

**Does it matter which process
modelling
language we teach or use?**
An experimental
study on understanding process modelling
languages without formal education

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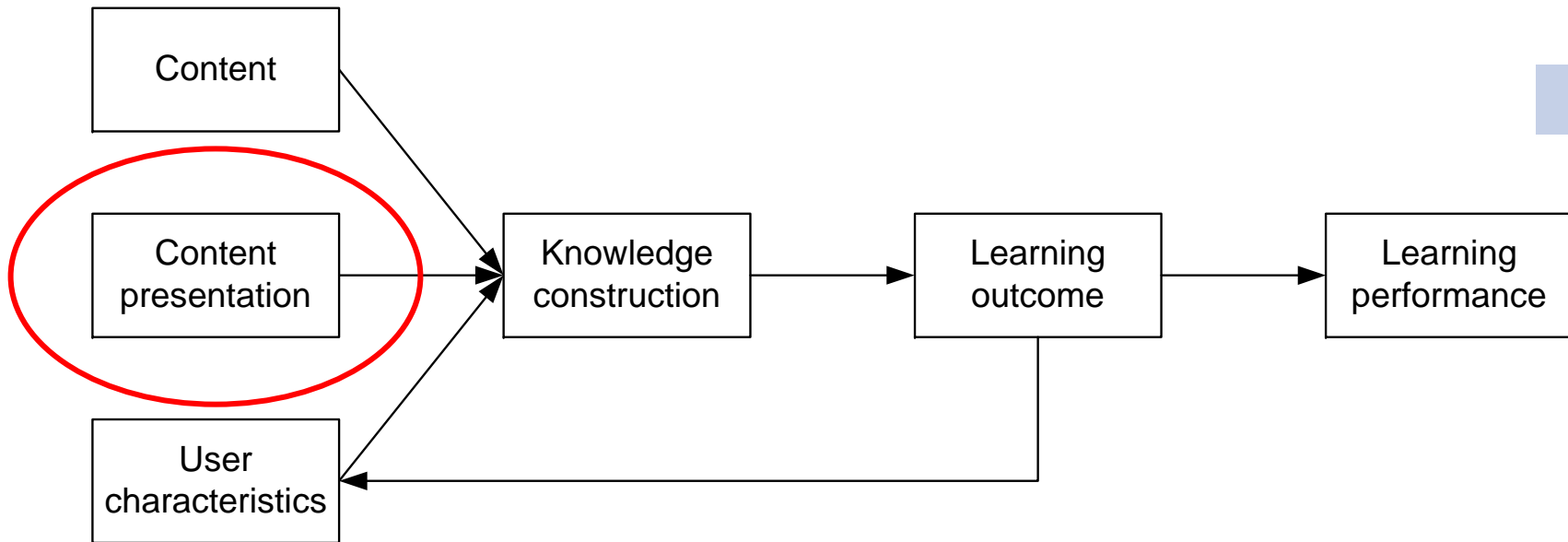
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Some current market problems

- Which process modelling language should be taught in tertiary educational institutions?
- Should multiple languages be taught in formal education?
- Which process modelling language should a vendor of a BPM tool support?
- Should a vendor create yet another language or language extension?
- Which process modelling language should an organization adopt and implement?
- Are business and system analysts equipped with skills in a particular language able to use a different language?
- And what are the implications of these questions?

Cognitive Theory of Multimedia Learning



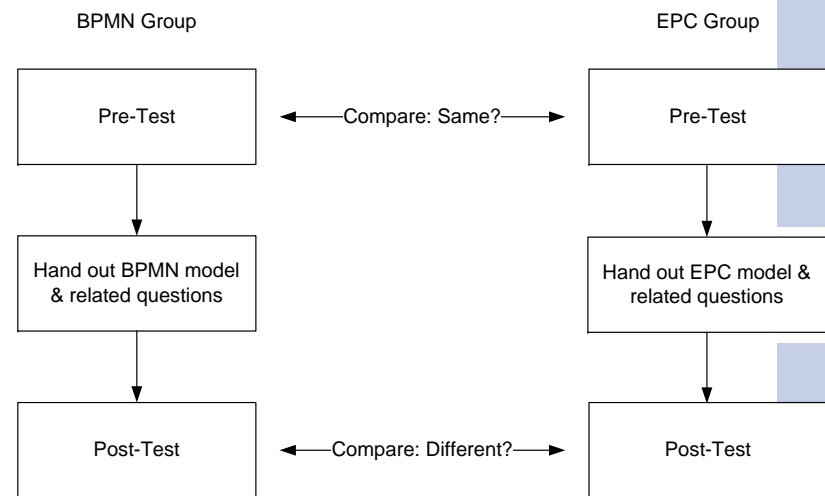
Adopted from Mayer (1989).

