Learning Design Toolkit

A framework for designing effective learning experiences and ensuring alignment between instructional strategies and client goals.

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Instructional Designer

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Learning Design Toolkit

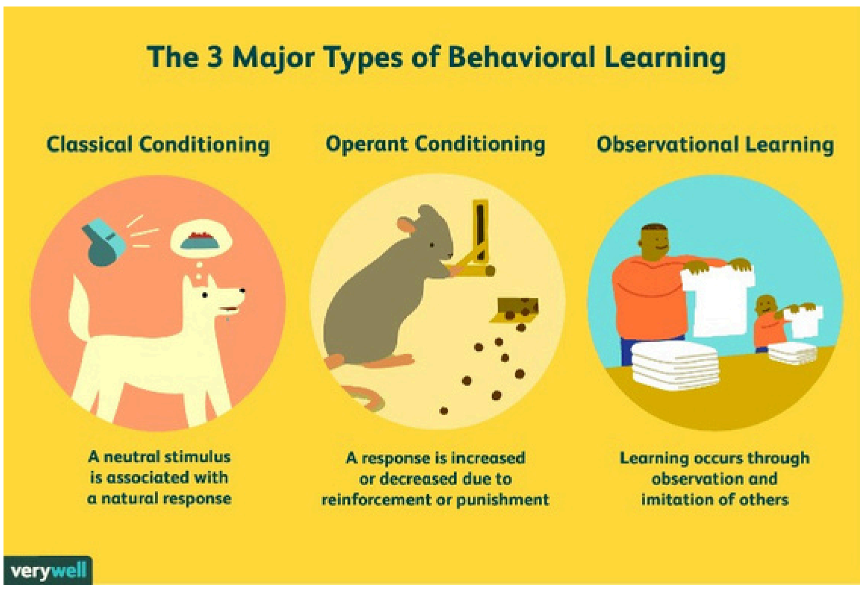
Learning Theories

Module 1

Behaviorism

Figure1

ThreeMajor Types of Behavioral Learning.



From ***Three Major Types of Behavioral Learning*** [Graphic], by Psychology and Counselling, 2023, March 5, ***Facebook***

Behavioral theory focuses on the way humans learn through interaction with their environment. Behaviorism solidifies the fact that behaviors are learned through conditioning. Skinner mentioned that conditioning is a procedure that utilizes punishment and reinforcement. The behavioral model provides an organized approach to teaching, allowing educators to set clear expectations and provide consistent routines. Behavioral theorists believe there is a certain way to do tasks to cultivate a desired outcome, and the teacher determines what that looks like (Samoila et al., 2023).

Example

This theory can be applied to student behavior plans. Many students thrive with positive
They can better interact in school when their positive behaviors are rewarded (Bright, 2023). For example, if a young student struggles with speaking out inappropriately in class, they may have a positive behavior plan to encourage them when they appropriately follow classroom

expectations. The plan could state that when the student does the desired task of raising their hand before asking questions, the teacher will thank them for raising their hand and waiting to be called on before speaking.

Reference(s)

Bright, K. (2023, September 21). ***Behaviorism in education: How to foster learning environments.*** LearnLever. https://learnlever.com/behaviorism-in-education/

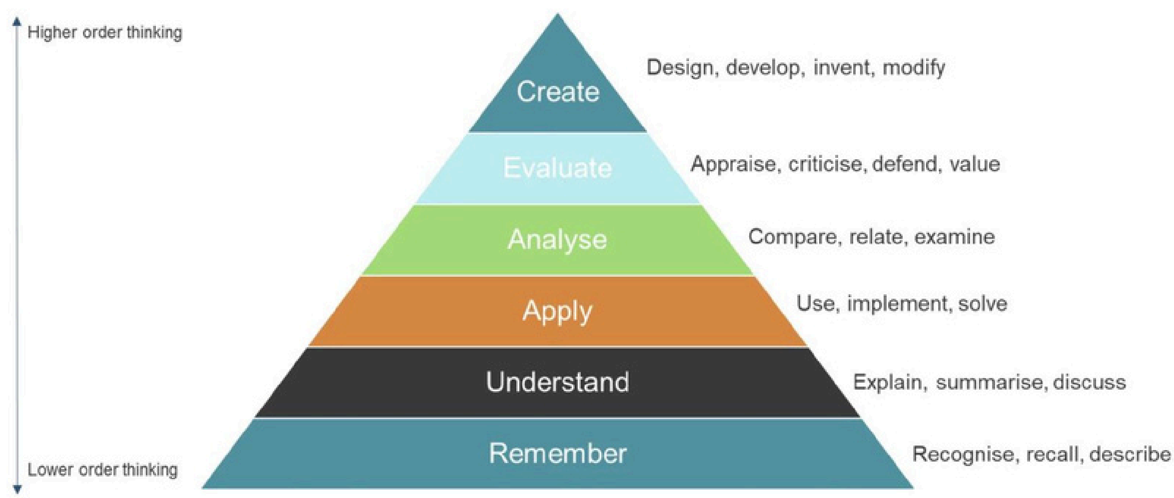
Psychology and Counselling. (2023, March 5). ***Three Major Types of Behavioral Learning*** [Graphic]. Facebook. https://www.facebook.com/psychandcounselling?__tn__=-UC*F

Samoila, C., Ursutiu, D., & Munteanu, F. (2023). The remote experiment in the light of the learning theories. ***International Journal of Online & Biomedical Engineering***, ***19***(14), 26–44. https://doi.org/10.3991/ijoe.v19i14.43163

Cognitivism

Figure 2

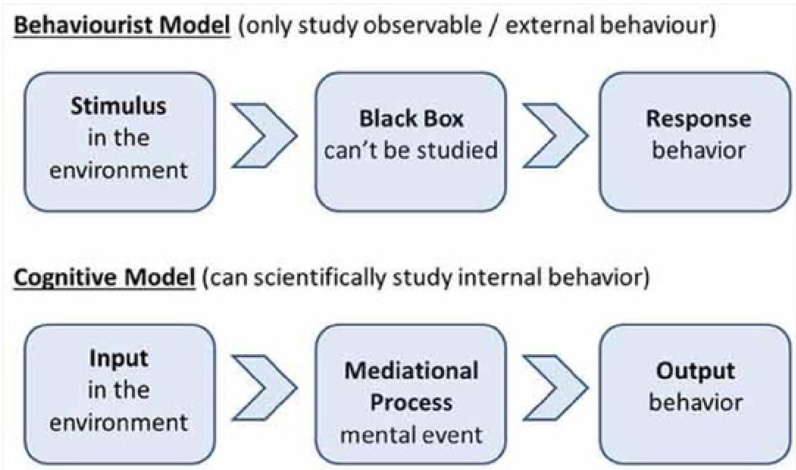
Bloom's Taxonomy



Amphigean. (2020, September 1). Learning theories – cognitivism[Diagram]. Amphigean. https://amphigean.com/2020/09/01/learning-theories-cognitivism/

Cognitivism represented a shift from focusing on the behaviors oflearners to the thinking processes of learners. In cognitive psychology, the difference between behaviorism and cognitivism is described as the step that happens, and can be studied, between a person experiencing a stimulus and the behavior response (McLeod, 2015).

Figure 3
Behaviorist Model Versus Cognitive Model



.From ***Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective***, by P. A. Ertmer & T. J. Newby, 2013, ***Performance Improvement Quarterly, 26***(2), 43–71 (https://doi.org/10.1002/piq.21143). Copyright 2013 by Wiley Periodicals, Inc.

For instructional design, this means that instead of creating materials and processes intended to instill desired behaviors in learners, instruction is designed to foster thinking processes through interaction with the material (Etmer, 2013).

Example

Cognitive learning can be seen during training opportunities when volunteers are asked to role-play common scenarios they may encounter in their roles. This encourages volunteers to apply what they have been learning to real-world situations. It also requires them to think critically about instruction and determine how to apply concepts within the context of the mock scenario they are presented with. Role-play opportunities are followed up with feedback to help reinforce best practices and correct misunderstandings or confusion that may exist.

