



**TAL
TECH**

**SIDUS ÕPPEKAVA
KUIDAS KUJUNEB VALDKONNA
TUDENGIST EKSPERT?
TATM ÕPPEKAVA ARENDUSPÄEV**

20.01.2025

ÕPPIMISE KOLM VAALA MAGISTRITÖÖ KONTEKSTIS



Mis on magistritöö meie kui
õppejõudude jaoks: õppimist ja
arengut toetava õppeülesandena
või kokkuvõtvat hindamist
võimaldava ülesandena?

Kuidas võiks magistritöö
protsess muutuda IGA õppija
 jaoks elumuutvaks ja
väärtustatud kogemuseks?

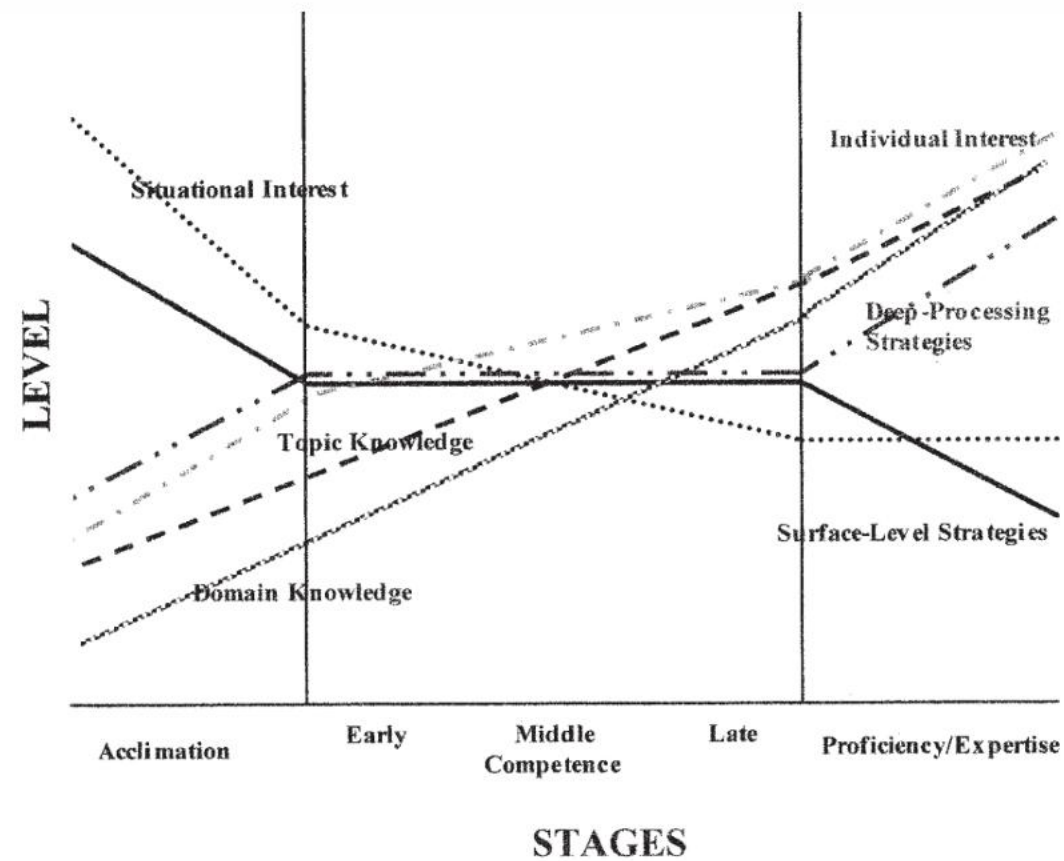


FIG. 10.1. The components and stages of the Model of Domain Learning, as modified from Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, interest, and recall: Assessing a model of domain learning. *Journal of Educational Psychology*, 87, p. 560.

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- Dumas, Denis, Boris Forthmann, and Patricia Alexander. "Using a model of domain learning to understand the development of creativity." *Educational Psychologist* (2024): 1-16.

