

Understanding Learning

“Thoughts About Learning to Support Implementing Improvements”

“If one is trying to make improvements.....things need to change.....change requires behavior modification....and this requires learning.”

“Anyone involved in improvements should understand some learning fundamentals so that improvements can actually be implemented.”

The following are selected slides from a longer seminar on this topic and contain one view of learning gained by the author over decades of experience. Many other important views of learning exist and those should be explored as well.

Contents

Part 1 Awareness of Learning Levels

Part 2 Learning Level Granularities

Part 3 Focus On Fundamentals

Part 4 Learning Misunderstandings

Part 5 Incomplete Learning

Part 6 Learning Opportunities

Summary Levels of Learning

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge

Notional Learning Level Granularity

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge

What Do You Remember?

$EV < RT$ OR $EV > RT$

What Some Believe Learning To Be

- I Can Remember
- I Understand
- I Can Apply

Some incorrectly believe this is all learning is.

Some think if you know a few terms and can recite some process steps, that they "know it all."

This is not the case as additional and significant depth in both knowledge and skills are yet to be achieved.

Educate individuals on these levels of learning so that stakeholders might change understand that real education, often resulting from

Incomplete Learning Real Learning Gaps Bottom Line

The result can be that "Real Learning Gaps" exist and organizations interested in improvements need to be aware of those gaps.

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge

Learning Opportunities

Multiple Development Methods Are Very Important

Part 1

Levels of Learning

Understanding Learning

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Levels of Learning

“New Bloom’s Taxonomy”

Paraphrased

- 1) I Can Remember
- 2) I Understand
- 3) I Can Apply
- 4) I Know Context and Structure
- 5) I Am Able to Evaluate
- 6) I Can Combine With Other Knowledge

EXAMPLES

The First Three Levels of Learning

1) I Remember

Seeing, touching a bike



2) I Understand

Seeing others ride a bike



3) I Can Apply

Riding the bike



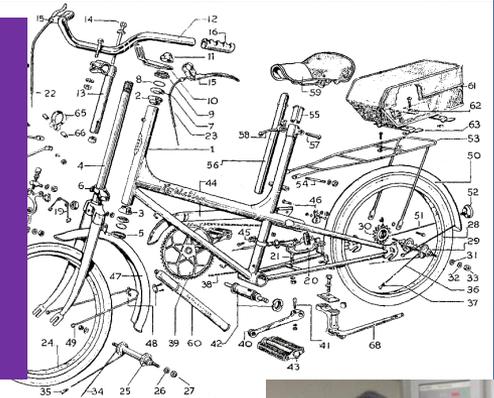
EXAMPLES

Levels 4, 5 & 6 of Learning

4) I Know Context and Structure

Modes of Transportation

- *Walk – Very Local, Inexpensive, Energy Efficient, Exercise*
- *Ride a Bike – Local, Inexpensive, Energy Efficient, Exercise*
- *Car – Expensive, Anywhere*
- *Bus – Inexpensive, City*
- *Train – Long Distance*
- *Airplane – Fast, Long Distance*



5) I Am Able to Evaluate

Bicycle Reviewer

- *Significant Bicycle Experience*
- *Evaluation Methods Skills*
- *Comparison Criteria Knowledge*
-



6) I Can Combine With Other Knowledge

Bicycle Designer and Builder

- *Bicycle Experience*
- *Design Skills*
- *Mechanical Skills*
- *Fabrication Skills*
- *Prototype Evaluation Skills*
-



Summary

Levels of Learning

I Can Remember



I Understand



I Can Apply



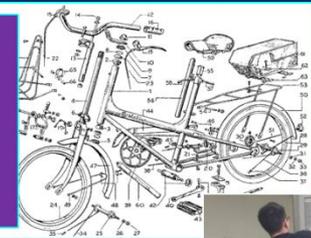
I Know Context and Structure

I Am Able to Evaluate

I Can Combine With Other Knowledge

Modes of Transportation

- Walk – Very Local, Inexpensive, Energy Efficient, Exercise
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- Train – Long Distance
- Airplane – Fast, Long Distance



Bicycle Reviewer

- Bicycle Knowledge
- Evaluation Skills



Bicycle Designer and Builder

- Design Skills
- Mechanical Skills
- Construction Skills
- Prototype Evaluation Skills
-



Levels of Learning

New Blooms Taxonomy – Paraphrased

- **Remember** – Recall of data, ability to remember, recite information.
- **Understand** – Comprehend, Ability to grasp the meaning, ability to explain or restate in multiple ways, real understanding.
- **Apply** – Ability to apply what is learned in new situations.
- **Context and Structure, Analyze** – Ability to separate something into components, to understand the functions of each and the relationships between components, understand the relationship or context of something to the external environment.
- **Evaluate, Critique** – Ability to critique something, judge the value of something, assess compliance with criteria, understand differences in performance or quality measures; appraise, judge or select.
- **Combine, Synthesize, Create** – The ability to combine a given set of knowledge & skills with other knowledge & skills to understand a larger context or to construct something new; generate new information or concepts that did not previously exist, create, design, combine.

Learning Levels Related to Learning Methods

Notional Only

- Remember** – *Read, Lecture, See, Experience, ...*
- Understand** – *Above + Details, Questions, Multiple Examples, ...*
- Apply** – *Above + Exercises, Doing It, Simulations, Coaching, ...*
- Know Context** – *Above + Experience, Learning of Adjacent Areas, ...*
- Evaluate** – *Above + More Varied Experience, Evaluation Skills, ...*
- Synthesize** – *Above + More Experience, Ability to Synthesize Knowledge and Skills, Knowledge and Skills in Adjacent Areas,(more).....*

Another Learning Example

*Let's take the
example of an
automobile*

Levels of Learning

"Bloom's Taxonomy"

Paraphrased

1. I Can Remember
2. I Understand
3. I Can Apply
4. I Know Context and Structure
5. I Am Able to Evaluate
6. I Can Combine With Other Knowledge

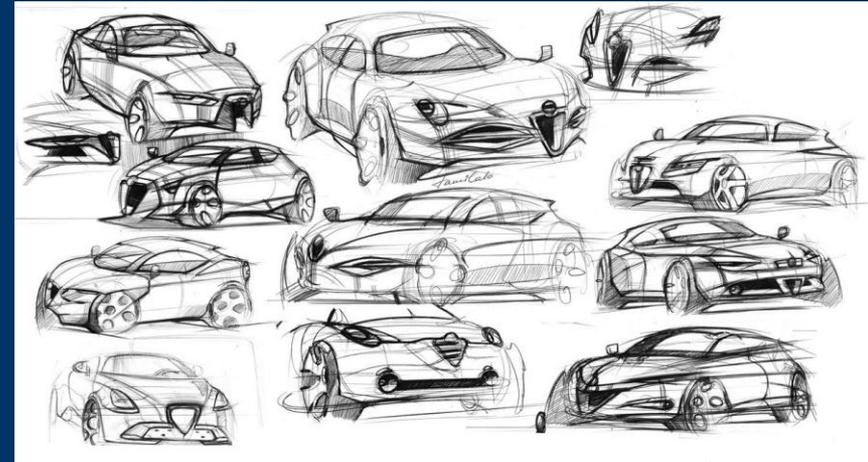
Remember

Yes, I know what a car is....