Reference(s)

Amphigean. (2020, September 1). ***Learning theories – cognitivism*** [Diagram of Bloom's Taxonomy]. Amphigean. https://amphigean.com/2020/09/01/learning-theories-cognitivism/

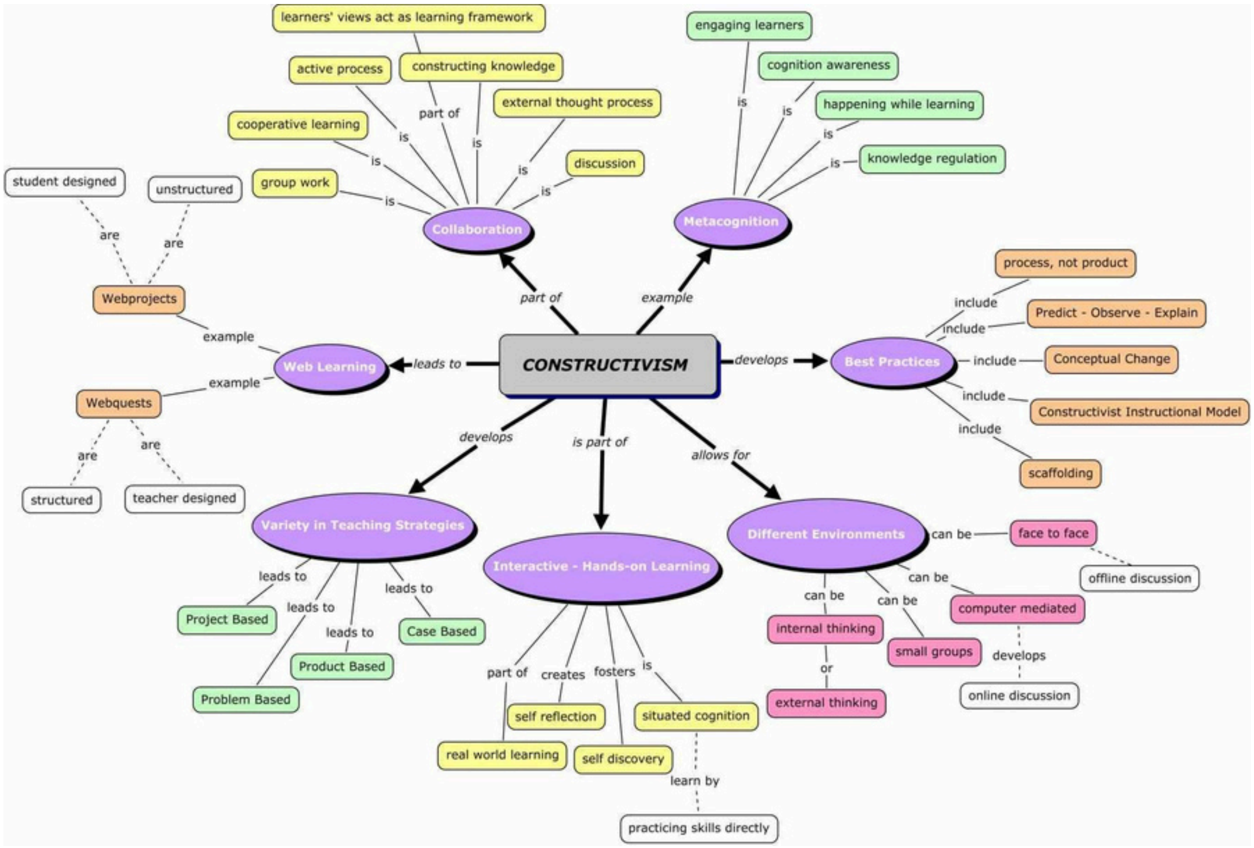
Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. ***Performance Improvement Quarterly***, ***26***(2), 43–71. https://doi.org/10.1002/piq.21143

McLeod, S. A. (2015). Cognitive psychology. ***Simply Psychology***. https://www.simplypsychology.org/cognitive.html

Constructivism

Figure 4

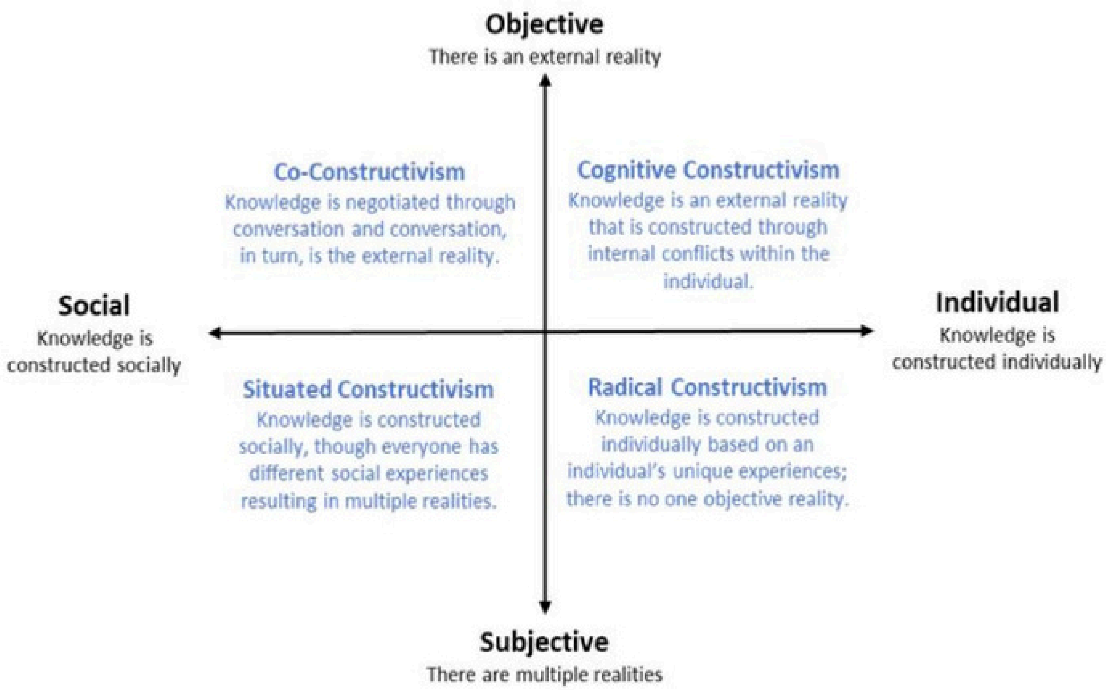
Constructivism Learning Theory



From Embracing the learning theory: Constructivism [Diagram], by Structural Learning, n.d., Structural Learning (https://www.structural-learning.com/post/embracing-the-learning-theory- constructivism). Copyright n.d. by Structural Learning.

Constructivist learning theory is based on the idea thatindividuals "construct knowledge as they reflect on and interpret their own experiences" (Allen,p.1). Among the most famous constructivist researchers, there are internal and externalvariables that influence how a person interprets their experiences.

Figure 5
Constructivism Dimensions and Positions



From An introduction to constructivism: Its theoretical roots and impact on contemporary education, by A. Allen, 2022, Journal of Learning Design and Leadership, 1(1), 1–25 (https://ldljournal.web.illinois.edu/wp-content/uploads/2022/09/Andrew-Allen-Constructivism_JLDL_Vol1Issue1September2022.pdf). Copyright 2022 by Andrew Allen.

Since constructivism is based on individual interpretation, it is possible that an individual's constructed knowledge is not based on reality. "Learning then becomes a matter of changes" as the connections that learners have are dynamic and interpretations can be fluid, and different people, even those with the same experience, may interpret it differently (Duffy, 1996, pp 9). Constructivism requires active engagement by learners who reflect upon their experiences, both past and present, to develop understanding and foster learning.

Example

In adult education, the constructivism learning model considers prior knowledge of learners. In a training session about best practices in fundraising strategies, a constructivism approach might be to have a group discussion where learners share their fundraising experiences and stories. Afterwards, a facilitator guides the group through reflective questions about what can be learned from the stories of others. Through social constructivism, individuals create learning through connection with others whose experiences are likely different than their own.