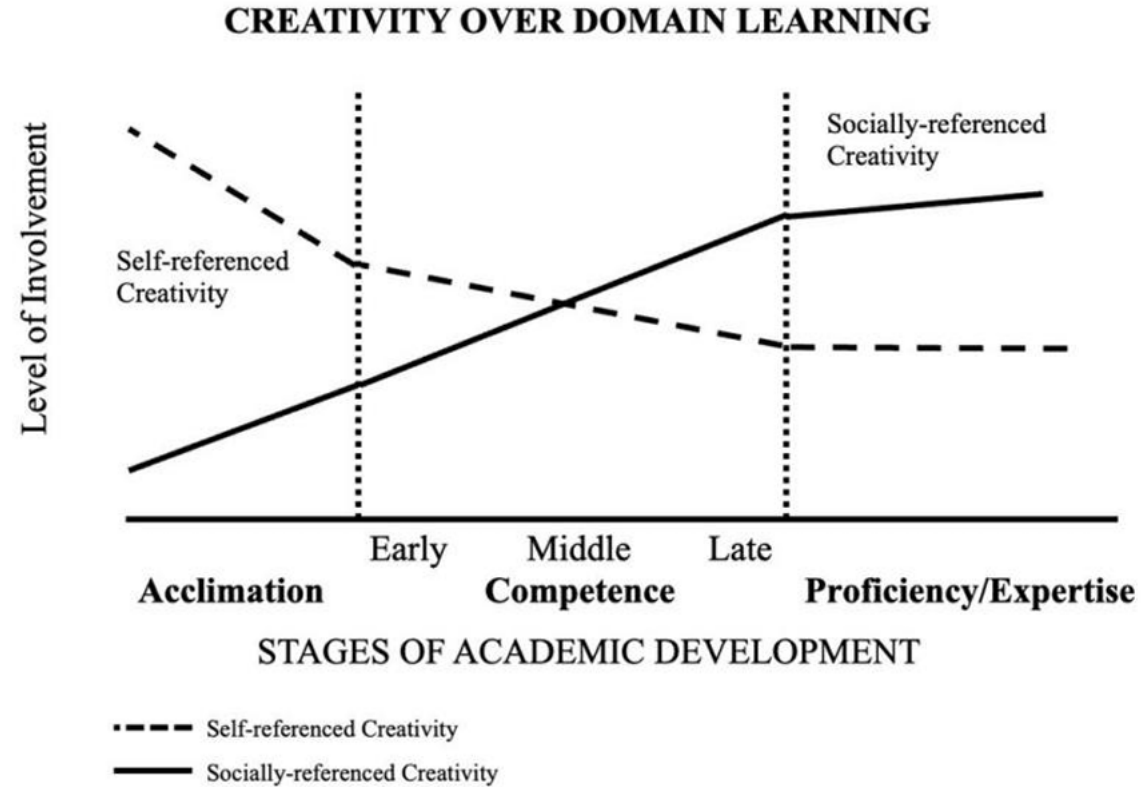
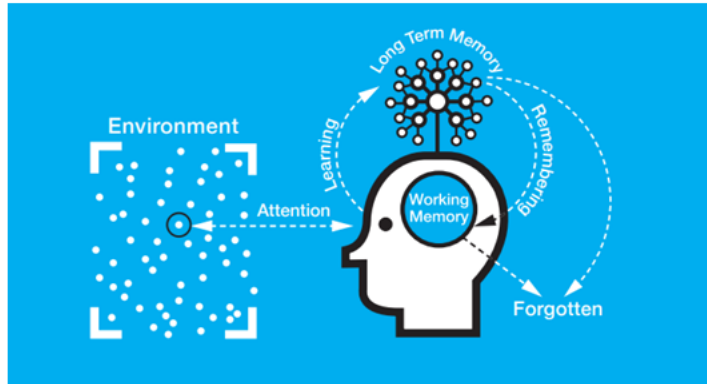


Figure 2. Analogous to Figure 1, this figure depicts the involvement of both self-referenced and socially-referenced creativity over the course of domain learning.

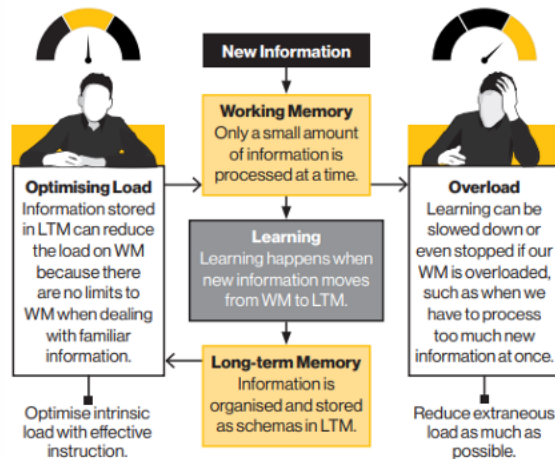
Table 2. Creativity across the stages of the MDL.