- I have seen cars
- I saw people getting into them and going away
- There are many different types, sizes, shapes and colors
- Many people like them
- Almost every family has one or more

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge



Understand

I Know What It Is and Its Purpose

- It is a “vehicle” that people get into and go someplace and carry things
- People go to work using cars

I know Why

- People live, work and entertain themselves in different locations and a car is of value to move themselves and things from one place to another
- People view cars as being necessary to function in society

I Know How

- The engine supplies power which is transmitted to the wheels
- The person operating the car has controls to make it go forward, stop, turn and go backward

Levels of Learning “Bloom’s Taxonomy”

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Apply

I can drive the car

- On residential streets
- In a parking lots and ramps
- In the city
- On the freeway
- On rural roads

I can park and secure the car

I can use the car's accessories

I can keep the car working

- Add fuel
- Check tires, oil, antifreeze,
- Monitor diagnostic indicators

I can use a car in different ways

- Going to the store and to work
- Going on vacation with family
- Hauling a trailer

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
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Understand Context and Structure

CONTEXT

I understand how a car fits into society overall



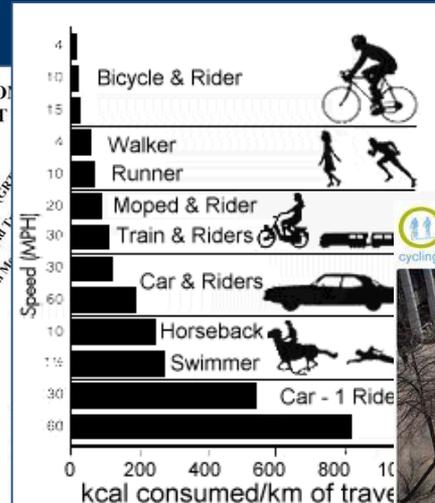
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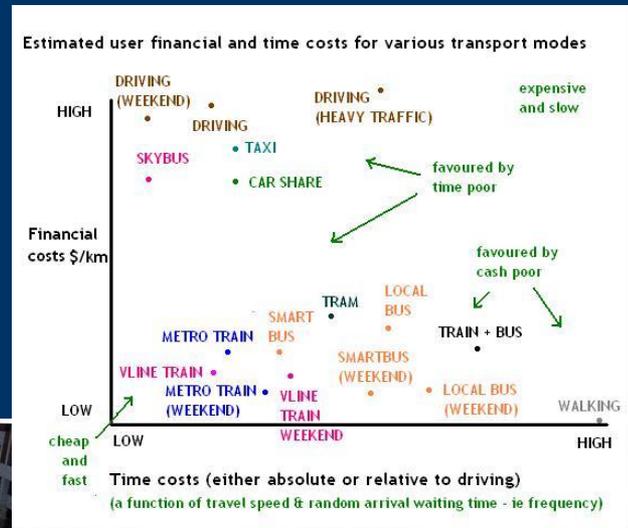
COMPARISON OF TRANSPORTATION FOR MORE EFFICIENT

	Streets	Freeway	Bus	Blue Rapid Transit	Light Rail	Heavy Rail	Monorail	Group Rapid Transit (GRT)	Personal Rapid Transit (PRT)	Dual Mode
Exclusive Right-of-Way	+	+	+	+	+	+	+	+	+	+
Off-line Stations	+	+	+					+	+	+
Driverless Operations						+	+	+	+	+
Non-stop Trips		+								+
Demand-based Scheduling	+	+						+	+	+
Widely Distributed Access Points / Stations	+	+	+	+					+	+
Trip Dedicated, Individual Vehicles	+	+								+

+ BY DEFINITION + MAYBE OR PARTIALLY
 ROAD-BASED + VIA STREET ACCESS



• Widely Distributed Network (Grid) - total trip begins and ends close to stations/parking.
 • Individual (trip dedicated) vehicles - vehicles are not shared except by choice.



Understand Context and Structure

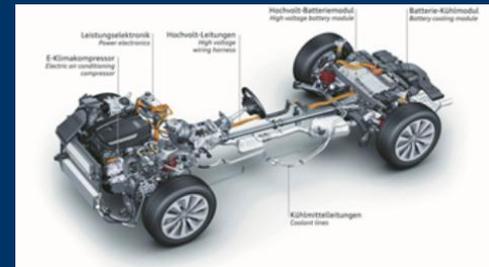
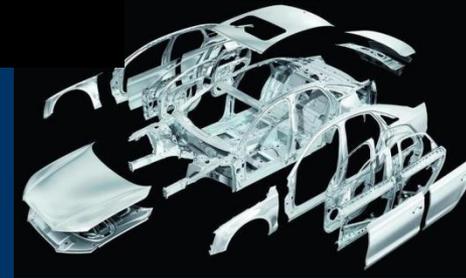
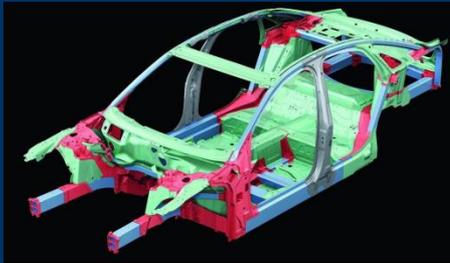
STRUCTURE

I understand the parts of a car and how they are related and work together



Levels of Learning "Bloom's Taxonomy"

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DYNAMOMETER TESTING
Line-in dynamometer testing assures trouble-free performance.

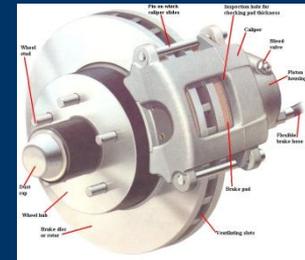
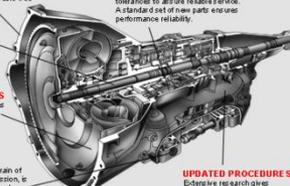
SHAFTS & PRESSURE PLATES
Profilometer inspection assures precise surface finish requirements for extended life and smooth operation.

TORQUE CONVERTERS
Dynamic balancing eliminates damage-causing vibration.

VALVE BODIES
The valve body, the brain of the automatic transmission, is carefully remanufactured and pre-tested with simulated vehicle speed and loads.

NEW AND QUALIFIED PARTS
All new and remanufactured parts are carefully inspected for correct tolerances to assure reliable service. A standard set of new parts ensures performance reliability.

UPDATED PROCEDURES
Extensive research gives us the insight to correct problems in original manufacturer design.



Evaluate

I Can Evaluate Different Cars

- Understand evaluation criteria
- Understand criteria priorities
- Can complete a comparison
- Can select a good car alternative
- Can recommend cars for others

I Can Evaluate Car Performance

- Can evaluate handling, braking, ...
- Can evaluate energy efficiency
- Can evaluate safety capabilities
- Can evaluate comfort, accessories, ...

I Can Evaluate Car Condition

- Can diagnose engine problems
- Can diagnose suspension problems
- Can diagnose transmission problems
- Can diagnose accessory problems

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
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Synthesize

I can combine my knowledge of a car with....

- Diagnostic skills
- Problem solving skills
- Mechanical skills
- Electrical skills
- Knowledge of tools
- Skills in fixing things
- Improvising skills
-

...into an overall capability to repair a car

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge



Synthesize

I can combine my knowledge of building design with....