Reference(s)

Allen, A. (2022). ***An introduction to constructivism: Its theoretical roots and impact on contemporary education***. ***Journal of Learning Design and Leadership, 1***(1), 1–25. https://ldljournal.web.illinois.edu/wp-content/uploads/2022/09/Andrew-Allen-Constructivism_JLDL_Vol1Issue1September2022.pdf

Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), ***Handbook of Research for Educational Communications and Technology*** (pp. 170–198). http://members.aect.org/edtech/ed1/41/41-01.htmlchrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://people.potsdam.edu/betrusak/621/Duffy%20and%20Cunningham%20(1996)-constructivism.pdf

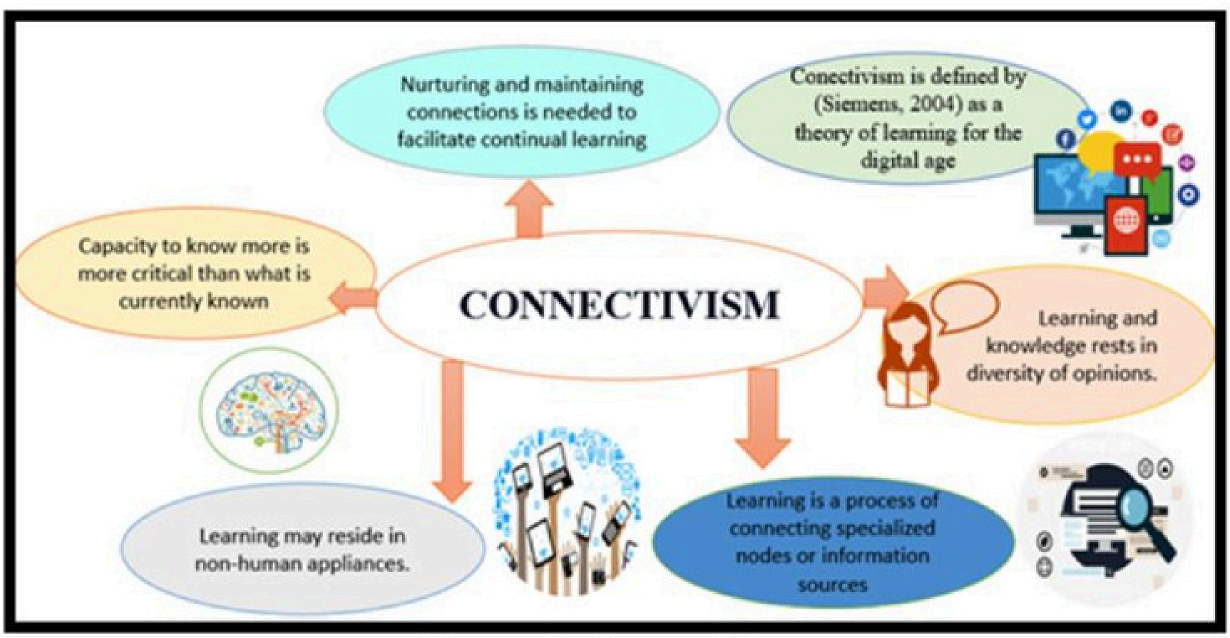
Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? ***Educational Technology Research and Development***, ***39***(3), 5–14. https://doi.org/10.1007/BF02296434

Structural Learning. (n.d.). ***Embracing the learning theory: Constructivism*** [Diagram]. Structural Learning. https://www.structural-learning.com/post/embracing-the-learning-theory-constructivism

Connectivism

Figure 6

Connectivism in Cognitive Cities



From Connectivism and learning in cognitive cities, by J. Smith & A. Lee, 2020, in Proceedings of The IAFOR International Conference on Education – Hawaii 2020 (pp. 100–110)

(https://papers.iafor.org/wp-content/uploads/papers/iicehawaii2020/IICEHawaii2020_51679.pdf).

Connectivism was developed as technology became a more prevalent and influential factor in learning and development (Seimens, 2005). As technology advanced and rewrote how society functions, there were also important trends observed in learning (Siemens, 2005):

- Many learners will move into a variety of different, possibly unrelated fields over the course of their lifetime.
- Informal learning is a significant aspect of our learning experience. Formal education no longer comprises the majority of our learning. Learning now occurs in a variety of ways – through communities of practice, personal networks, and through completion of work-related tasks.
- Learning is a continual process, lasting for a lifetime. Learning and work related activities are no longer separate. In many situations, they are the same.
- Technology is altering (rewiring) our brains. The tools we use define and shape our thinking.
- The organization and the individual are both learning organisms. Increased attention to knowledge management highlights the need for a theory that attempts to explain the link between individual and organizational learning.
- Many of the processes previously handled by learning theories (especially in cognitive information processing) can now be off-loaded to, or supported by, technology.
- Know-how and know-what is being supplemented with know-where (the understanding of where to find knowledge needed)

(Siemens, 2005).

To address these notable shifts in learning, connectivism theorizes "that knowledge is distributed across a network of connections" rather than being constructed, transferred, created, or built as others have theorized (Downes, 2007, pp 1). Siemens (2005) defines learning as "actionable knowledge" and postulates that it can exist outside a person in databases and that learning how to access that knowledge is more important than knowing that information. The implications of connectionism on instructional design are that instruction should focus on ensuring learners know what information is available and how to access it.

Example

In nonprofit organizations, connectionism is seen through mentorships as new volunteers are connected with seasoned volunteers who can share their knowledge and answer concerns or questions. National nonprofit organizations also utilize digital chat spaces to facilitate communication among staff across the country who share the same role within their region, allowing them to discuss concerns and seek help with problem-solving, among other purposes. It is also seen in training modules that focus on acclimating new staff and volunteers to available platforms and databases that are meant to be used to find and/or share information through the organization's established connections.

Reference(s)

Downes, S. (2007). What connectivism is. ***Half an Hour***. https://www.downes.ca/post/38653

Dunaway, K. M. (2011). Connectivism: Learning theory and pedagogical practice for networked information landscapes. ***Reference Services Review***, ***39***(4), 675–685. https://doi.org/10.1108/00907321111186686

Goldie, J. G. S. (2016). Connectivism: A knowledge learning theory for the digital age? ***Medical Teacher***, ***38***(10), 1064–1069. https://doi.org/10.3109/0142159X.2016.1173661

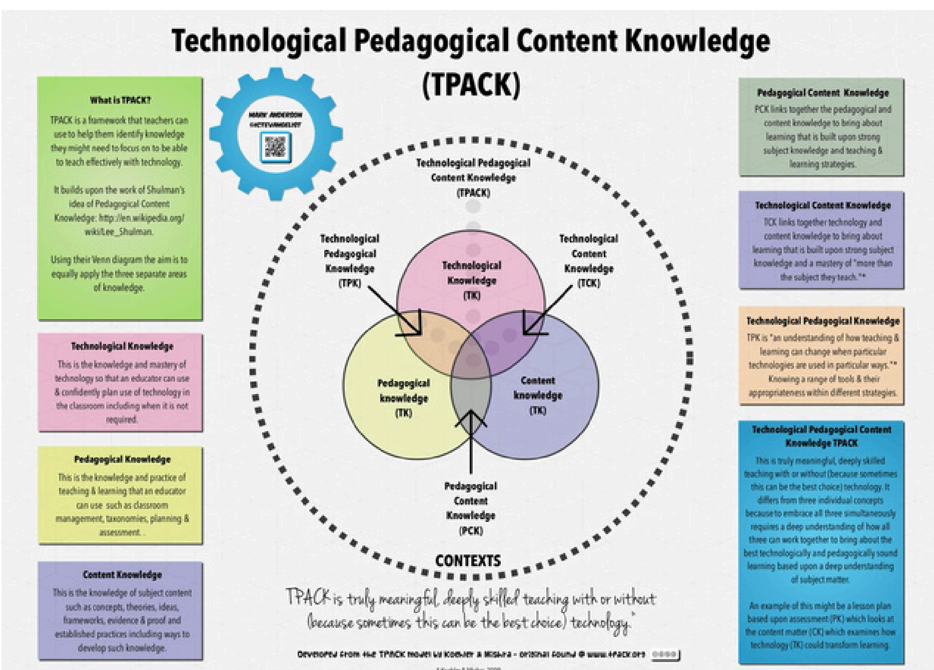
Siemens, G. (2005). Connectivism: A learning theory for the digital age. ***International Journal of Instructional Technology and Distance Learning***, ***2***(1), 3–10. http://www.itdl.org/Journal/Jan_05/article01.htm

Smith, J., & Lee, A. (2020). Connectivism and learning in cognitive cities. In ***Proceedings of The IAFOR International Conference on Education – Hawaii 2020*** (pp. 100–110). The International Academic Forum. https://papers.iafor.org/wp-content/uploads/papers/iicehawaii2020/IICEHawaii2020_51679.pdf

Pedagogy vs. Andragogy

TPACK|Technological Pedagogical Content Knowledge

Figure 7
TPACK



From TPACK explained [Diagram], by M. Anderson, n.d., ICT Evangelist (https://ictevangelist.com). Copyright n.d. by Mark Anderson.

TPACK is the knowledge that educators need to integrate technology into instructional design effectively. Koehler (2009) suggests three important elements that are central to technology use in learning:

- Content Knowledge – an educator's knowledge of the content to be taught.
- Pedagogical Knowledge – an educator's knowledge of the theories, methods, practices, and processes that support learning.
- Technology Knowledge – an educator's knowledge and ability to leverage technology to support learning.

TPACK involves not only being fluent in each of these three components but also understanding how they relate, in order to integrate them seamlessly in instructional design (Koehler, 2009).