Stage of domain learning	Domain creative thinking	Examples of creative activities
Acclimation	Self-referenced creativity: lack of domain knowledge means learners do not yet know what others in the domain would view as original or creative.	Imaginative processes that require mainly declarative domain knowledge, are situationally motivating, and can be supported by surface-level processing strategies: • Questioning • Generating examples • Perspective taking
Competence	As the learner develops within the domain, they begin to be able to predict what others in the domain would view as creative. Therefore, the involvement of self-referenced creativity is waning, and the capacity for socially-referenced creativity in the domain is waxing.	Using both declarative and procedural domain knowledge to make increasingly deeper domain-specific predictions and connections: • Consequences • Original uses of tools • Analogical mapping • Formulating hypotheses
Proficiency/Expertise	Experts' deep understanding of domain norms allows them to potentially break those norms in a useful way: if they can re-direct their habitual processes and seek an original contribution to their domain.	An effortful, risky, and time-consuming process of transforming, expanding, re-defining, and competing within the domain: • Inhibiting automated habits • Problem-finding • Trend forecasting • Investing in original ideas • Identifying new collaborators • Persuading other experts

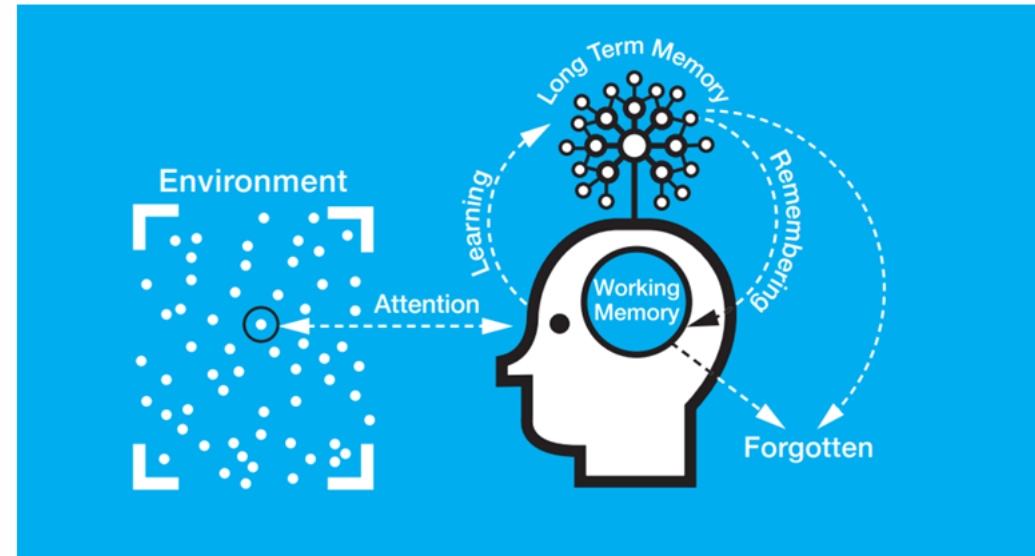


TÕHUSA ÕPPIMISE KOLM VAALA

- EELTEADMISTEST SÕLTUV
TÄHELEPANU JA TAJU –
ekspert-algaja
- TÖÖMÄLU JA KOGNITIIVNE
KOORMUS
- PIKAAJALINE MÄLU JA
KVALITEETSED MÄLUSISUD