- Environmental Knowledge
- Energy Needs
- Urban Requirements
- Transportation
- Construction Limits
- Esthetics and Artistic Skills
-

...into an overall capability to create a building design meeting all requirements

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge



Synthesize

I can combine my knowledge of a car with....

- Artistic Skills
- Design skills
- Fabrication skills
- Problem solving skills
- Mechanical skills
- Electrical skills
- Knowledge of tools
- Improvising skills
-

...into an overall capability to design and build a new car

Levels of Learning "Bloom's Taxonomy"

- I Can Remember
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Part 2

Granularity of Learning Levels

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Notional Learning Level Granularity

Fundamental



Intermediate



Advanced



Example Learning Level Granularities

- I Can Remember



- I Understand



- I Can Apply



- I Know Context and Structure



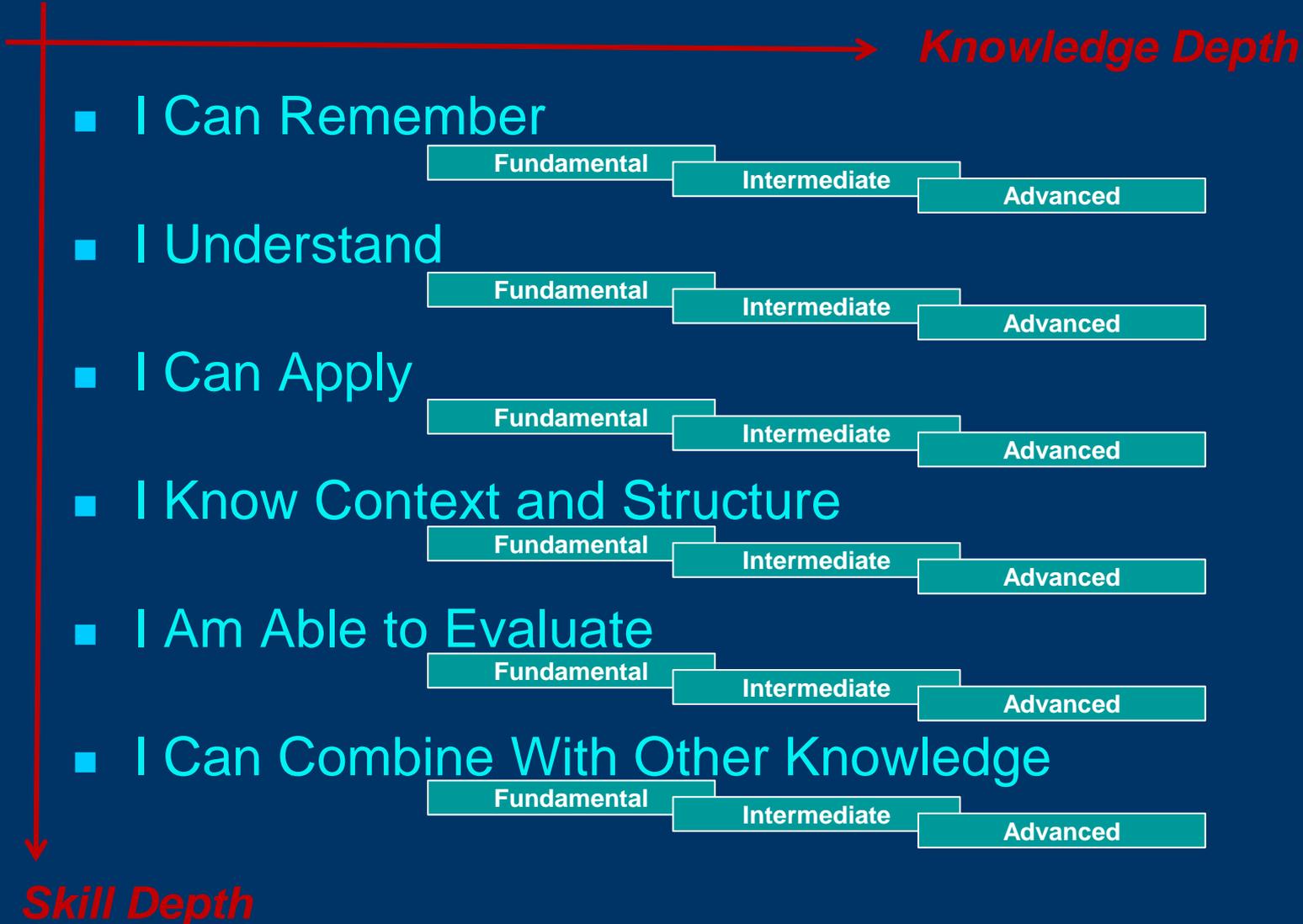
- I Am Able to Evaluate



- I Can Combine With Other Knowledge



Notional Depths of Learning



Part 3

Misunderstandings About What Learning Is

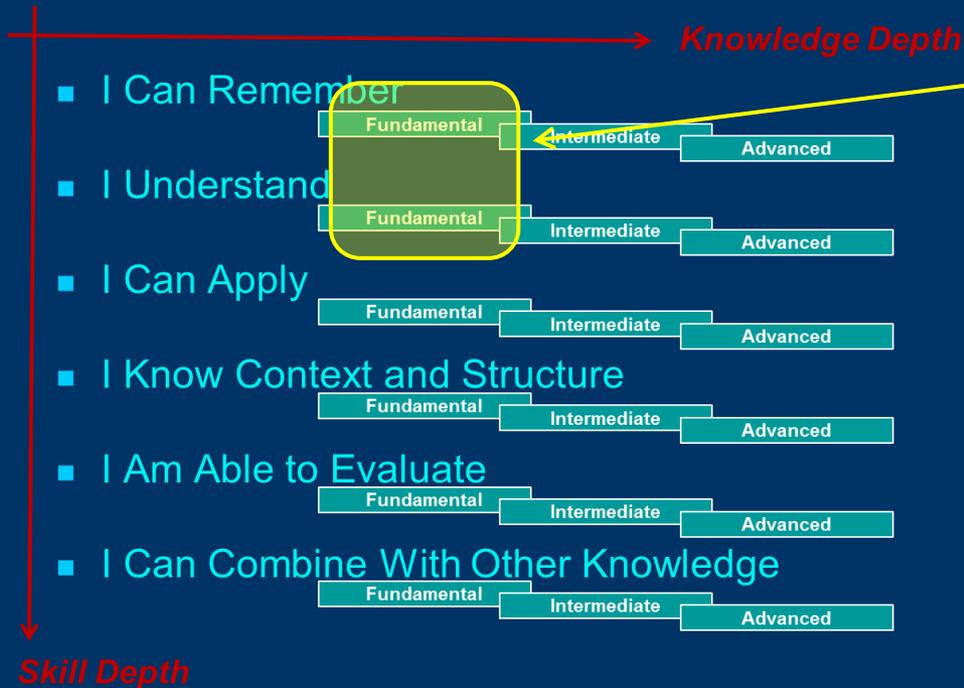
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What Some Believe Learning To Be