Example(s)

- Technological Pedagogical knowledge (TPK) – As part of a virtual training presentation, the facilitator includes interactive opportunities to think critically about scenarios, such as "think-pair-share" to encourage collaborative learning.
- Technological Content Knowledge (TCK) – As part of a training, the facilitator allows the learners to work through interactive case studies in a "choose-your-own-adventure" format.
- Pedagogical Content Knowledge (PCK) – A trainer coaches best practices for addressing common questions and concerns, like setting boundaries and protecting self-wellness by reviewing "Common Concern" topics through interactive reflection and guided discussions.
- TPACK Integration – The facilitator presents on impact measurement and the importance of event reporting using the above suggestions and others, and then has learners practice completing a report in the system with a realistic context from previous engagement during the training.

Reference(s)

Anderson, M. (n.d.). ***TPACK explained*** [Diagram]. ICT Evangelist. https://ictevangelist.com

Harris, J., Mishra, P., & Koehler, M. J. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. ***Journal of Research on Technology in Education***, ***41***(4), 393–416. https://doi.org/10.1080/15391523.2009.10782536

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? ***Contemporary Issues in Technology and Teacher Education***, ***9***(1), 60–70. https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogicalcontent-knowledge/

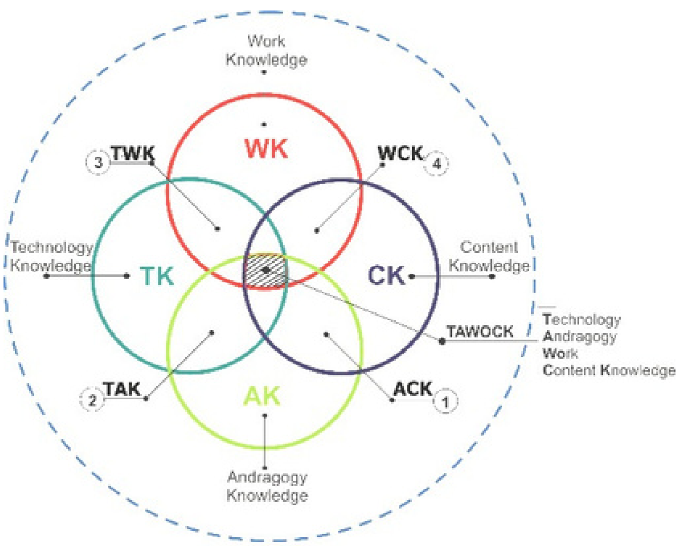
Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. ***Teachers College Record***, ***108***(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge—A review of the literature. ***Journal of Computer Assisted Learning***, ***29***(2), 109–121. https://doi.org/10.1111/j.1365-2729.2012.00487.x

TAWOK | Technology Andragogy Work Content Knowledge

Figure 8

TAWOCK Model Framework



From ***TAWOCK model framework on TVET*** [Diagram], by M. Nurtanto, 2020, ***ResearchGate*** (https://www.researchgate.net/figure/TAWOCK-Model-Framework-on-TVET_fig3_343685517). Copyright 2020 by Muhammad Nurtanto.

TAWOCK is an adaptation of TPACK model that can be applied in technical and vocational education and training.

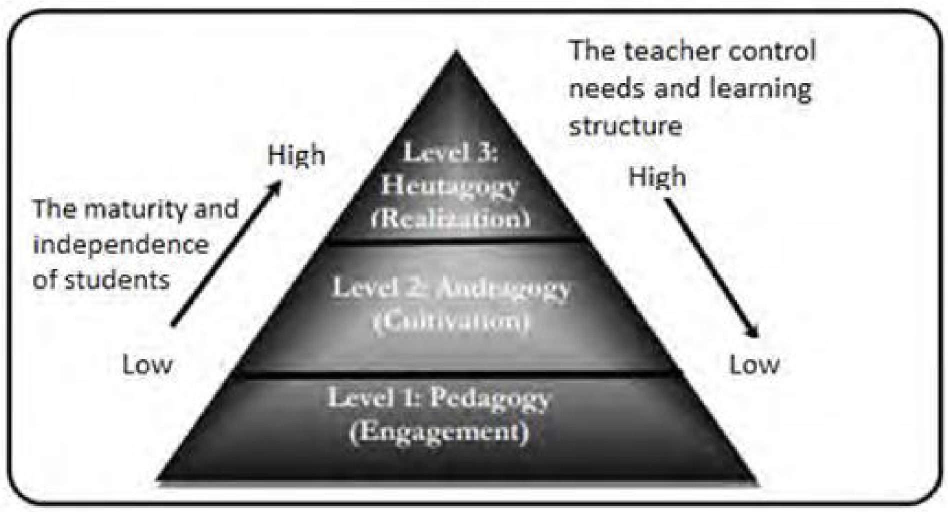
- Technology Knowledge (T) – Using technology as an effective tool to support learning
- Andragogy (A) – The theory of adult learning
- Work (WO) – The application of learning into relevant work
- Content Knowledge (CK) – Mastery of the subject matter

Arfin (2020) points out that a shortcoming of the TPACK model is the lack of “freedom of students to develop mature and independently.” Therefore, in vocational learning, three components are needed:

- Pedagogy – the engagement in learning through pedagogical approaches
- Andragogy – the cultivation and development of competency

•Heutagogy – the realization of student maturity

Figure 9
Vocational Learning Components



From The technology andragogy work content knowledge model framework on technical and vocational education and training, by Z. Arifin, M. Nurtanto, N. Kholifah, S. Nurhaji, & W. Warju, 2020, Journal of Education and Learning (EduLearn), 14(3), 442–448 (https://files.eric.ed.gov/fulltext/EJ1266419.pdf). Copyright 2020 by Zainal Arifin et al.

Examples

- TAWOCK Integration – Ensuring volunteers who want to host resource tables are trained effectively.
- Technology (T) – Training volunteers on how to navigate the volunteer signup platform so they know how to use the technology to sign up for resource tabling events.
- Andragogy (A) – Prioritizing a learner-centered approach that values the experiences and knowledge of adults who come to volunteer, such as discussions on what draws them to pick up resources at a resource event or what makes them skip a resource table.
- Work (WO) – Teaching volunteers not just how to set up a resource, as well as ways to engage with people who stop by to pick up resources (i.e., how to greet them and start a conversation) with practice that they can use in real life.
- Content Knowledge (CK) – Making sure that volunteers know the mission of the organization, its core values, and how volunteers help the organization meet its strategic goals and mission, which will guide them in their interactions and the way they present the organization.

Reference(s)

Alqahtani, R. N., & Almassaad, A. Z. (2024). The impact of a training program based on the TAWOCK model for teaching computational thinking skills on improving teaching practices among computer teachers. ***Pakistan Journal of Life and Social Sciences, 22***(1). https://www.pjlss.edu.pk/pdf_files/2024_1/2833-2854.pdf

Arifin, Z., Nurtanto, M., Kholifah, N., Nurhaji, S., & Warju, W. (2020). The technology andragogy work content knowledge model framework on technical and vocational education and training. ***Journal of Education and Learning (EduLearn)***, ***14***(3), 442–448. https://files.eric.ed.gov/fulltext/EJ1266419.pdf

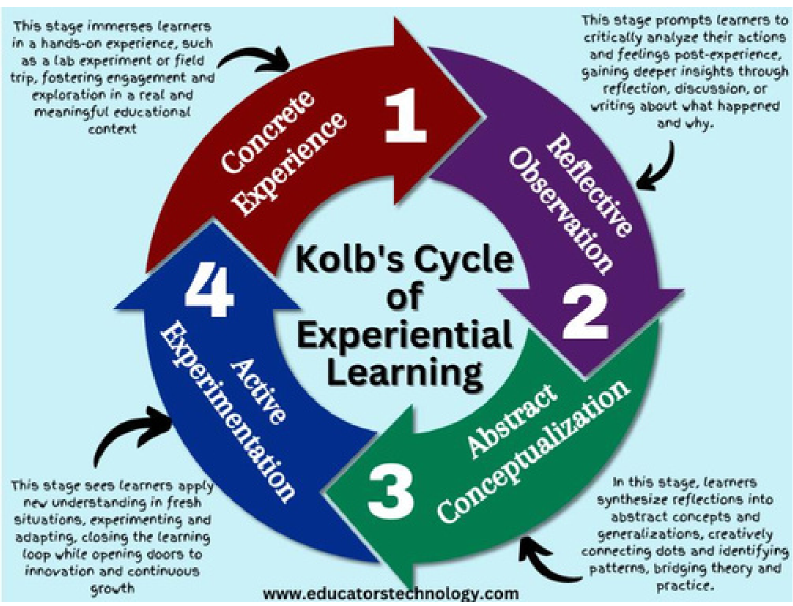
Nurtanto, M. (2020). ***TAWOCK model framework on TVET*** [Diagram]. ResearchGate. https://www.researchgate.net/figure/TAWOCK-Model-Framework-on-TVET_fig3_343685517

Learning Process Models

Kolb's Experiential Learning Theory

Figure 10

Kolb's Cycle of Experiential Learning



From ***Kolb's cycle of experiential learning***, by M. Kharbach, 2025, April 28, in ***Experiential learning simply explained***, ***Educator's Technology*** (https://www.educatorstechnology.com/2023/08/experiential-learning.html). Copyright 2025 by Med Kharbach. Used under fair use for educational purposes.