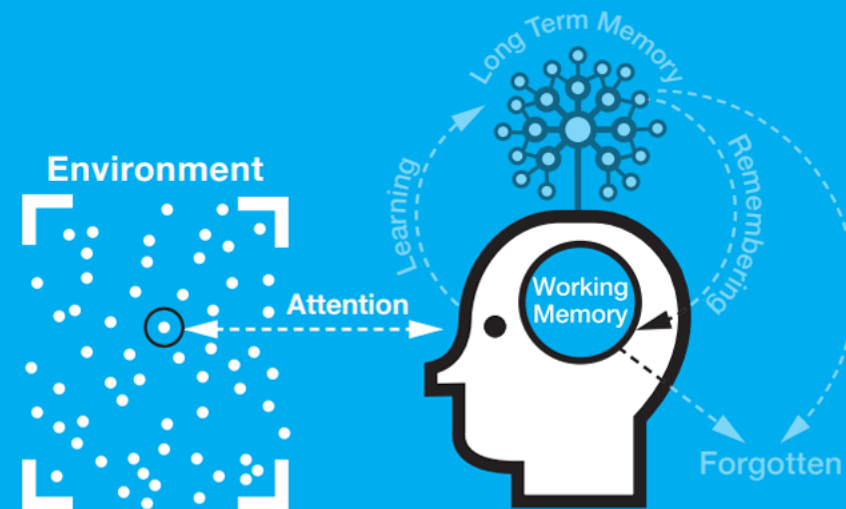


"Learning occurs through alterations in long-term memory, spurred only by active student engagement in thinking. Such cognitive activity strengthens neural pathways, facilitating the transfer and retention of knowledge in long-term memory."



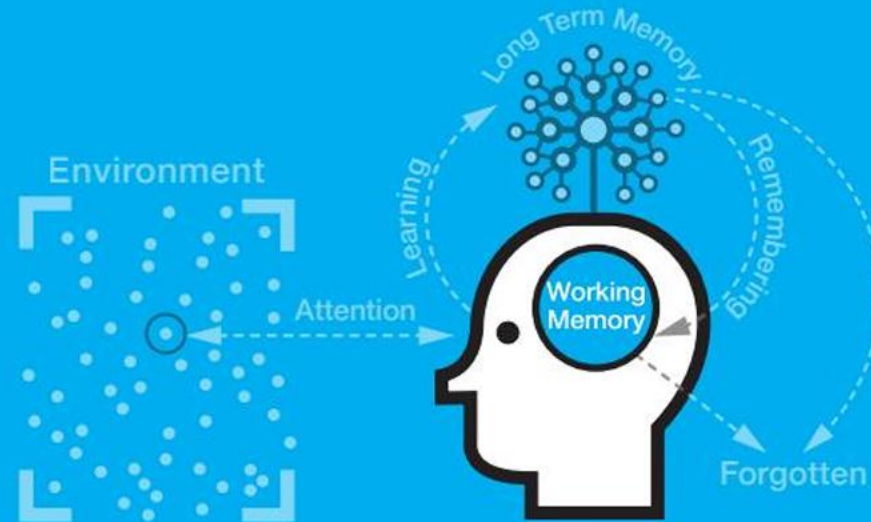
ÕPPIJA SAAB
MÄLETADA
AINULT SEDA,
MILLELE TA ON
TÄHELEPANU
PÖÖRANUD

1



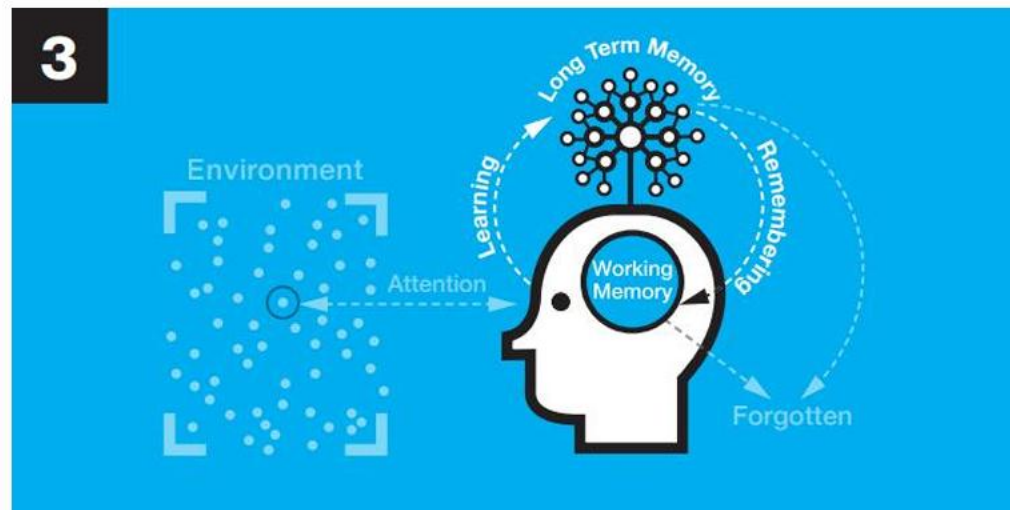
TÖÖMÄLU
ON NAGU
UDUSELE
KLAASILE
KIRJUTAMINE