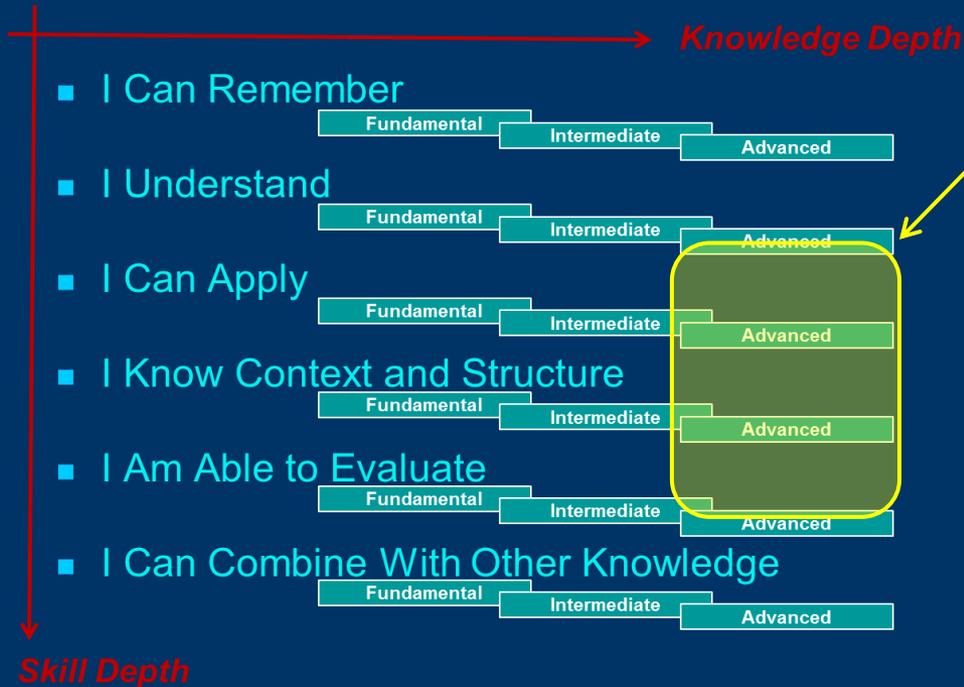
Some incorrectly believe this is all learning is.

Some think if you know a few terms and can recite a few basics, that they...

“know it all.”

This is not the case as additional and significant depth in both knowledge and skills are yet to be achieved and inadequate implementation skills may exist.

What Some Believe Learning To Be



Some incorrectly believe this is all learning is.

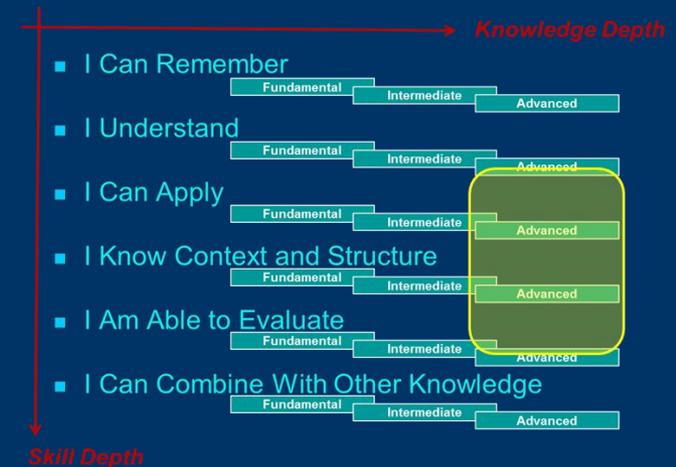
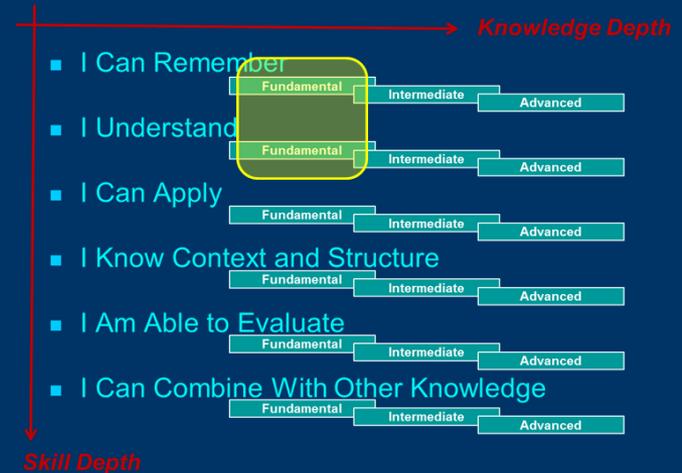
Some think if you know the details of how to do something, that they...

“know all that is needed.”

This is not the case as a clear understanding of fundamentals may not exist to enable improvements and innovation in adjacent areas.

What To Do

Educate all on depths of knowledge and skills so that stakeholders involved in making improvements and those involved in learning actions have a complete view of what complete learning means.



Part 4

Fundamentals or Details?

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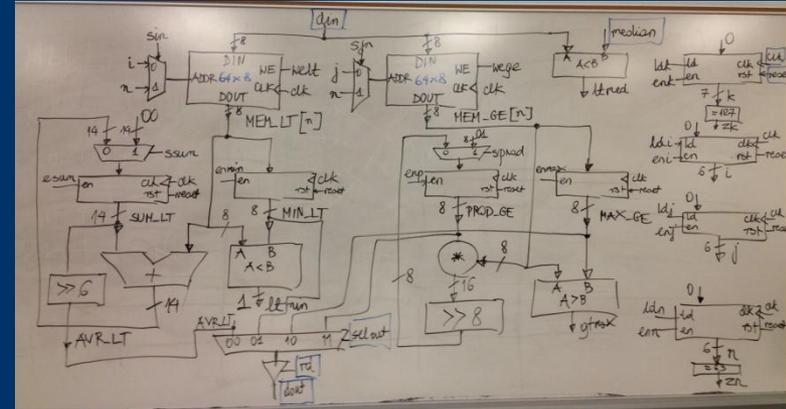
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What Do You Remember?



or



or

A page of handwritten mathematical derivations, including calculus, algebra, and trigonometry.

You apply skills and knowledge that you can recall

Fundamentals Are Essential

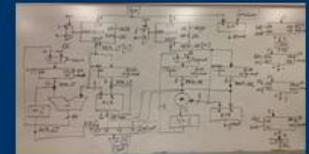
Why Fundamentals Are Important

- Fundamental knowledge is the foundation for advanced knowledge, without fundamentals, retainable and truly understood advanced knowledge is not possible.
- Fundamentals can be applied in a broad set of situations.
- Fundamentals can be recalled, you can't remember all the details.
- Recalling fundamentals is one solution to “*not getting lost in the weeds*” when solving problems and making improvements as one can focus on the basic concept.
- Fundamentals help teams find common ground for understanding, agreements and cooperation.