Experiential Learning theorizes that learning happens through four types of real-life experience: Concrete experience, reflective experience, abstract experience, and active experimentation. Essentially, an individual learns by "experiencing, reflecting, thinking, and acting" (Kolb, 2005). Since participation is a requirement for real-life experience in learning, "workplaces need to provide active support and include learners in workplace activities" (Yardley, 2012).

Example

If volunteers want to facilitate educational programing and give public presentations, then trainers can coordinate opportunities for volunteers to co-present with a seasoned presenter, because having that experience will allow the volunteer to gain greater understanding for how to phrase and pace the things they want to say and how to assess and adjust to their audience effectively.

Reference(s)

Educators Technology. (2023, August). ***Experiential learning*** [Diagram of Kolb's Cycle of Experiential Learning]. Educators Technology. https://www.educatorstechnology.com/2023/08/experiential-learning.html

Kharbach, M. (2025, April 28). ***Experiential learning simply explained***. Educator's Technology. https://www.educatorstechnology.com/2023/08/experiential-learning.html

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. ***Academy of Management Learning & Education***, ***4***(2), 193–212. https://doi.org/10.5465/amle.2005.17268566

Yardley, S., Teunissen, P. W., & Dornan, T. (2012). Experiential learning: Transforming theory into practice. ***Medical Teacher***, ***34***(2), 161–164. https://doi.org/10.3109/0142159X.2012.643264

Gagne's Nine Events of Instruction

Figure 11

Gagné's Nine Events in Workplace Training

From ***Gagné's nine events in workplace training*** [Infographic], by D. Gupta, 2024, December 17, ***Whatfix*** (https://whatfix.com/blog/gagnes-nine-events-of-instruction-model/). Copyright 2024 by Whatfix.

Gagne theorized that learning needs to be broken into smaller chunks to allow for maximum retention and minimize mental load. This does not mean that a long lecture or lesson should be presented in short parts, but rather that learning should be broken into more easily digestible parts, each with its own objective and specific outcomes, and each following Gagne's prescribed nine steps (McNeill, 2023).

Example

To follow Gagne's theory, an hour presentation on Volunteer 101 can be broken down into individual parts, such as: Who are we? What do we do? Why do we do what we do? How can you get involved? Each of those chunked lessons would follow Gagne's nine steps. Ideally, as part of the instruction, learners will find out how to re-read, re-watch, or re-try aspects of the training as much as they want and whenever they want.

Reference(s)

Goodwin, L. D. (1999). Gagné's theory of instruction: Contributions to the design of teaching. ***The Educational Forum***, ***63***(4), 372–379. https://doi.org/10.1080/00131729908984445

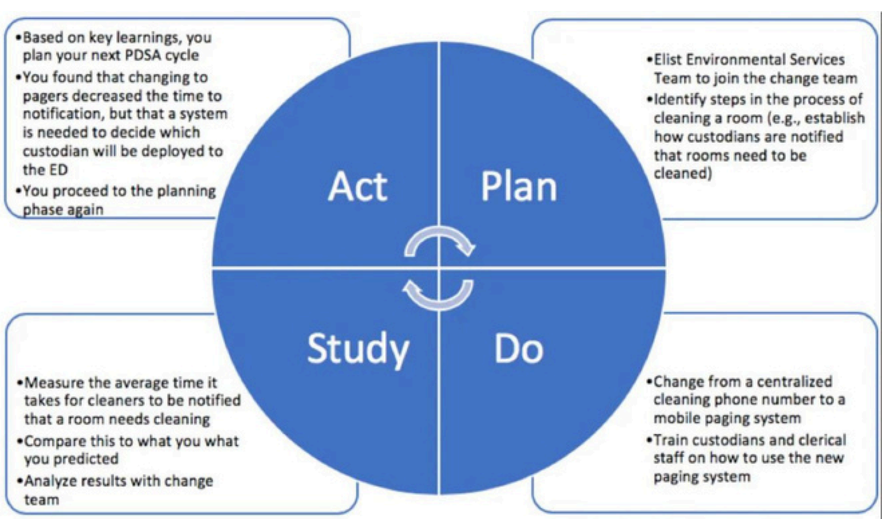
Gupta, D. (2024, December 17). ***Gagné's nine events in workplace training*** [Infographic]. Whatfix. https://whatfix.com/blog/gagnes-nine-events-of-instruction-model/

McNeill, L., & Fitch, D. (2023). Microlearning through the lens of Gagne's nine events of instruction: A qualitative study. ***TechTrends: Linking Research and Practice to Improve Learning***, ***67***(3), 220–230. https://research.ebsco.com/linkprocessor/plink?id=eb3197f7-fdda-3880-be2a-342332fe34f6

PDSA Cycle | Plan Do Study Act Cycle

Figure 12

Plan-Do-Study-Act (PDSA) Cycle.



Adapted from Which strategy to choose: PDSA, Lean, or Six Sigma? [Figure of Plan Do Study Act cycle], 2019, CanadiEM (https://canadiem.org/which-strategy-to-choose-pdsa-lean-or-six-sigma/). Licensed under CC BY-NC-SA 4.0.

This theory is a cycle that provides "a structure for iterative testing of changes to improve the quality of the system" (Taylor, 2014). In essence, it is meant to guide organizations through the thoughtful implementation of a plan for change to create improvement, followed by a period of outcome evaluation and tweaks before beginning the cycle again by implementing the updated plan.

Example

In the nonprofit world, it is common to hear, "Let's try it and see what happens, and then we'll know if it's a good idea or not." Often, this comes about in planning fundraising initiatives or events. When applied to developing staff, this framework would allow new staff to try their ideas in a well-structured way to see if they work and then adjust. This is a fundamental method to use when an organization wants to keep fresh staff feeling passionate and motivated to try new things with great energy.

Reference(s)

CanadiEM. (2019, January 4). ***Which strategy to choose: PDSA, Lean, or Six Sigma?*** [Figure of Plan-Do-Study-Act cycle]. CanadiEM. https://canadiem.org/which-strategy-to-choose-pdsa-lean-or-six-sigma/. Licensed under CC BY-NC-SA 4.0

Reed, J. E., & Card, A. J. (2016). The problem with Plan-Do-Study-Act cycles. ***BMJ Quality & Safety***, ***25***(3), 147–152. https://doi.org/10.1136/bmjqs-2015-005076

Taylor, M. J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2014). Systematic review of the application of the plan–do–study–act method to improve quality in healthcare. ***BMJ Quality & Safety***, ***23***(4), 290–298. https://doi.org/10.1136/bmjqs-2013-001862

Design Models

Module 2

Instructional Design (ID) vs. Learning Experience Design (LXD)

Instructional Design (ID) and Learning Experience Design (LXD) define an approach to creating a learning experience. Design includes understanding the audience's needs and goals to create learning activities and effective content delivery. The two methods are complementary and do not have to exist exclusively. ID emphasizes learning and supports a step-by-step process for developing instruction. Typically, instruction is driven by learning objectives, direct instruction, and uses traditional assessments to evaluate learning. LXD has an integrated approach with a heavier emphasis on emotional, social, and cognitive aspects of learning. In LXD, the focus is on integrating hands-on and collaborative instruction that often utilizes technology. According to Floor (2023), “A great way to explain the general difference between LXD and ID is by comparing a scientist to an artist” (para. 2). Like a scientist, the instructional designer follows a methodical process with clear objectives and measurable results. Meanwhile, the learning experience designer, like an artist, creates engaging, emotionally rich experiences that connect with learners on multiple levels beyond just transferring information.

Example

An example demonstrating the difference between ID and LXD can be illustrated in a professional development session with school staff. The staff will receive training on the new Assessment Feature in the school’s LMS.