2



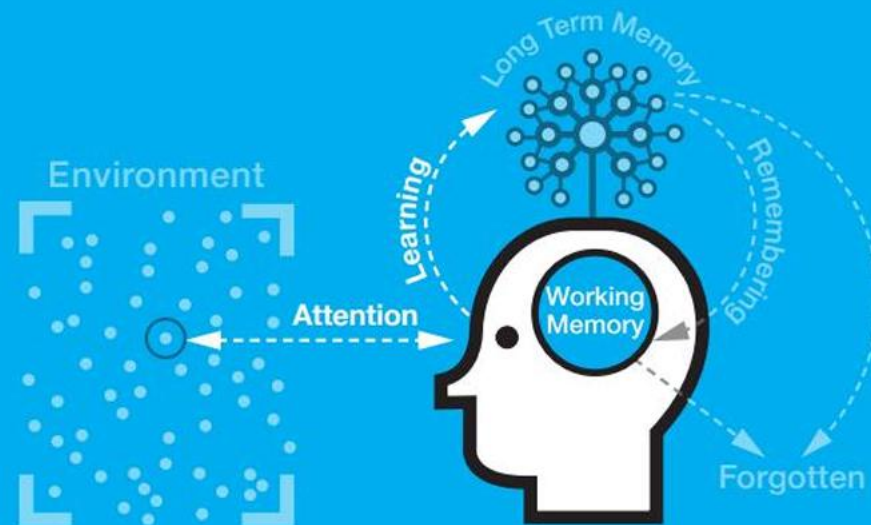


KOGNITIIVSED SKEEMID JA PUNAMÜTSIKE

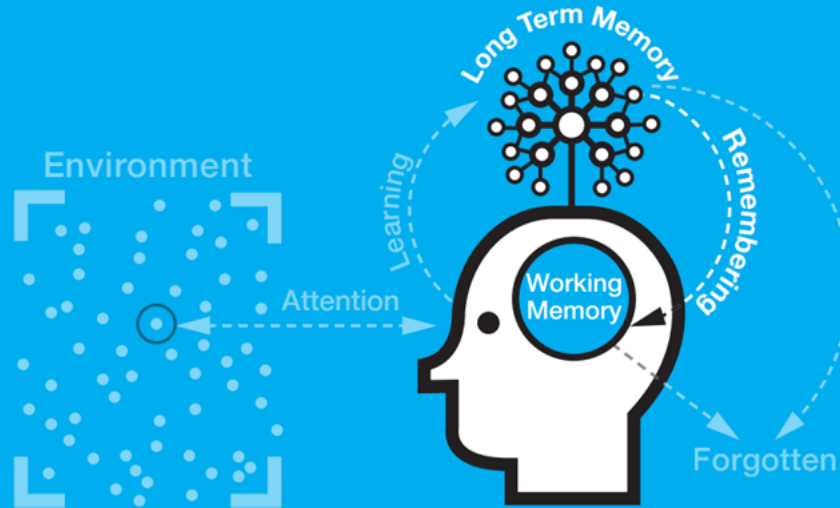


IGA ÜKSIKU ÕPPIJA KOGNITIIVNE KAASAMINE

4



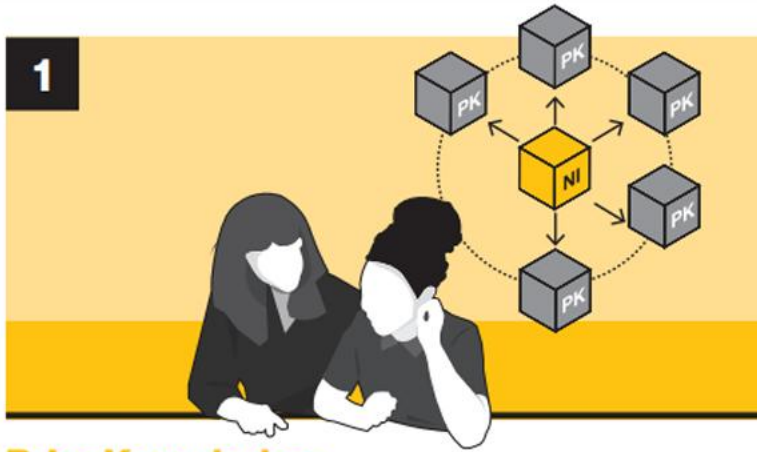
5



*DESIRABLE
DIFFICULTIES!*
MÄLUSISUDE LOOMINE
ON AKTIIVNE PROTSESS
- ÕPIB SEE, KES
AKTIIVSELT MEENUTAB
JA TÄHENDUST LOOB

To learn something new, knowledge must first be processed in working memory (WM) before being transferred and stored in long-term memory (LTM) in the form of 'schemas'. If WM is overloaded, there is a greater risk that the content being taught will not be understood by the learner.





Prior Knowledge

Activate What Students Already Know



Completion Tasks

Increase Independent Problem Solving



Worked Examples

Guide Students Step By Step With New Skills

WORKED EXAMPLES – MILLAL JA KELLELE?

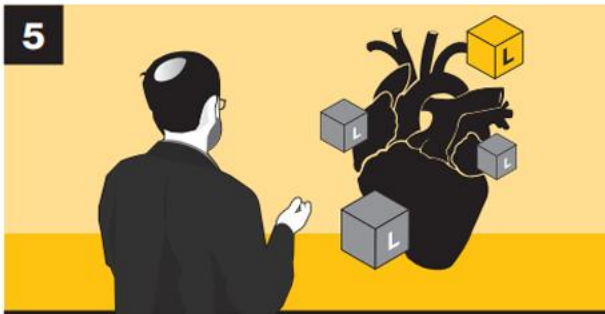


The 'expertise reversal effect'

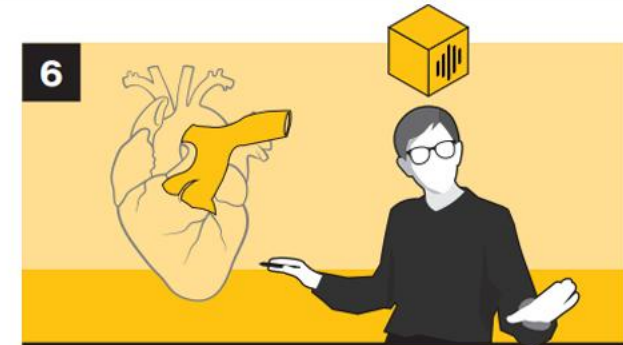
The 'expertise reversal effect' is an important exception to the worked example effect. According to the expertise reversal effect, the heavy use of worked examples becomes less and less effective as learners' expertise increases, eventually becoming redundant⁷ or even counter-productive to learning outcomes (Leslie et al. 2012; Pachman, Sweller & Kalyuga 2013; Yeung, Jin & Sweller 1998). This means that some instructional procedures such as worked examples, which assist learning for novices because they reduce cognitive load, are not effective for teaching more expert learners. While cognitive load theory supports fully guided instruction for novice learners, it also supports the gradual incorporation of more independent problem-solving tasks as learners gain expertise.



The 'Redundancy/Coherency Effect'
Cut out unnecessary or repeated information



The 'Split Attention Effect'
Present All Essential Information Together



The 'Modality Effect'
Present Information Verbally And Visually

Types of cognitive load

Load type	Source	Effect on learning	Example
Intrinsic load	The inherent complexity of the material and the prior knowledge of the learner	Necessary to learning (but potentially harmful if too high, because it can cause cognitive overload)	Learning how to solve the mathematical equation $a / b = c$, <i>solve for a</i> Learning this equation might have a high intrinsic load for a novice maths student, but would have a low intrinsic load for an expert mathematician
Extraneous load	Poorly designed instruction that does not facilitate schema construction and automation	Harmful because it does not contribute to learning	The student is required to figure out how to solve the equation themselves, with minimal guidance from the teacher This imposes a high cognitive load, but does little to encourage schema construction because the student's attention is focused on <i>solving</i> the problem rather than on <i>learning</i> the technique
Germane load	Well designed instruction that directly facilitates schema construction and automation	Helpful because it directly contributes to learning	The student is explicitly taught how to solve the problem and given lots of worked examples demonstrating how to do it This imposes a lower cognitive load on the student, enabling them to learn and remember <i>how</i> to solve the problem when faced with it again



