

Session M105



## *Spacing Learning Over Time: A Research-Based Secret*

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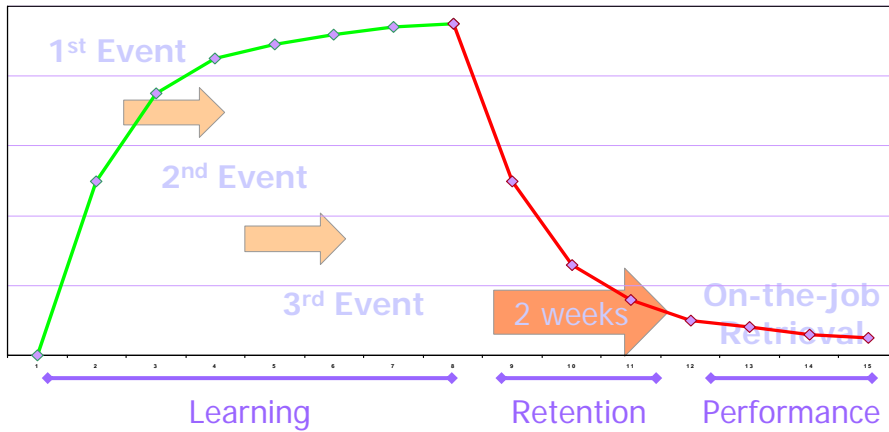


## Objectives

- ◆ Utilize the spacing effect to significantly improve training and instructional design outcomes
- ◆ Assess the inadequacies of current learning programs in terms of spaced learning and feedback
- ◆ Champion the spacing effect as a great opportunity for e-learning and m-learning applications



## Time Sequence of How Learning Becomes Performance



  
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## Value of Repetition

- ◆ Helps us absorb information we missed earlier
- ◆ Helps us remember things we'd forgotten
- ◆ Strengthens and enriches what we know

  
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## Examples of Repetition

- ◆ Verbatim Repetition (exact content)

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Presentation {


- ◆ Paraphrases, Rewrites, Redesigns
- ◆ Stories, Examples, Demonstrations

Retrieval Practice {

- ◆ Testing, Practice, Exercises
- ◆ Simulations, Case Studies, Role Plays
- ◆ Discussions, Collaboration, Dialogue

Media Delivery {

- ◆ Video, Audio, Graphics, other Media




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## Question – Who will perform better on May 4<sup>th</sup>?

**A. Wide Spacing**  
*Person who spends 18 hours (6/day) learning and **relearning** relevant material on Feb 3, Mar 3, April 3?*

**B. Narrow Spacing**  
*Person who spends 18 hours (6/day) learning and **relearning** relevant material on April 1, 2, and 3?*

**c. Both will perform about the same.**



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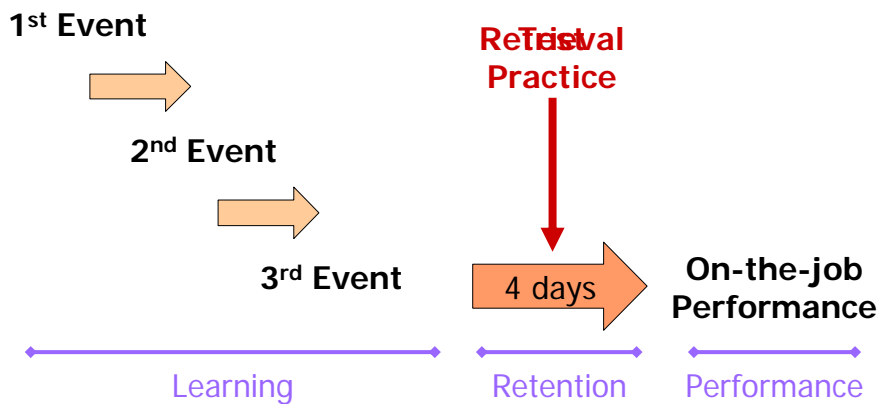
## What does the research say about spacing learning over time?