Instructional Design (ID)	Learning Experience Design (LXD)
The staff is presented with the learning objective to learn the new online feature. Staff are required to use online assessments to collect data. ⊠ The instructor demonstrates the skills and steps to complete the goals. ⊠ The staff members try the step-by-step implementation as guided by the instructor. ⊠ Staff have begun using the new online feature in their classrooms. Instructors and administration evaluate and hold staff	The staff is presented with a problem that needs to be solved. The administration needs a way to collect data as students complete formative work. The staff are given the new online assessment feature on the LMS as a possible option. ⊠ Thestaff begins to explore the LMS and its features to experiment with how it works and whatit can do. As they explore, they create listsof pros and cons. The staff notes items forwhich they need further training or exploration. ▯

accountable for carrying out the directive.	Through collaboration, the staff determines that the online LMS is the best way to collect data. The staff begins using the assessment feature to collect data. As the data are collected, the administration and staff evaluate the effectiveness and adjust accordingly.

Reference(s)

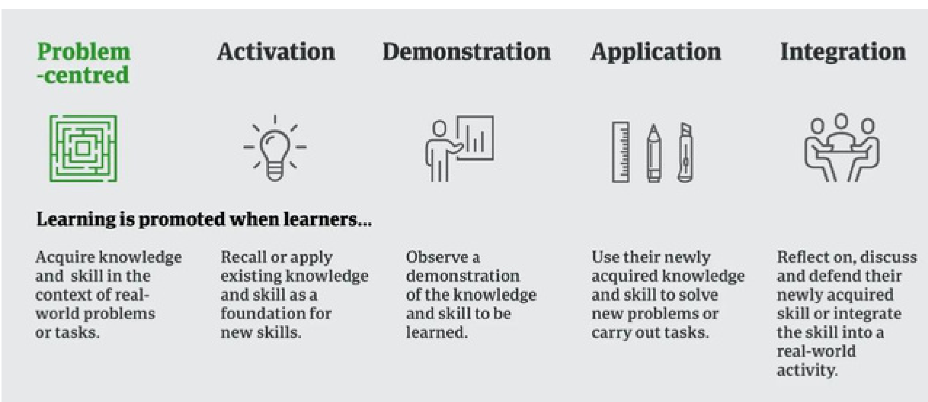
Floor, N. (2023, November 9). ***Learning experience design vs instructional design.*** Learning Experience Design. https://lxd.org/news/learning-experience-design-vs-instructional-design/

First Principles of Instruction

Merrill's Principles of Instruction

Figure 13

Merrill's First Principles of Instruction.



Adapted from ***First Principles of Instruction***, by M. D. Merrill, 2012, Pfeiffer. Copyright 2012 by John Wiley & Sons.

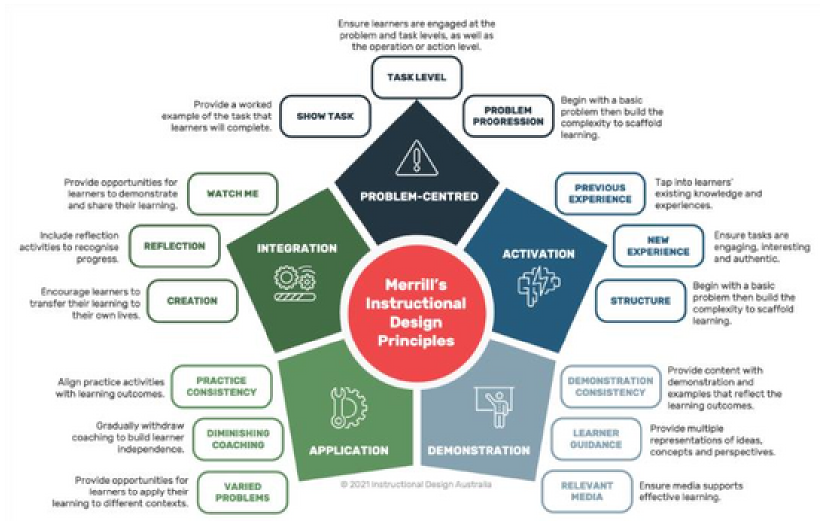
David Merrill, an educational researcher, studied some of the most well-known instructional theories and models to identify their shared characteristics. His goal was to create a list of common principles that would provide a more universal model for instructional design. This list of principles is Merrill's First Principles of Instruction (Merrill, 2002). Merrill (2009) identified the following principles as the First Principles of Instructional Design:

1. Demonstration: Learning is promoted when learners observe a demonstration.
2. Application: Learning is promoted when learners apply the new knowledge.
3. Task-centered: Learning is promoted when learners engage in a task-centered instructional strategy.

4. Activation: Learning is promoted when learners activate relevant prior knowledge or experience. 5. Integration: Learning is promoted when learners integrate their new knowledge into their everyday world. (Merrill, 2009, p. 4-5)

Figure 14

Infographic summary of Merrill's instructional design principles.



Adapted from ***Infographic Summary of Merrill's Instructional Design Principles***, by Discover Learning, 2021 (https://discoverlearning.com.au/2021/06/how-to-apply-merrills-instructional- design-principles/). Copyright 2021 by Discover Learning. Used under fair use for educational purposes.

Example

Merril's First Principles of Instruction could be used to train volunteers on how to respond to challenging scenarios when presenting in front of an audience.

1. Problem/Task: Present the problem by sharing real-world scenarios of challenging situations that have happened during presentations.
2. Activation: Invite discussion about commonalities volunteers have witnessed in great de-escalation scenarios versus commonalities they have witnessed in bad de-escalation attempts.
3. Demonstration: Invite volunteers to try and challenge the trainer with various situations or scenarios to see how they respond to challenging situations. Offer an example challenge situation to get volunteers thinking.
4. Application: Reverse the roles of the trainer and volunteers to practice responding appropriately to challenging situations. The trainer can offer tips, corrections, clarifications, and other guidance as needed (especially at first), until volunteers consistently respond to challenge scenarios appropriately. Afterward, ask volunteers to independently evaluate case study situations to determine what went right and what went wrong in the interaction. If the interaction went wrong, ask the volunteer to provide

instructions for the case study presenter about how they can improve their approach moving forward.
5. Integration: Once the volunteer demonstrates successful understanding of how to respond to challenging situations, they will have the opportunity to put this into practice during real-life presentations with a mentor present to help navigate challenging situations that arise if they struggle, until they demonstrate mastery of this skill.

Reference(s)

Clark, R. C. (2003). Building Expertise: Cognitive Methods for Training and Performance Improvement . Washington D.C., International Society for Performance Improvement.

Merrill, M. D. (2002). First Principles of Instruction. ***Educational Technology Research and Development.*** 50(3), 43-59. https://mdavidmerrill.wordpress.com/wp-content/uploads/2019/04/firstprinciplesbymerrill.pdf

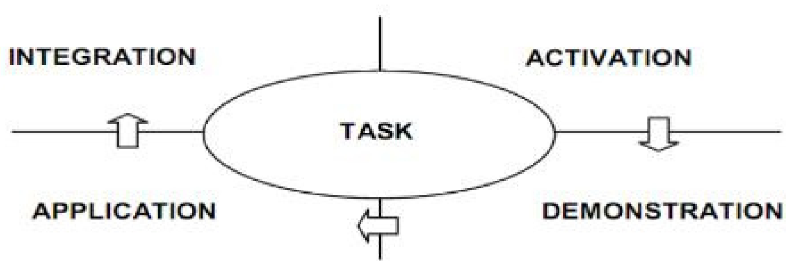
Merrill, M. D. (2007). A task-centered instructional strategy. ***Journal of Research on Technology in Education***, 40(1), 33-50. https://mdavidmerrill.wordpress.com/wp-content/uploads/2019/04/task_centered_strategy_published.pdf

Merrill, M. D. (2009). First Principles of Instruction. In C. M. Reigeluth & A. Carr (Eds.), ***Instructional Design Theories and Models: Building a Common Knowledge Base (Vol. III).*** New York: Routledge Publishers. https://mdavidmerrill.wordpress.com/wp-content/uploads/2019/07/firstprinciplesreigeluthcarr-1.pdf

Truong, M. T., Elen, J., & Clarebout, G. (2019, May). Implementing Merrill's first principles of instruction: Practice and identification. Journal of Educational & Instructional Studies in the World, 9(2), 25–34.' https://research.ebsco.com/c/36ffkw/viewer/pdf/gk5s5joaln

Merrill's Four-Phase Cycle of Instruction

Figure 15
The four-phase cycle of instruction.