DAILY REVIEW

Review Previous Learning



MODELS

Provide Cognitive Support



SMALL STEPS

Chunk New Information



QUESTIONS

Check Students' Answers



GUIDED PRACTICE

Support Student Practice

PRINCIPLES OF INSTRUCTION



HIGH SUCCESS RATE
Aim For 80% Success Rate



CHECK UNDERSTANDING
Address Misconceptions



WEEKLY/MONTHLY REVIEW
Extend Practice Over Time



INDEPENDENT PRACTICE
Build Fluency and Mastery

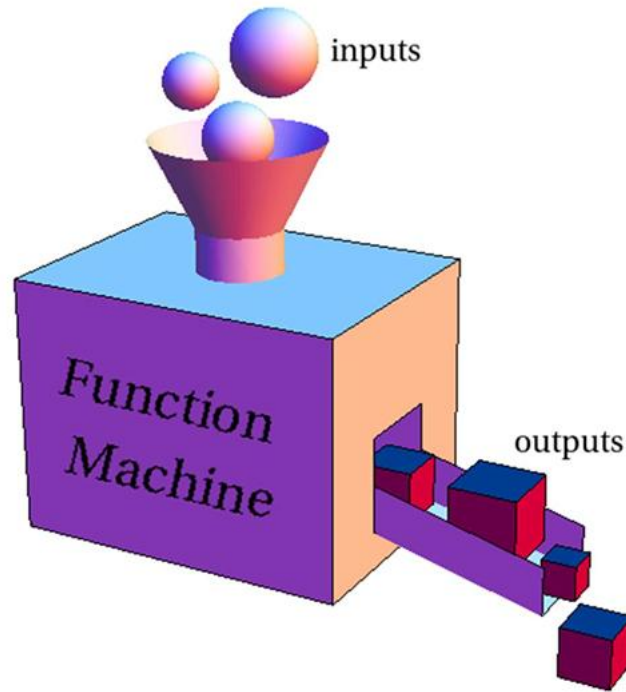


SCAFFOLDS
Use Temporary Supports

PRINCIPLES OF INSTRUCTION

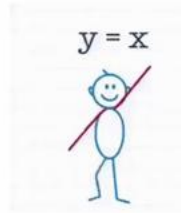
KUIDAS ARENG TOIMUB?

Mida peab tudeng 2 aasta jooksul kogema ja milliste ülesannetega kokku puutuma, et olek {puudub} saaks muutuda olekuks {olemas}?