*“The spacing effect is one of the oldest and best documented phenomena in the history of learning and memory research.”*

Harry Bahrick & Lynda Hall (2005)  
*Journal of Memory and Language*



**Question** – What would happen if we inserted spaced practice?



  
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**What causes the spacing effect?**

- A. *Wider spacings require more cognitive effort.*
- B. *Wider spacings produce more varied retrieval routes through memory.*
- C. *Wider spacings promote more retrieval failure, and thus encourage better learning practices.*

  
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## Spacing by Delaying


Topic A

wait

Topic A

wait

Topic A



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## Spacing by Interspersing

Topic A

Topic B

Topic C

Topic D

Topic A

Topic B

Topic C

Topic B

Topic C


Topic D

Topic A

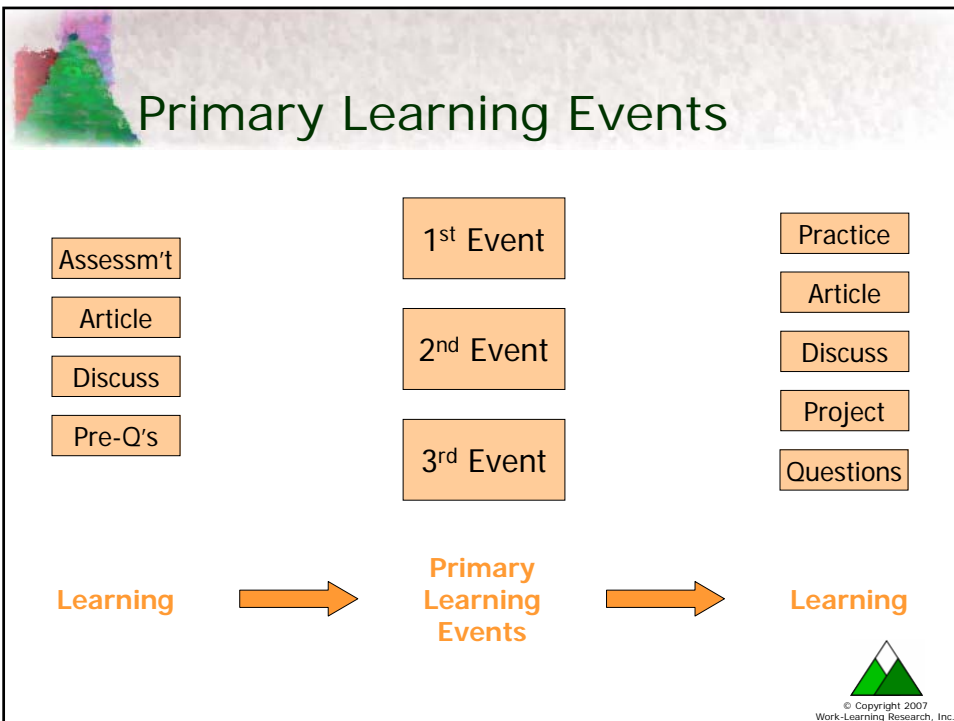
Topic B

Topic C

Topic D



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## Question – Is Feedback Like Spacing?

When should feedback be delivered?


- A. *Immediately after each question.*
- B. *At the end of the test.*
- C. *After a delay of two hours or more.*
- D. *After a delay of a day or more.*

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## Spacing and Delayed Feedback Caveats

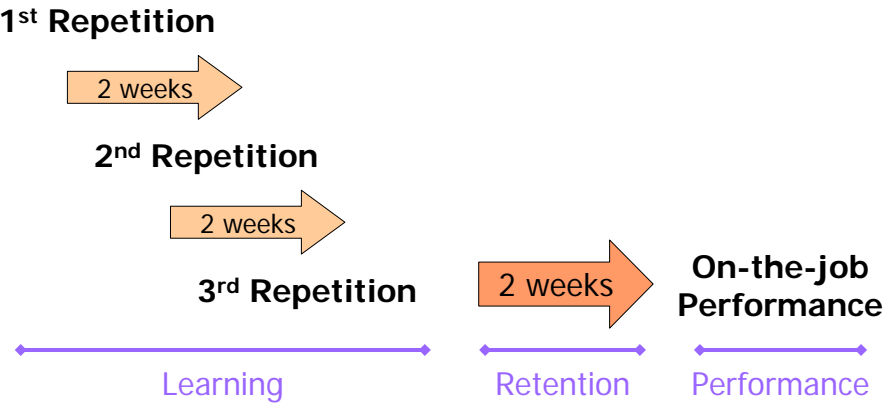
- ◆ Both only help when we want learners to remember over time. Not helpful for immediate use of learned information.
- ◆ Feedback must come before learners retrieve information incorrectly again.