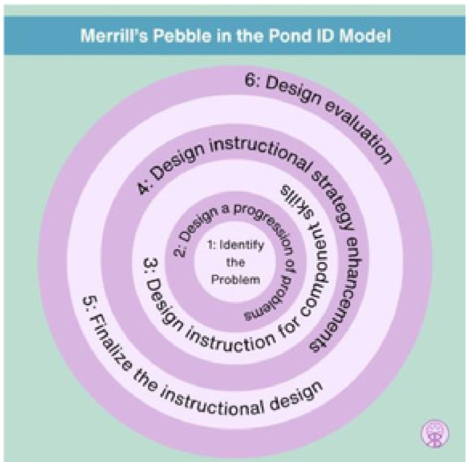


From ***Identifying Merrill's First Principles of Instruction in a BlendedLearning Course in Hanoi University, Vietnam*** [Master's thesis], by T. T. M. Truong, 2012, ***Katholieke Universiteit Leuven, Faculty of Psychology and Educational Sciences***. Copyright 2012 by Truong Thi My.

This four-phase cycle is a framework for implementing the First Principles of Instruction within a learning environment. Within this framework, an overarching problem is introduced to learners, who then learn how to address it through a series of instructional tasks. Each task follows the four-phase learning cycle. Learners repeat this cycle for each task. When all tasks are completed, the learner should have the necessary knowledge and skills to achieve the learning goal(s) (Merrill, 2007).

To design a four-phase learning experience, Merrill suggests a "pebble-in-the-pond" approach.

Figure 16
Merrill'spebble-in-the-pond model.



From ***A pebble-in-the-pond model for instructional design***, by M. D. Merrill, 2002, ***Performance Improvement, 41***(7), pp. 39–44 (reprinted 2015, ***Performance Improvement, 54***(5), pp. 40–45). Copyright 2002 by David D. Merrill. Adapted with permission.

Merrill (2007) elaborates on each ripple of the pond as follows:

Ripple 1: Identify a real-world problem or a ***whole task*** that learners could encounter. A problem or a whole task includes the following parts:

1. Inputs – the defined "givens" or information about the problem/task.
2. A goal – the identified overarching outcome (i.e., the product, activity, etc.) that learners are working to produce.
3. A solution – the specific task(s) (see ripple 2) that transforms the givens into the desired goal.
(Merrill, 2007)

Figure 17
Asampleproblem with identified tasks.

A Task-Centered Course in Entrepreneurship

The Center for Instructional Technology and Outreach at Brigham Young University developed a task-centered course in Entrepreneurship (Mendenhall et al., 2006a, 2006b). The primary goal of the course is to teach the fundamental steps for starting a business to non-business majors in developing countries. The whole task involves six steps: (1) Identify a business opportunity, (2) Define the idea, (3) Identify resources, (4) Acquire resources, (5) Start your business, and (6) Manage your business. The course is organized around scenarios for five real-world businesses in developing countries. The first whole task for this course is Veanesa's Pig Farm, a small product business in Cambodia. Space limitations in a short article preclude a complete description of this task here. Please refer to the on-line course referenced above to study this example of a whole task.

Ripple 2: Identify the task(s) learners need to complete to produce the desired goal. (i.e. the six fundamental steps of starting a business in Figure 17)

1. Determine specific task(s) that are complete in and of themselves, not just steps in a larger task, that need to be completed to produce the desired goal.
   a. Identify the steps (subtasks) that learners need to take to complete each task.
2. In a progression of tasks, sequence tasks so each is more complex than the previous.
3. Adjust tasks as needed to ensure each task:
   a. progresses smoothly to the next and
   b. can be effectively demonstrated and applied.

(Merrill, 2007)

Figure 18
Asampleof task progression.

Entrepreneur Course Task Progression

In the Entrepreneur course there are five whole tasks, each a scenario describing a small business in a developing country: (1) Veasna's Pig Farm, a product business in Cambodia, (2) Instant Service Carpet Cleaning, a service business in Mongolia; (3) Da Kine Wireless, a retail cell phone business in Laie Hawaii; (4) Fiesta Mexican Café, a restaurant business in Russia; (5) Kahn Sub, a fast food business in Mongolia. Each successive business in this progression is more complex that the preceding business. Each of the businesses involves all six of the fundamental steps for starting a business but the details of each step get more complex for each business in the progression. See the on-line course for more details about this progression of tasks.

Ripple 3: Identify the content components of each task, taking into consideration the task's steps.

1. Determine the content components needed for each task:
   a. Information – knowledge learners need to have or gain to complete a task.
   b. Portrayal(s) – real-world example(s) of the information as it applies to the task.
2. Determine or develop ***knowledge object(s)*** – the framework(s) for how learners will organize and store a task's content components.
3. Define the learning outcome(s) for each task:

a. Knowledge learning outcome(s) – the desired information the learner will retain after completing the task.
b. Skill learning outcome(s) – the desired ability the learner will have to apply their knowledge to real-world scenarios after completing the task.

4. Assign one of the four knowledge analysis procedures to each subtask
    a. presentation (tell),
    b. demonstration (show),
    c. recall (ask), and
    d. apply (do)

(Merrill, 2007)

The four knowledge analysis procedures resemble Bloom's Taxonomy, and they function in a similar manner, with 'tell/show' representing lower-order thinking and 'recall/do/ represent higher-order thinking. Earlier tasks will use lower-order thinking procedures. As learners progress through the tasks, the knowledge analysis procedure will transition to higher-order thinking processes. The final task will prioritize higher-level thinking procedures.

Figure 19

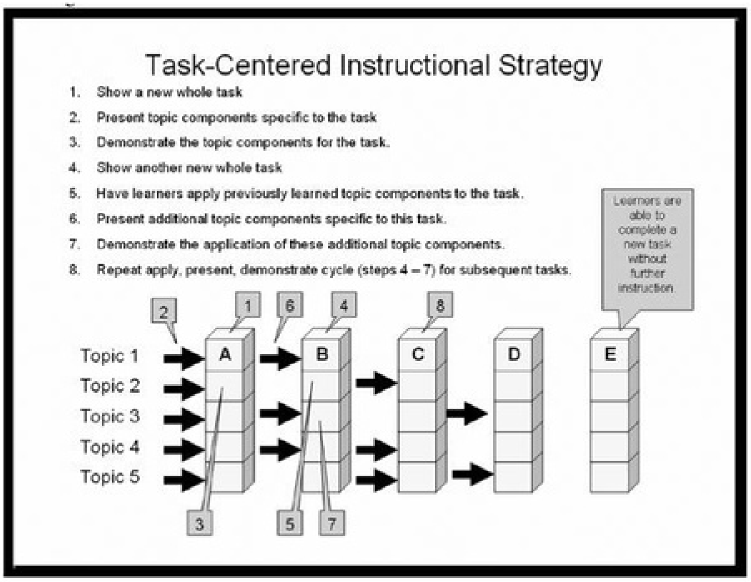
Thefivekinds of knowledge and skill acquired through instruction.

Learning Outcome	Remember Information (knowledge)	Apply Information to Portrayal (skill)
Information about	Remember the description of an entity.	Given a description recognize a given instance of an entity.
Parts-of	Remember the names and description of the parts of an entity.	For a given entity, locate the parts in the context of the whole.
Kinds-of	Remember the definition—the property values that define a class of entity.	Classify examples—identity entity portrayals that belong to a specific class of entity.
How-to	Remember the steps—a sequence of action names or descriptions.	Do the task—execute the actions in the sequence.
What-happens	Remember the name, description, conditions and consequence for the process.	Given the conditions predict a consequence or given a consequence find missing or faulted conditions.

Ripple 4: Define the instructional strategy steps for the whole task or series of whole tasks. Follow the steps shown in Figure 20.

Figure 20

Thetask-centered instructional strategy.



Example

Use Merrill's Four-Phase Cycle (activation, demonstration, application, and integration) to instruct volunteers in each step of utilizing the volunteer signup application.

Ripple 1: Problem/Task Identification. Volunteers need to be able to confidently use the volunteer signup platform.

1. Input: The platform's name and purpose. The platform is how volunteers can look for and sign up for opportunities to get involved or to post opportunities for other volunteers to get involved with them.
2. Goal: Empowering volunteers to get involved in ways that fulfill their personal desires and needs to give back.
3. Solution: Volunteers will learn to leverage the various components of the volunteer platform by 1) Identifying opportunities to get involved, 2) Committing to Volunteer Opportunities, and 3) Connecting with other volunteers.