Sisend:
ei oma pädevust x

Funktsioon:
õppekava
läbimine

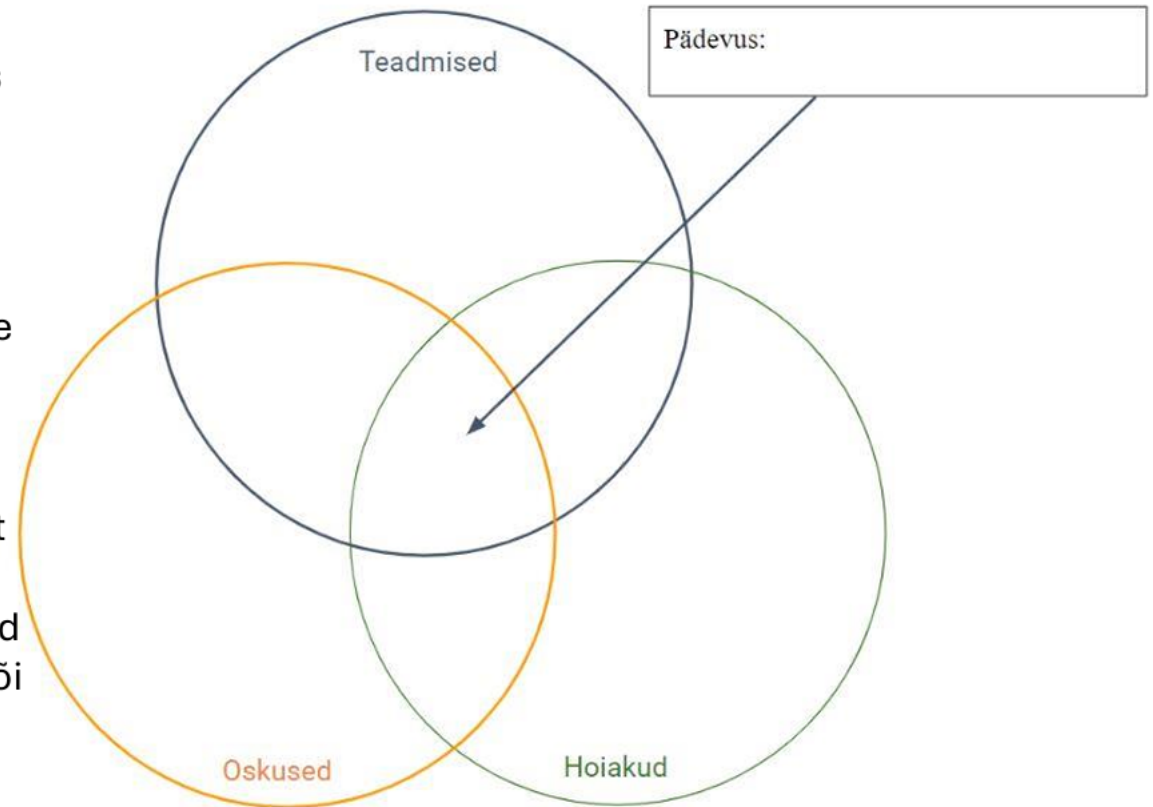


Väljund:
omab pädevust x

PÄDEVUS (TOOMELA, HTM)

Pädevus on olemuselt oskuste eriline vorm. Pädevus sisaldab (1) konkreetse oskuse, (2) teadmised valdkonnast, kus vastavat oskust kasutada ja (3) teadmised selle kohta, kuidas antud olukorras vastavaid oskusi kasutada. Pädevus väljendub võimes teadmisi ja oskusi sihipäraselt ja efektiivselt konkreetsetes elusituatsioonides kasutada.

- Teadmine on tunnetustegevuse käigus kujunev kogetava maailma psüühiline peegeldus. Teadmiste hulka kuuluvad ka väärtused ja hoiakud.
 - Hoiak on kalduvus hinnata keskkonnas kogetavat mitteneutraalsest, väärtusepõhisest vaatepunktist.
 - Väärtus on emotsioonide ja vajadustega seotud teadmiste vorm, teadmine, mis on positiivse või negatiivse emotsionaalsusega.
- Oskus on sihipärase tegevuse planeerimise ja elluviimise võime.



ÜLEASANNE 2: Mida õpilane peab kogema, tegema ja harjutama, et me neid oskusi õppeainetes rohkem arendaks?

- Mida õpilane peab kogema, mitte õppejõud tegema
 - Kui ta kohal ei käi, siis ta seda kogeda ei saa...
 - Mida peab päriselt tegema ja korduvalt harjutama (mitte ühtegi pädevust ei omanda passiivselt loengus kuulates).
-
- 5 min individuaalseid mõtteid
 - 30 min grupiarutelu
 - Tulemused esitleda slaididel

KODUTÖÖ: Mida Sina enda aines teha saad, et me selle tulemuseni jõuaks?

- Mõttele välja vähemalt üks tegevus, mida sina oma aines teha saad, et üliõpilaste oskused lõputöö kirjutamisel oleksid paremad.
- Pane see tegevus kirja, vajadusel lisa hindamismeetodid jne. Leia jagatud materjalide hulgast kaks printsiipi, millele tuginedes usud, et see võiks tõhus olla.
- Lisa kodutöö kausta: https://drive.google.com/drive/folders/1JgMyRpoKYFkkDzhSTtFgaLeP283UI836?usp=drive_link
- Tähtaeg 30. jaanuar
- Jätkame arutelu nende tegevuste üle õpetamispäeva seminaril

Materjalide lingid:

- [Make it stick eestikeelne kokkuvõte](#)
- [Sinine poster Learning and Memory](#)
- [Oranž poster Cognitive Load Theory](#)
- [Oranž poster Principles of Instruction](#)

Täiendav lugemine:

- [Harvardi õpetamisoskuste lehekülg](#)



**TAL
TECH**

SUUR AITÄH PANUSTAMAST!

20.01.2025