Cognitive Theory of Multimedia Learning

- Two variables:
 - Retention: The ability to comprehend the material presented.
 - Transfer: The ability to use knowledge gained from the material to solve related problems.
- Learning outcomes
 - No learning (*no retention and no transfer*)
 - Fragmented learning (*retention but no transfer*)
 - Meaningful learning (*retention and transfer*)

Study

- Experimental study with 69 BPM students in higher education
 - Hoboken, NJ, USA
 - Brisbane, QLD, Australia
 - Saarbruecken & Muenster, Germany
- Participants had knowledge of EPCs but not BPMN
- Participants were randomly given EPC or BPMN models and were asked to complete model comprehension, recall and problem solving tasks.

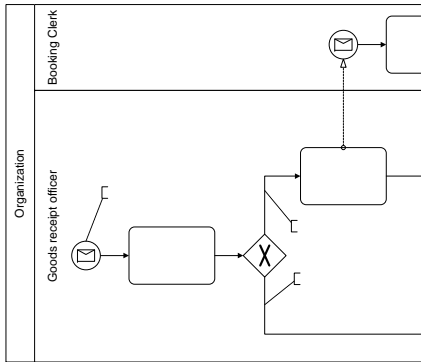


Experiment Case 1

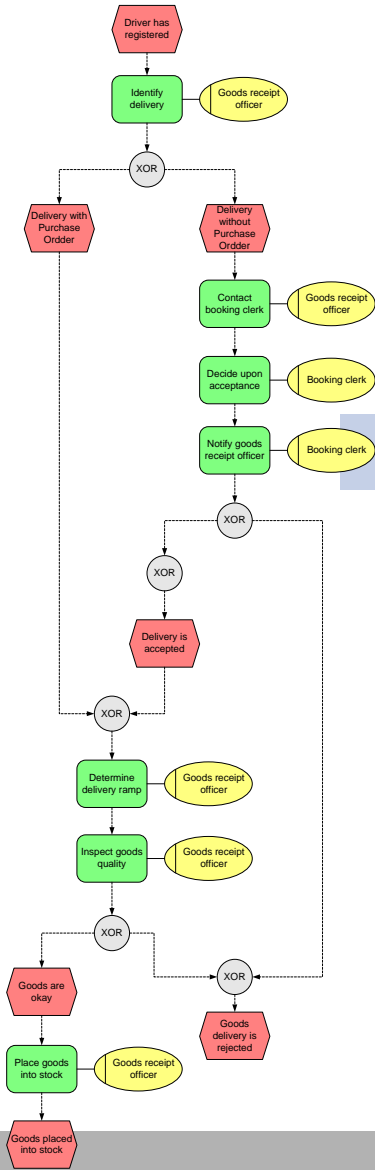
Goods Receipt Process

A truck driver registers at the goods receiving department with a delivery note. In his case, it is a delivery related to a purchase order. In case of deliveries without purchase order, a booking clerk has to be contacted that has the authority to decide whether the delivery is to be accepted. When the decision has been made, the booking clerk notifies the goods reception officer. Following the assignment of a delivery ramp to the truck driver, the goods are inspected. Since the goods inspection proceeds without complaints, the goods are placed into stock. In case of inspection complaints, the goods would have been rejected.