*“Don’t delay if they’ll repeat the wrong way.”*



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## What is the ideal spacing between repetitions?



**1<sup>st</sup> Repetition**

2 weeks →


**2<sup>nd</sup> Repetition**

2 weeks →

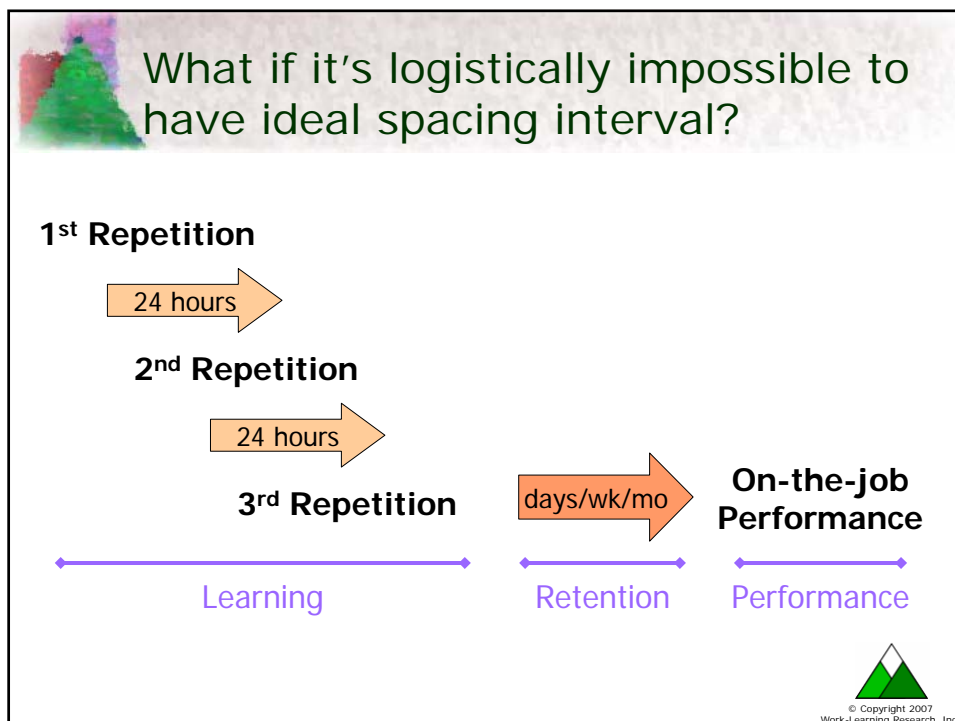
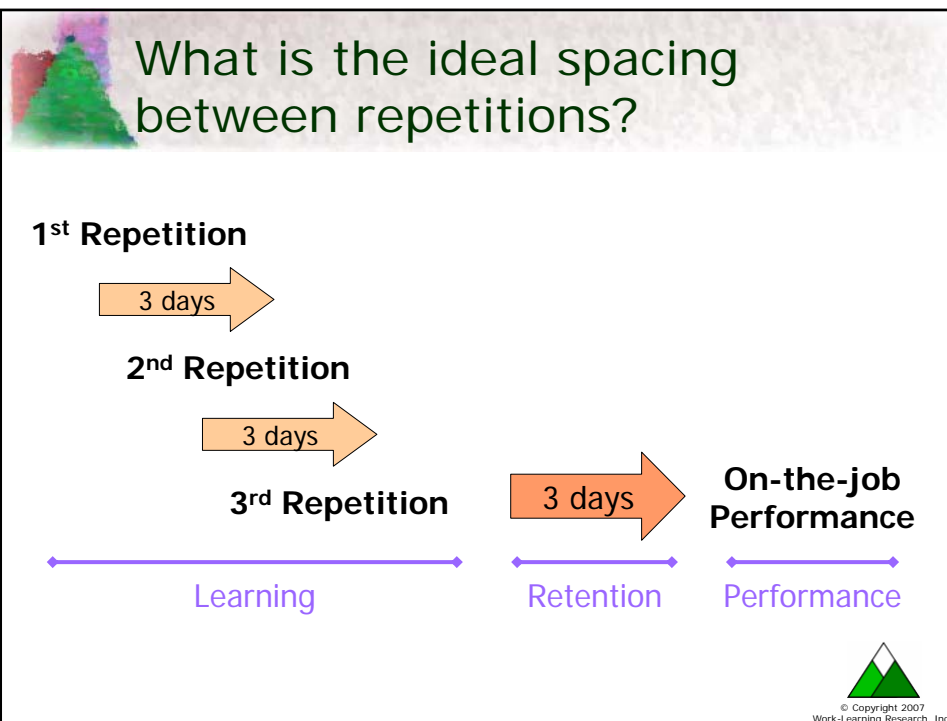
**3<sup>rd</sup> Repetition**