What Do You Remember?



or



or



You apply skills and knowledge that you can recall

Part 5

Incomplete Learning

Understanding Learning

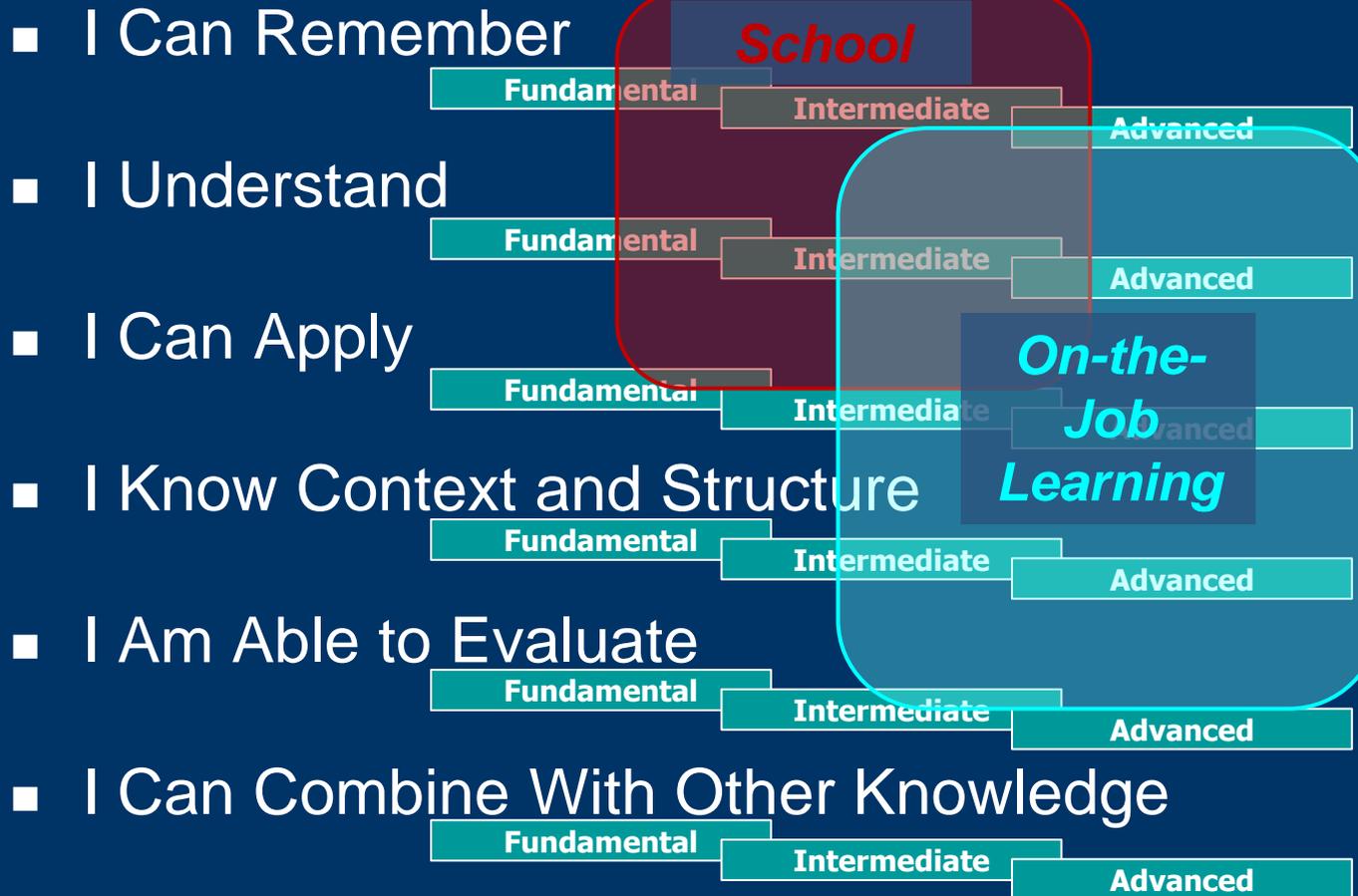
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Incomplete Learning

School Based Learning and On-the-Job Learning are Important, Can Be Complementary and Overlapping, but May Not Cover All Knowledge and Skill Depths.



*Graphic is
an Example
Only*

Incomplete Learning

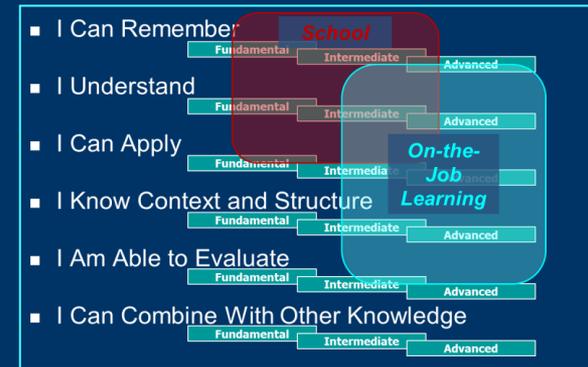
General Thoughts

School

- Schooling is essential learning, but
- Sometimes schooling misses a sufficient focus on low end fundamentals and can “*race to address the details*”
- Schooling can not address the many variations that exist in our society that has ever increasing levels of complexity and diversity
- Schooling can not provide all of the detail skills building needed on the job

On-the-Job Learning (OJL)

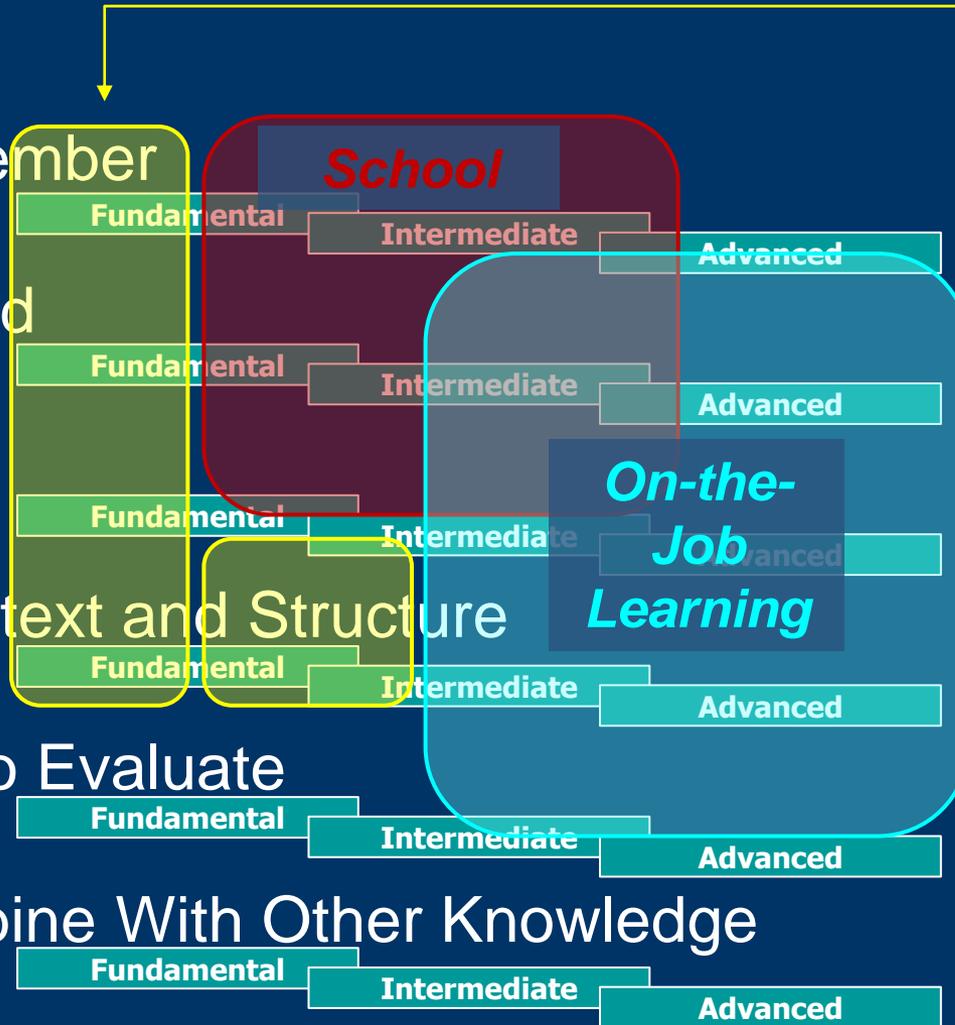
- OJL is essential and builds real skills, but
- OJL seldom address core fundamentals
- OJL can miss higher skill depths
- OJL focuses on “the real world, do it now” getting the work done and may not provide sufficiently “generic learning” that can be applied later in different situations