Treatments



Apparent complexity:
 EPC: 9 different constructs
 BPMN: 39 different constructs



Apparent Complexity

| Measure | Goods receipt EPC | Goods receipt BPMN | Claims handling EPC | Claims handling BPMN |
|--|----------------------|-----------------------|------------------------|-------------------------|
| Number of semantically different language constructs | 4 | 10 | 6 | 13 |

Pre-Test (Learner Characteristics)

- Gender
- Study Course
- # of BPM-related courses
- Type and duration of BPM-related working experience
- Experience in EPCs
- # of process models created with EPCs
- Training in EPCs
- Familiarity, Confidence, Competence in EPCs

Stimulus and related Questions

- **Stimulus**
hand out process models in different variants

- **Tests**
 - *Domain Comprehension:*
Multiple Choice
 - *Task Solving:*
Provide textual solutions
 - *Recall:*
Cloze Test

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Question 3:

The inbox and outbox warehouse of a company are conveniently located close to each other. However, the interims warehouse is located elsewhere due to cheaper ground hire. Some goods that have been delivered to the inbox warehouse are stored in the interims warehouse for some weeks before being delivered to the outbox warehouse for shipping. Some other goods, however, go directly from inbox to outbox warehouse as they are being scheduled for immediate shipping. What are options for the quality inspection officer to carry out his tasks?

Your solution(s):

_____ in a warehouse have to be _____ at some point in time during their storage. A _____ quarantine inspection is _____ prerequisite to _____. The _____ of quarantine inspection is solely subject the _____ of the quarantine officer that is assigned to the task. During _____ of the _____, all goods _____ processes in the warehouse are _____.

Post-Test: Ease of Interpretation

| | Strongly disagree | Disagree | Somewhat disagree | Neutral | Somewhat agree | Agree | Strongly agree |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|
| 1) It was easy for me to understand the extended/ traditional BPMN models that were given to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2) Overall, I believe that extended/ traditional BPMN is easy to use for process modelling. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3) Understanding the extended/ traditional BPMN models that were given to me was often frustrating. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4) Learning how to read the extended/ traditional BPMN models that were given to me was easy for me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Results

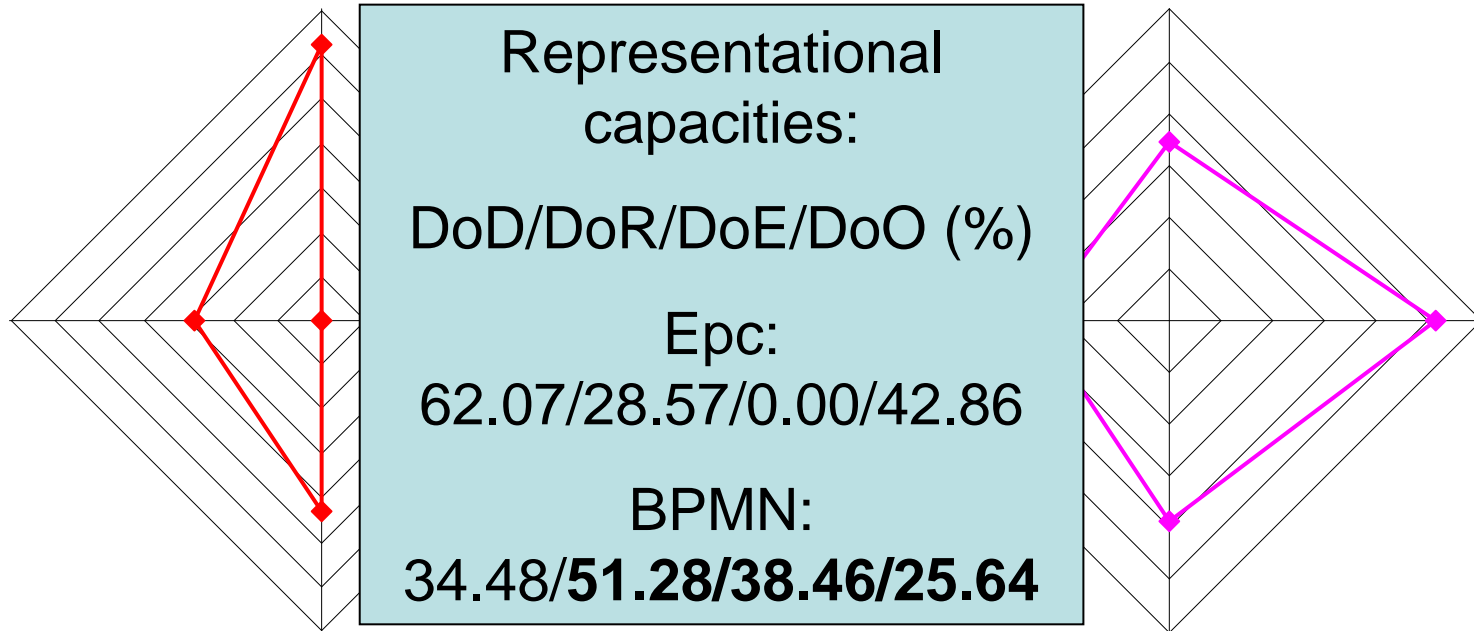
- There are no significant differences between the 'EPC' and the 'BPMN' groups
 - Model comprehension
 - Information recall
 - Problem Solving
- Differences in test times are also insignificant.
- Process modellers with training in any process modelling language perform reasonably well in understanding other process models.