2 weeks → **On-the-job Performance**

Learning      Retention      Performance

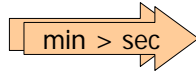


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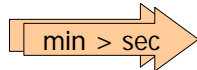


## What if 24 hours is impossible?

### 1<sup>st</sup> Repetition



### 2<sup>nd</sup> Repetition



### 3<sup>rd</sup> Repetition



### On-the-job Performance



**Question** – *Suppose you're designing a leadership course for high-potential managers.*

*Topics are:*

- ◆ *Finance for Non-Financial Managers*
- ◆ *Leading Your Direct Reports*
- ◆ *Writing for Power and Persuasion*
- ◆ *Sexual Harassment Prevention*
- ◆ *Company Mission and Ethics*





**Question** – Who will remember more in regard to these topics on May 15<sup>th</sup>?

**A. Week-Long Program**

The group that takes one topic a day for a week, with last day on March 15<sup>th</sup>.  
(March 11, 12, 13, 14, 15).

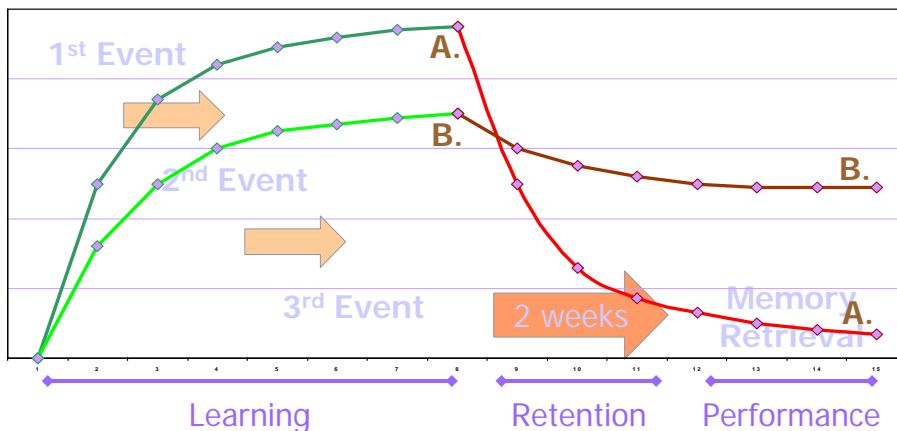
**B. Spaced Program**

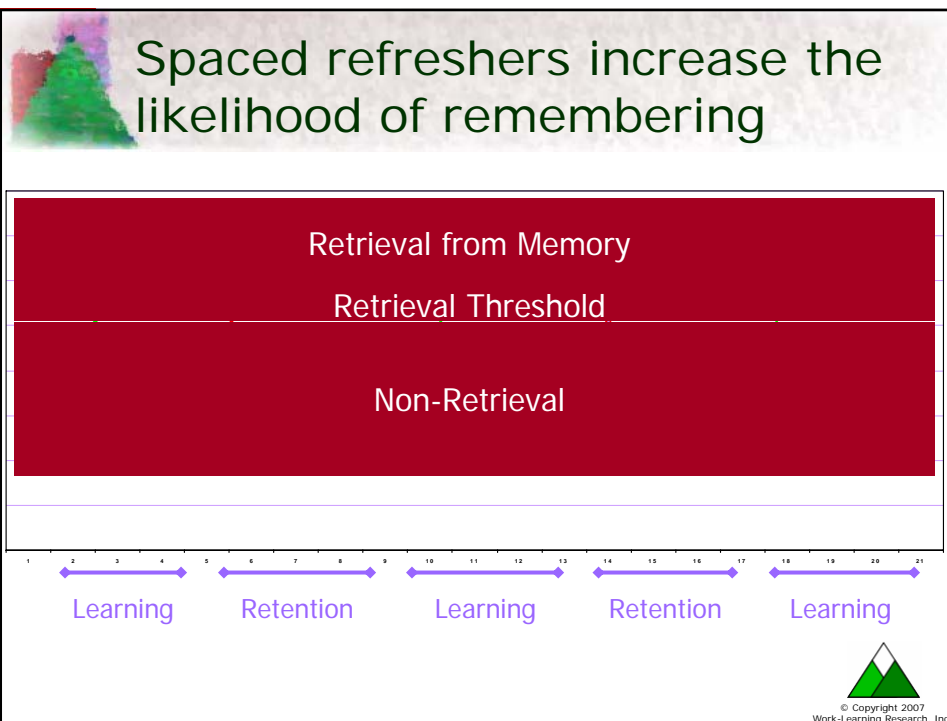
The group that takes one topic every Friday for five weeks, with last day on March 15<sup>th</sup>.  
(Feb 15, Feb 22, Mar 1, Mar 8, Mar 15)

**c. Both will perform about the same.**



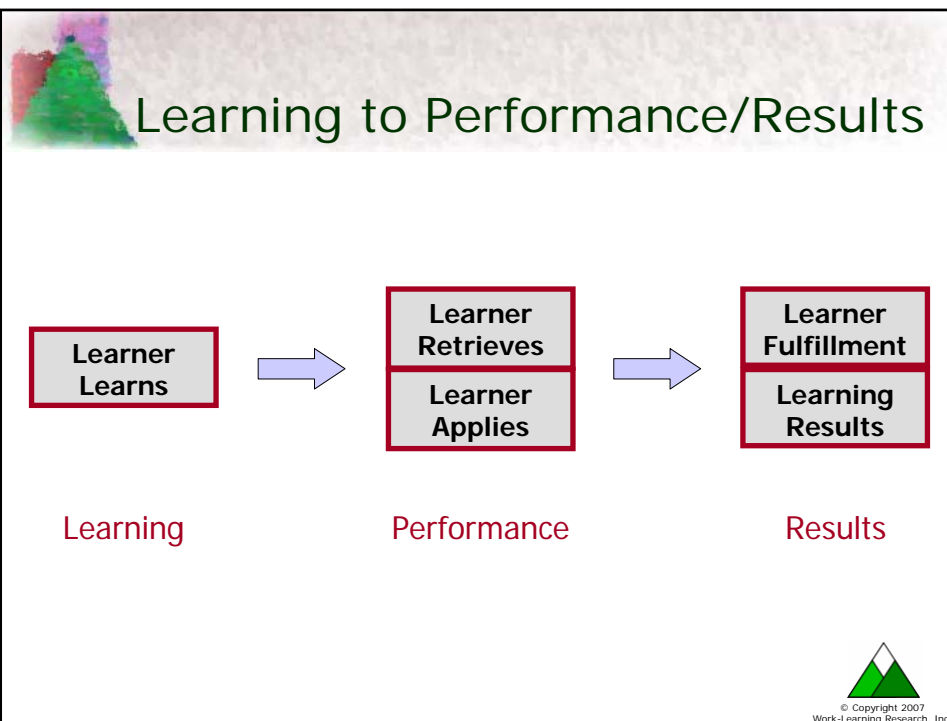
**Time Sequence of How Learning Becomes Performance**