Incomplete Learning

Real Learning Gaps Can Exist

- I Can Remember
- I Understand
- I Can Apply
- I Know Context and Structure
- I Am Able to Evaluate
- I Can Combine With Other Knowledge



Schools may address fundamentals but can miss a sufficient focus there resulting in "Real Learning Gaps"

OJL seldom addresses fundamentals, so the gap is not resolved

Graphic is an Example Only

Gaps

Incomplete Learning

Real Learning Gaps Can Exist

Graphic is an Example Only

- I Can Remember

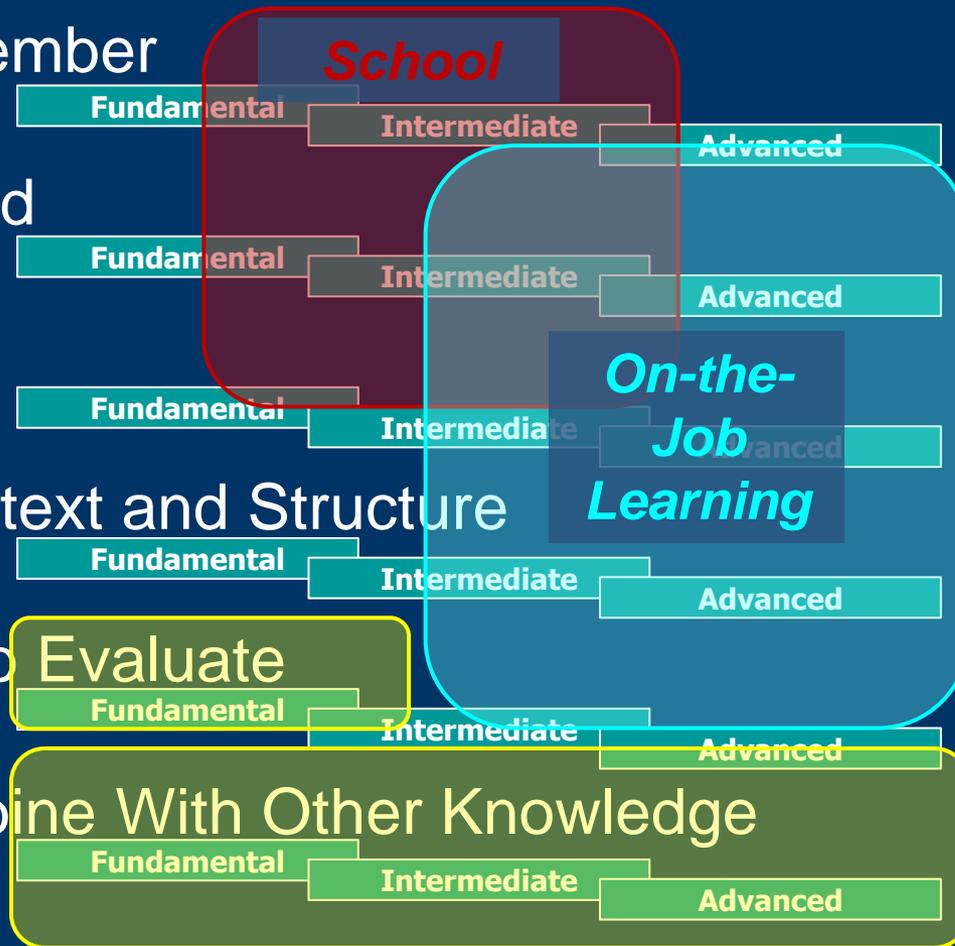
- I Understand

- I Can Apply

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Schools can not address many learning depths due to complexity and diversity of our world.

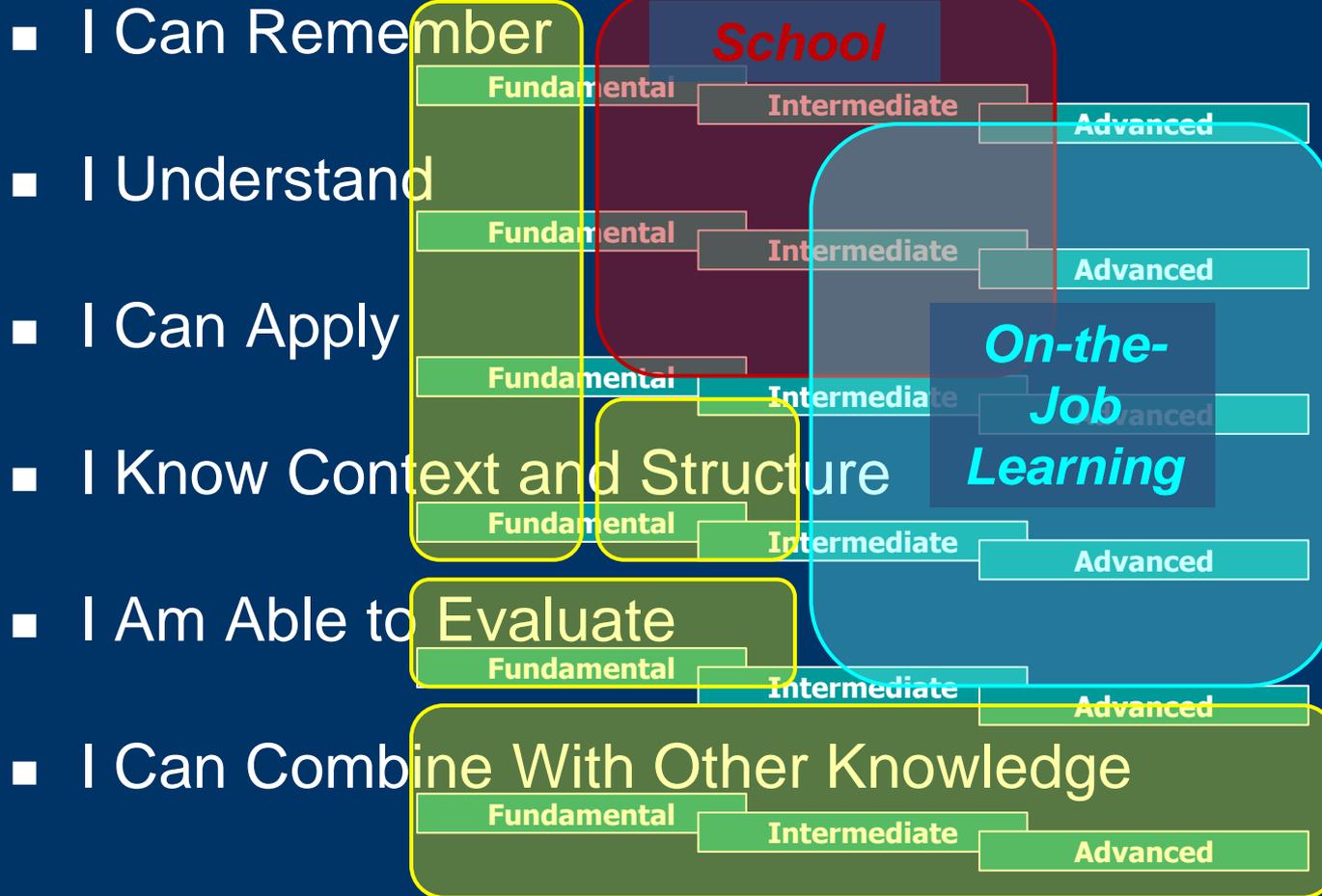
Typical on the job work assignments may not address learning depths and deliberate learning actions can be needed.