No differences between the languages?

| Workflow Pattern | EPC | BPMN |
|--|-----|------|
| CP1. Sequence | + | + |
| CP2. Parallel Split | + | + |
| CP3. Synchronization | + | + |
| CP4. Exclusive Choice | + | + |
| CP5. Simple Merge | + | + |
| CP6. Multiple Choice | + | + |
| CP7 Structured Synchronizing Merge | + | + |
| CP8. Multiple Merge | | + |
| CP9. Structured Merge | | +/- |
| CP10. Arbitrary Merge | | + |
| CP11. Inclusive Merge | | + |
| CP12. Exclusive Merge | | + |
| CP13. Multiple Merge | | + |
| CP14. Multiple Merge | | + |
| CP15. Multiple Merge | | - |
| CP16. Delegation | | + |
| CP17. Inclusive Split | | - |
| CP18. Multiple Split | | - |
| CP19. Exclusive Split | | + |
| CP20. Exclusive Split | | + |
| CP21. Structured Split | | + |
| CP22. Rejection | | - |
| CP23. Transfer | | - |
| CP24. Parallel | | + |
| CP25. Exclusive | | +/- |
| CP26. Exclusive | | + |
| CP27. Exclusive | | - |
| CP28. Blocking Discriminator | - | +/- |
| CP29. Cancelling Discriminator | - | + |
| CP30. Structured Partial Join | - | +/- |
| CP31. Blocking Partial Join | - | +/- |
| CP32. Cancelling Partial Join | - | +/- |
| CP33. Generalized AND-Join | +/- | + |
| CP34. Static Partial Join for Multiple Instances | - | +/- |
| CP35. Cancelling Partial Join for Multiple Instances | - | +/- |
| CP36. Dynamic Partial Join for Multiple Instances | - | - |
| CP37. Acyclic Synchronizing Merge | + | - |
| CP38. General Synchronizing Merge | - | - |
| CP39. Critical Section | - | - |
| CP40. Interleaved Routing | - | - |
| CP41. Thread Merge | - | + |
| CP42. Thread Split | - | + |
| CP43. Explicit Termination | - | + |

Workflow pattern support:
 Full/partial/none (#)
 Epc: 10/2/31
 BPMN: 24/8/11

No differences between the languages?



What are the implications?

- The emergence of new process modelling languages is NOT an economic threat to organizations.
- Carefully managed changes to process modelling languages are likely to be accepted by a customer base.
- Background in ONE process modelling language suffices for working with other languages.
- Knowledge of process modelling is NOT dependent on the choice of language.
 - Some alternative explanations
 - Paradigmatic modelling style: “Thinking in processes”
 - Abilities and Cognitive style of the modeller: “Nerds versus Managers”

Next steps

- Compare results across the different regions
 - Do students from Germany perform different from U.S. students?
- Conduct additional series of experiments
 - Process models versus data models
 - Can data modellers understand process models?
 - Process modelling languages with different paradigms
 - Event-based techniques versus state-based techniques
- Investigate the process of teaching process modelling
 - How can you teach process modelling?
 - Should you teach different techniques or one in great detail?
 - How can you measure the success of teaching styles?

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