## Potential Spacing Effects

Initial Repetitions	<i>30 to 110%</i>
Subsequent Repetitions	<i>15 to 40%</i>
Retrieval Practice	<i>30 to 100%</i>
Spacing	<i>5 to 40%</i>
Reduce Retention Interval	<i>30 to 100%</i>
Totals (÷ 4)	<i>25 to 100%</i>




# Book and New Type of Application

- ◆ Training Follow-Through Software
  - ◆ Friday5's from Fort Hill Company  
[www.forthillcompany.com](http://www.forthillcompany.com)
  - ◆ ActionPlan Mapper from ZengerFolkman  
[www.zengerfolkman.com](http://www.zengerfolkman.com)

Book Review: [www.willatworklearning.com/2006/07/book\\_review\\_wic.html](http://www.willatworklearning.com/2006/07/book_review_wic.html)

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## Changing the Frame of Learning

Training / e-Learning	Training / e-Learning	Training / e-Learning	Managed Follow-Up
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*Learning Experience*




## What are the major findings from the research?

1. *Repetitions support learning.*
2. *Spaced repetitions are generally more effective.*
3. *Both presentations and retrieval practice produce spacing benefits.*
4. *Spacing helps minimize forgetting.*
5. *Wider spacings are generally more effective.*
6. *Spacing may slow learning (while it improves remembering).*
7. *Gradually expanding the length of spacings is fine too.*
8. *A new learning frame—learning takes place over time.*




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## Reference List

- ◆ [www.work-learning.com/reference\\_list.htm](http://www.work-learning.com/reference_list.htm)
- ◆ **The Research-to-Practice White Paper**  
*Spacing Learning Over Time:  
What the Research Says*  
[www.work-learning.com/catalog/](http://www.work-learning.com/catalog/)




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## Questions

- ◆ What questions do you have now?
- ◆ Questions later:  
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# The Spacing Implementation Quick-Audit

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*“The spacing effect is one of the oldest and best documented phenomena in the history of learning and memory research.”*

Harry Bahrick & Lynda Hall (2005, page 566),  
quoted in the *Journal of Memory and Language*

Knowledge and Opportunities	Your Description of Your Situation and Efforts	Rate Your Compliance
1. <b>Your Spacing Knowledge</b> Have you recently reinforced your knowledge of the spacing effect?		Bad OK Good
2. <b>Organizational/Team Support</b> Do your most important stakeholders understand and support the need for utilizing the spacing effect?		Bad OK Good
3. <b>Spacing Opportunity Search</b> Have you specifically looked for opportunities to add spacing and delayed feedback to your formal learning programs?		Bad OK Good
4. <b>Opportunities? Informal Learning</b> Have you specifically looked for opportunities to add spacing to your informal learning situations?		Bad OK Good
Specific Opportunities	Your Description of Your Efforts	Rate Your Compliance
5. Designing learning using the spiral-curriculum paradigm.		Bad OK Good
6. Utilizing spaced repetitions by presenting learners with information before primary learning events.		Bad OK Good
7. Utilizing spaced repetitions by prompting learners to engage in authentic retrieval practices.		Bad OK Good
8. Utilizing delayed feedback when appropriate.		Bad OK Good
9. Prompting learners to study in a manner consistent with spacing.		Bad OK Good
10. Encouraging note taking and subsequent review.		Bad OK Good
11. Utilizing e-learning and m-learning to provide pre- and post-learning experiences.		Bad OK Good
12. Encouraging training implementation and after-training management support.		Bad OK Good
13. Changing the definition of training/learning to represent a process, not an event.		Bad OK Good

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The Spacing Research-to-Practice Report is available at [www.work-learning.com/catalog](http://www.work-learning.com/catalog). Or click [Quick Buy](#).