Gaps

Incomplete Learning

Real Learning Gaps- The Bottom Line

The result can be that “Real Learning Gaps” exist and organizations interested in improvements need to be aware of gaps and fill them



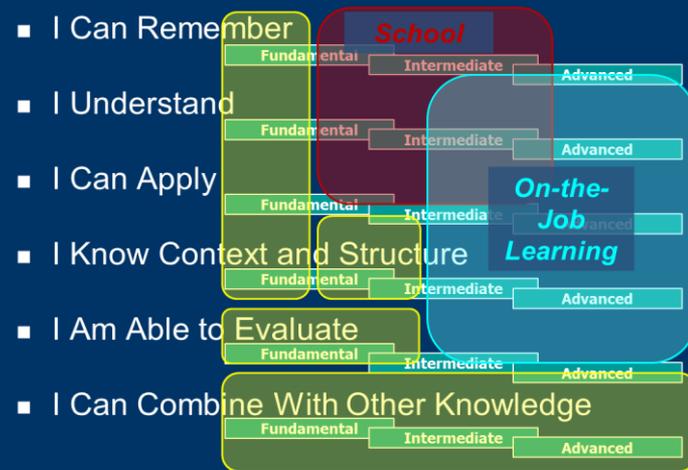
Graphic is an Example Only

Gaps

Incomplete Learning

What to Do

- Use position competency models to identify learning gaps
- Identify high priority, high payback gaps to close
 - Example - Add fundamental training to broaden employees on the job learning with generic, widely applicable knowledge
 - Example - Extend learning to “Evaluate” and “Combine” skill levels through assessments, cross functional teams and coaching
- Educate stakeholders on these concepts to support important learning gap awareness and closure actions



Part 6

Learning Opportunities

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Some Ways NOT to Provide Learning

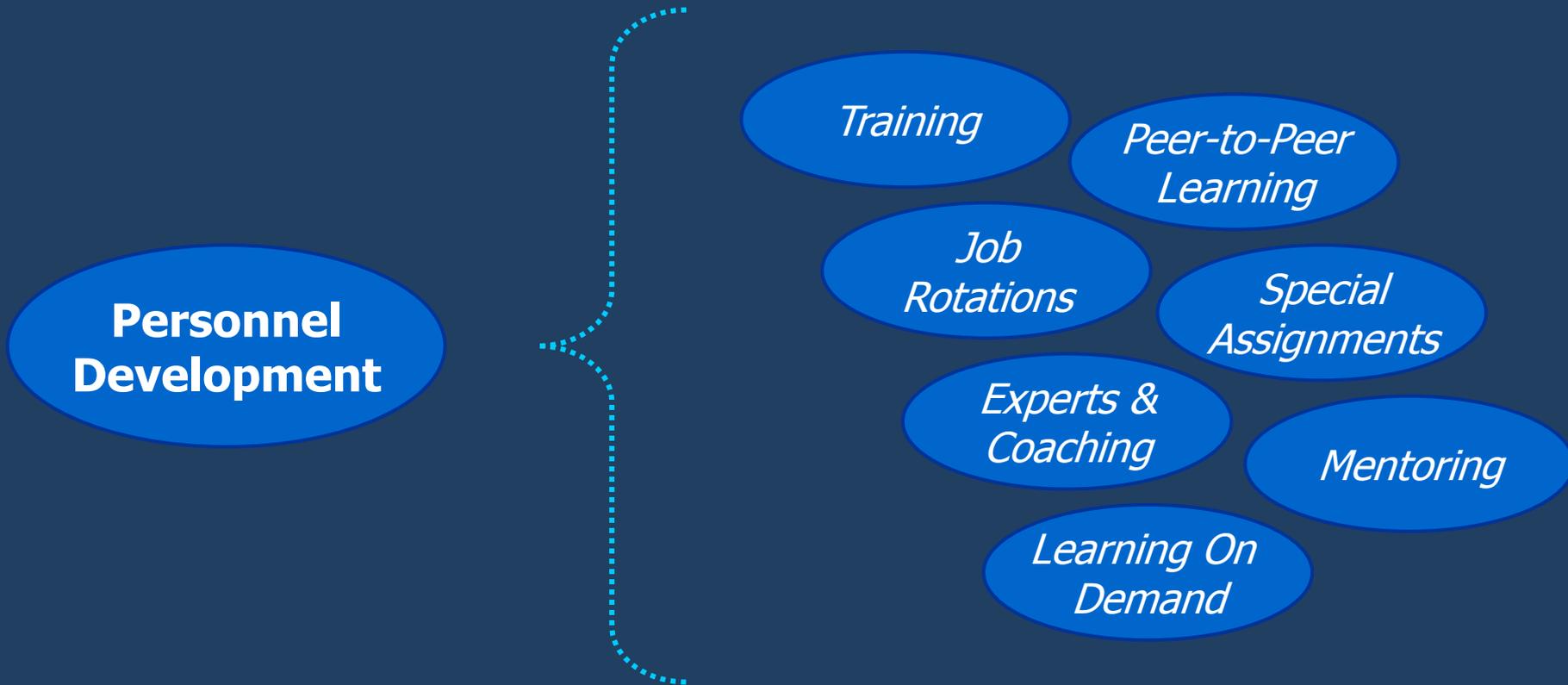
Use anecdotal information or current events to identify development actions....

...use the latest book fad...

...let's quickly do some training before we lose our budget.....

.....do not involve SMEs in learning growth decisions.....

Learning Opportunities



Multiple Development Methods Are Very Important

Learning Opportunities

- **Training** – Seminars, courses and workshops both internal and external.
- **Learning On Demand** – Use websites for tutorials, guides, short seminars, FAQs, etc. to support “learning on demand” and “just-in-time” learning.
- **Job Rotation** – Move individuals into different positions or have individuals support another function, perhaps on a part time basis.
- **Peer-to-Peer** – Establish and support CoPs (Communities of Practice) or SIGs (Special Interest Groups) and let the employees run them with some guidance.
- **Special Assignments** – Have individuals take short term or part time “Special Assignments” to broaden experience, skills and context awareness.
- **Coaching** – Long term one-on-one pairing of senior and junior employees for frequent advice discussions; this is “real work” advice, not career mentoring.
- **Experts** – Identify experts for critical topics and have experts advise teams on lessons learned, best practices, pitfalls to avoid and to answer team questions.
- **Mentoring** – Longer term one-on-one pairing of senior and junior employees for career growth discussions; this is not coaching as the focus is career growth.

