts of common and special causes of variation is to risk economic and psychological losses.

by Thomas W. Nolan and Lloyd P. Provost

There is variation in all aspects of our lives. Household expenses, people's behavior, stress, weight, time required to travel to work, and the gas mileage of our cars all vary over time.

There is variation among people. The ability to perform a task, intelligence, methods of learning, and perceptions of quality all vary from person to person. Those things also vary over time for each individual.

There is variation among institutions. Profit margins vary from company to company in the same industry and from quarter to quarter for an individual company. Test scores for students in different schools vary. Crime rates in our communities change from month to month. Success rates for the same operation vary from hospital to hospital and from time period to time period for an individual hospital.

We constantly make decisions in our daily lives based partly on our interpretation of the variation we encounter. Is it time to have the car tuned up? Is my child's school improving? Is crime increasing in my community? The decision is often based on whether we think the variation we observe is indicative of a change or simply random variation that is no different from that which has occurred in the past.

Critical knowledge for managers

One of the functions of managers is to make decisions. These decisions are often based on interpretation of patterns of variation in figures that are available to them. For three months in a row, sales are below forecast. Do the data indicate a trend? What action should be taken? There are differences in the performance of the people in the organization. Who among them needs special assistance and who deserves recognition? The number of accidents has been higher than last year's average for two months in a row. Is the company becoming a dangerous place to work? Should new safety procedures be instituted? Based on the patterns of variation in the processes, which of the proposals to spend capital are most likely to result in improvement?

Managers must also interpret the implications of variation in the external environment. Figures on the trade balance, interest rates, inflation, the gross national product, and the company's share of the market all vary over time.

It is vital that managers understand some of the basic statistical concepts needed to interpret variation. Managers must be able to determine whether the patterns of variation that are observed are indicative of a trend or of random variation that is similar to what has been observed in the past. This distinction between patterns of variation is necessary to minimize the losses resulting from the misinterpretation of the patterns. Typical losses resulting from misinterpretation are:

- Blaming people for problems beyond their control
- Spending money for new equipment that is not needed
- Wasting time looking for explanations of a perceived trend when nothing has changed
- Taking other actions when it would have been better to do nothing

The concepts of common and special causes of variation can be used to help minimize these and other losses resulting from misinterpretation of variation. The information here is directed toward managers, but the content is useful for anyone.

Common and special causes of variation

As a starting point for understanding the concepts of common and special causes of variation, it is useful to review the notions of processes and systems.

A process can be defined[1] as a set of causes and conditions that repeatedly come together to transform inputs into outcomes. The inputs might include people, materials, or information. The outcomes include products, services, behavior, or people.

A system is an interdependent group of items, people, or processes with a common purpose.

Indicators of the performance of any process or system can be identified and measured. These indicators will be called quality characteristics.

For manufacturing processes, quality characteristics such as length, width, viscosity, color, temperature, line speed, number of accidents, and percentage of rejected material are examples. Number of billing errors, number of incorrect transactions in a bank, time of delivery, time to check out in a grocery store, frequency of program restarts

2

[Understanding Variation](#)
by Thomas W. Nolan and Lloyd P. Provost

ORIGINAL RESEARCH

The run chart: a simple analytical tool for learning from variation in healthcare processes

Rocco J Perla,[1] Lloyd P Provost,[2] Sandy K Murray[3]

► An additional text box is published online only. To view this file please visit the journal online (http://qualitysafety.bmj.com).

[1]UMass Memorial Health Care, Worcester, Massachusetts, USA
[2]Associates in Process Improvement, Austin, Texas, USA
[3]Corporate Transformation Concepts, Eugene, Oregon, USA

Correspondence to
Dr Rocco J Perla, Office of Quality and Patient Safety, Center for Innovation and Transformational Change, 22 Shattuck Street, Worcester, MA 01605, USA; rocco.perla2@umassmemorial.org

Accepted 26 July 2010

Background: Those working in healthcare today are challenged more than ever before to quickly and efficiently learn from data to improve their services and delivery of care. There is broad agreement that healthcare professionals working on the front lines benefit greatly from the visual display of data presented in time order.
Aim: To describe the run chart—an analytical tool commonly used by professionals in quality improvement but underutilised in healthcare.
Methods: A standard approach to the construction, use and interpretation of run charts for healthcare applications is developed based on the statistical process control literature.
Discussion: Run charts allow us to understand objectively if the changes we make to a process or system over time lead to improvements and do so with minimal mathematical complexity. This method of analyzing and reporting data is of greater value to improvement projects and teams than traditional aggregate summary statistics that ignore time order. Because of its utility and simplicity, the run chart has wide potential application in healthcare for practitioners and decision-makers. Run charts also provide the foundation for more sophisticated methods of analysis and learning such as Shewhart (control) charts and planned experimentation.

The skills associated with using data for improvement vary widely among those working to improve healthcare. We describe a simple analytical tool commonly used by professionals in quality improvement, but underutilised in healthcare—the run chart.[1] For those health professionals that use run charts, they provide a valuable source of information and learning for both practitioner and patient. The following scenario described by Neuhauser and Diaz[2] provides one example of the simplicity of run charts and their potential for wide application in healthcare:

Susan Cotey is a diabetes educator at Huron Hospital in Cleveland, Ohio. She gives out graph paper to elderly diabetic patients who live in the most impoverished part of her city. She uses a self-help book designed specifically for her patients. Each patient gets a copy. She asks them to plot their blood sugar measures over time, connect the dots and bring their graphs in to small discussion groups of similar patients who share their experience and learn about diabetes self-management (diet, exercise, weight control). Nearly every patient brings in their graph. The large majority of patients improve their diabetic control. This hospital has made diabetes management a centre of its healthcare mission.

The use of run charts by these patients with diabetes summarises the spirit of our paper—the run chart has a role to play in healthcare improvement work.

Although many healthcare professionals now recognise the value of statistical process control methods, applications and tools in improving the quality of care, much of this focus in the healthcare improvement literature is on Shewhart (control) charts and their various derivatives (such as cumulative summation charts and funnel plots).[3] Very little has been written about the use and application of run charts.

The run chart allows us to learn a great deal about the performance of our process with minimal mathematical complexity. Specifically, it provides a simple method to determine if a process is demonstrating non-random patterns, what we term a 'signal'. By focussing on the time order that data are collected, the run chart can be applied when traditional methods to determine statistical significance (t-test, chi-square, F test) are not useful. Important uses of the run chart for improvement activities include the following[4]:

[The run chart: a simple analytical tool for learning from variation in healthcare processes](#)
by Rocco J Perla, Lloyd P Provost and Sandy K Murray