Personnel Development Must Be Driven by Defined Competencies

EXAMPLE

4 Project Planning	
4.1	Prepares project plans that accurately includes needed project resources, schedule and budgets
4.2	Ensures defined requirements and known deliverables drive the plan
4.3	Defines the overall approach for the project before defining detail tasks, schedules and budgets
4.4	Develops complete task listings (WBS) for project work
4.5	Develops feasible schedules
4.6	Estimates feasible budgets

Project Manager Competency Categories

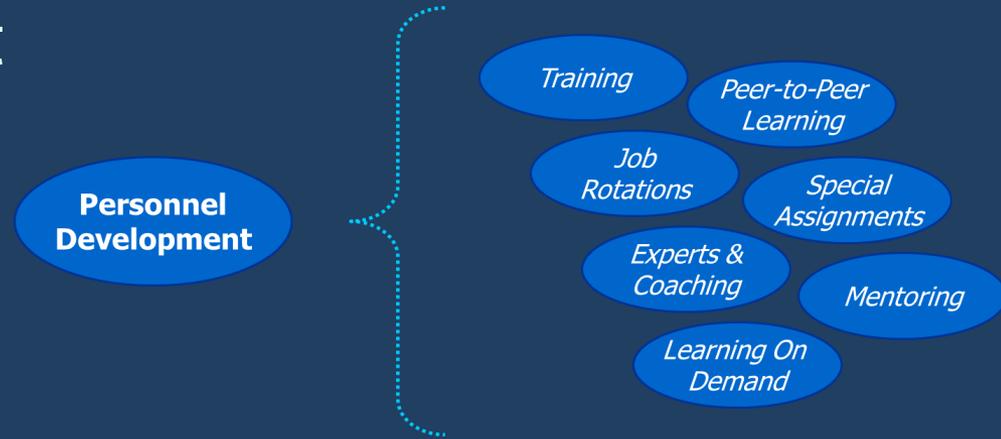
- 1 - Project Results
- 2 - Project Proposal
- 3 - Project Initiation / Startup
- 4 - Project Plans**
- 5 - Project Organization Development
- 6 - Project Controls
- 7 - Risk Management
- 8 - Supplier Management
- 9 - Customer & Management Relations
- 10 - Business Knowledge and Skills
- 11 - Business Sense
- 12 - Technical Knowledge
- 13 - Personal Traits
- 14 - Leadership



If you don't know what skills and knowledge are needed for a given position, how can you define learning opportunities

Personnel Development

What to Do



- Consider multiple learning opportunities, including non-classroom methods

- Consider defined competencies for key positions to drive the definition of real “value add” learning.

EXAMPLE

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Project Manager Competency Categories

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Summary and What to Do

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Summary

Part 1

Instill Awareness of Learning Levels

Summary Levels of Learning

- I Can Remember 
- I Understand 
- I Can Apply 
- I Know Context and Structure 
- I Am Able to Evaluate 
- I Can Combine With Other Knowledge 

Modes of Transportation

- Walk - 100 Long
- Bike - 100 Long
- Bus - 100 Long
- Train - 100 Long
- Plane - 100 Long
- Ship - 100 Long
- Space - 100 Long

Bicycle Reviewer

- Bike Knowledge
- Evaluate Bike

Bicycle Designer and Builder

- Bike Knowledge
- Build Bike
- Repair Bike

Part 2

Be Aware of Learning Granularities

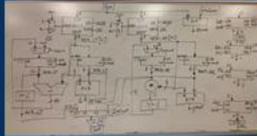
Notional Learning Level Granularity

- I Can Remember
 - Fundamental
 - Intermediate
 - Advanced
- I Understand
 - Fundamental
 - Intermediate
 - Advanced
- I Can Apply
 - Fundamental
 - Intermediate
 - Advanced
- I Know Context and Structure
 - Fundamental
 - Intermediate
- I Am Able to Evaluate
 - Fundamental
- I Can Combine With Other Knowledge
 - Fundamental

Part 3

Ensure A Focus On Fundamentals Exists

What Do You Remember?

 or 

 or 

You apply skills and knowledge that you can recall

Summary

Part 4 Resolve Learning Misunderstandings

What Some Believe Learning To Be

Some incorrectly believe this is all learning is.

Some think if you know a few terms and can recite some process steps, that they "know it all."

This is not the case as additional and significant depth in both knowledge and skills are yet to be achieved.

Part 5 Resolve Incomplete Learning

Incomplete Learning Real Learning Gaps Bottom Line

The result can be that "Real Learning Gaps" exist and organizations interested in improvements need to be aware of those gaps.

Graphio is an Example Only

levels of learning so that stakeholders at real education, often resulting from imperfect real improvements.

Part 6 Utilize Multiple Learning Methods

Learning Opportunities

Multiple Development Methods Are Very Important

Longer Seminar Available

A longer seminar exists with enhanced guidance for parts 1 to 6 and new parts including

Part 7

Learning Sequences?

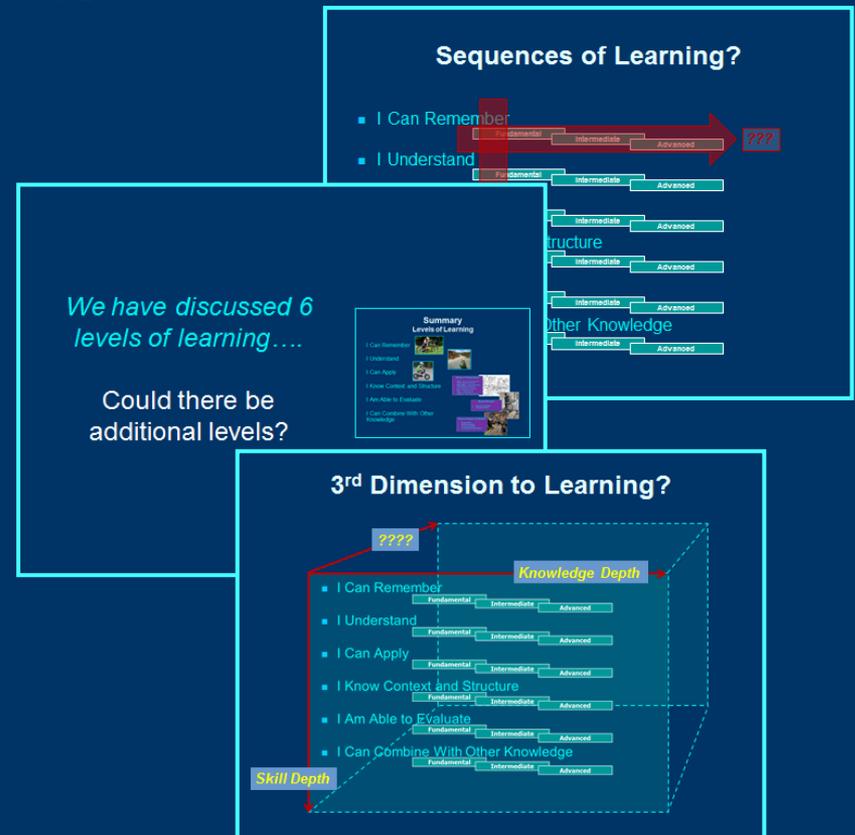
Part 8

Extended Learning Levels?

Part 9

A Third Dimension to Learning?

See "Seminars" at
www.manageprojectsbetter.com



END OF

Understanding Learning

“Thoughts about Learning to Support Implementing Improvements”