Ripple 2: Task Progression

1. Identify Tasks and Subtasks
    a. Identify opportunities to get involved
        i. Access the volunteer opportunity calendar
        ii. Use the calendar search and filter features
        iii. Access opportunity details to learn more
    b. Commit to volunteer opportunities
        i. Identify available slots to help out
        ii. Claim an available slot
        iii. Edit commitment
    c. Connect with other volunteers
        i. Discover other ways to get involved
        ii. Post new opportunities on the calendar

iii. Communicate with other volunteers who want to get involved with you

Ripple 3: Task Components. (Knowledge objects = volunteer platform checklist and case-study-volunteer outcomes)

1. Identify opportunities to get involved. (KO = case study volunteer matching – volunteers can successfully match case study volunteers with relevant opportunities to get involved)
    a. Information: Platform location, login, filters, search features, and color-coding features.
    b. Portrayal: Examples of why the color codes matter and how search features help.
2. Commit to volunteer opportunities (KO = case study volunteer commitment notifications – volunteers can sign up case-study-volunteers for relevant opportunities or change their commitments)
    a. Information: Signup requirements, reminder process, and the change process.
    b. Portrayals: examples of why info matters, what happens if the process is not followed.
3. Connect with other volunteers (KO = case-studyvolunteer submission – volunteers can add appropriate new volunteer opportunities on the calendar)
    a. Information: Search ideas, submission requirements, and confirmation process.
    b. Portrayals: Examples of why requirements matter and what happens if the process is not followed.

Ripple 4: Instructional Strategy – Four-Phases of Instruction. Follow these phases for each of the three tasks outlined above.

1. Activation – Connect to what volunteers know from other platforms and experiences volunteering
2. Demonstration – Show how to complete each task using a case study volunteer.
3. Application – Have volunteers "help" 3 case study volunteers, applying appropriate scaffolding that decreases with each case study.
4. Integration – Have volunteers apply what they learned for themselves and sign up for their first opportunity (get involved) and share a new opportunity (connect with other volunteers to get involved).

Reference(s)

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Project Management Models

Agile

Agile emerged through a manifesto that provides a framework intended to guide software development (Beck, 2001). According to the manifesto (2001), there are twelve key principles for software development:

1. Satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements at any stage in development for the customer's competitive advantage.
3. Deliver working software frequently (i.e., in a couple of weeks to a couple of months)
4. Businesspeople and developers must work together daily throughout the project.
5. Build projects around motivated individuals, giving them the environment and support needed, and trust them to "get the job done."
6. Face-to-face conversation is the most effective and efficient method of sharing information for a development team.
7. Working software if the primary measure of success
8. Promote sustainable development where all parties in the development can maintain a constant pace indefinitely.
9. Maintain continuous attention to technical excellence and sound design.
10. Simplicity (maximizing the amount of work not done) is essential.
11. The best software development comes from self-organized teams.
12. Teams must regularly reflect on how to become more effective and then adjust accordingly.

(Beck, 2001)

While these principles were written for software development, they also lend themselves well to other industries, including instructional design and learning and development. Instructional designers can "leverage Agile as a mindset" and adapt the key principles behind the method to help "manage unpredictability and changing requirements" (Scanlon, 2001).

Example

This method can be reworked into a framework for Learning and Development solutions in the nonprofit sector. Scanlon's (2021) reworked principles for learning and development are:

1. Satisfy the customer through early and continuous efforts to build valuable L&D solutions.
2. Welcome changing requirements throughout the project to support the client's competitive advantage.
3. Deliver functional e-learning modules on the shortest possible timescale
4. Business stakeholders and the L&D team must collaborate and communicate throughout the project
5. Build projects around a motivated team that wants to be agile. Support and trust them to do a great job
6. Communicate as frequently as possible through face-to-face conversation
7. A working e-learning module is the primary measure of progress
8. Maintain a steady pace, indefinitely
9. Attention to sound design enhances agility
10. Simplicity is essential
11. The best e-learning solution emerges from self-organizing teams
12. Regularly reflect on how to be more effective, and then adjust accordingly

Reference(s)

Beck, K. et al. (2001). Manifesto for Agile Software Development. https://agilemanifesto.org/
Scanlon, S. (2021, July 6).

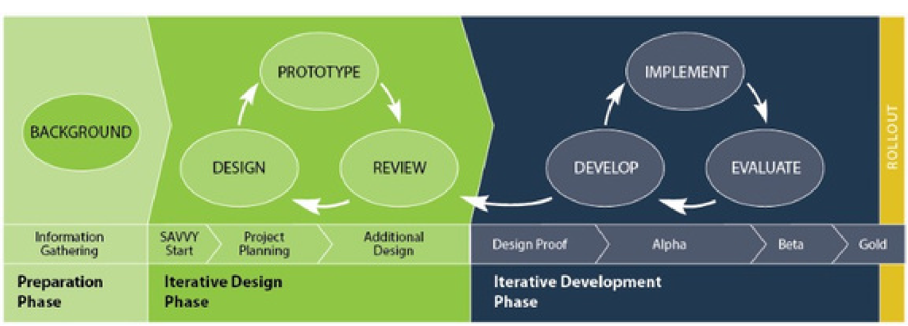
Elblearning. (2024). ***Embracing Agile methodologies in L&D***. ELB Learning Blog. Retrieved from https://blog.elblearning.com/embracing-agile-methodologies-in-ld

Scanlon, S. (2021, July 6). ***How to apply the 12 Agile principles to L&D project management***. eLearning Industry. Retrieved from https://elearningindustry.com/apply-12-agile-principles-ld-project-management

SAM | Successive Approximation Model

Figure 21

The successive approximations model.



From ***The Successive Approximations Model*** [Diagram], by Allen Interactions, n.d., ***Allen Interactions*** (https://learn.alleninteractions.com/services/custom-learning/sam/elearning-development). Copyright n.d. by Allen Interactions. Used under fair use for educational purposes.

SAM is a model that "breaks eLearning development into more manageable tasks" in a cyclical design that allows greater flexibility in addressing production issues as they arise unlike ADDIE and other linear models (Pappas, 2024). Pappas (2024) proposes the following seven steps for implementing SAM based on the prescribed three phases of development:

1. Involve key stakeholders in all steps of development

Preparation phase

2. Identify goals and outcomes.
3. Gather resources and research.
4. Host a brainstorming session.

Iterative Design Phase

5. Plan and prototype.

Iterative Development

6. Create a design Proof
7. Implement multiple evaluation phases

Example

SAM can be used when developing online training modules for volunteers.

1. Preparation Phase – Brainstorm and gather stakeholder and volunteer feedback.
2. Iterative Design Phase – Outline or storyboard training modules and draft volunteer portal wireframe. Evaluate, get feedback, repeat.
3. Iterative Development Phase – Create a working design proof, engage in 3 rounds of review/feedback.

Reference(s)

Allen, M. W., & Sites, R. (2012). Leaving ADDIE for SAM: An agile model for developing the best learning experiences. ASTD Press.

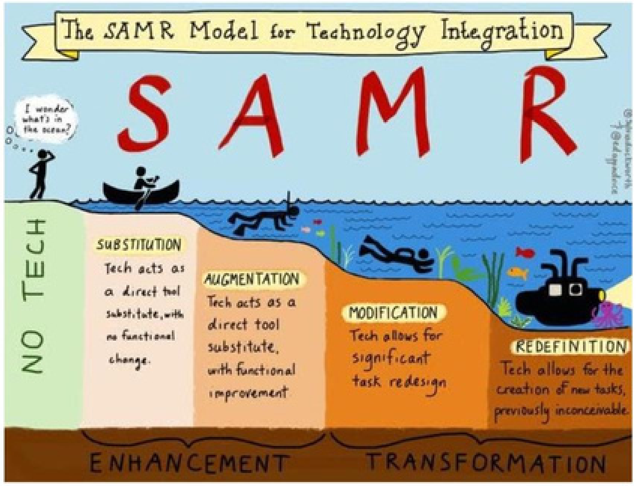
Allen Interactions. (n.d.). ***The Successive Approximations Model*** [Diagram]. Allen Interactions. https://learn.alleninteractions.com/services/custom-learning/sam/elearning-development

Pappas, C. (2024, August 5). ***7 tips to implement the SAM model in eLearning***. eLearning Industry. Retrieved from https://elearningindustry.com/tips-implement-sam-model-in-elearning

SAMR | Substitution, Augmentation, Modification, and Redefinition

Figure 22

SAMR Model for technology integration.



From SAMR Model [Diagram], by Auburn SchoolDepartment, n.d., Auburn School Department (https://www.auburnschl.edu/departments/technology_team/tech_tools_for_teachers/samr_model). Copyright n.d. by Auburn School Department.Used under fair use for educational purposes.

SAMR is a model that identifies the degrees to which technology can impact task-based learning. It provides a framework for how to leverage technology in instructional design that can “allow for the creation of new tasks previously inconceivable” (Puentadora, 2013).

Figure 23

Examples of SAMR in practice.

From SAMR Model [Diagram], by Auburn School Department, n.d., Auburn School Department (https://www.auburnschl.edu/departments/technology_team/tech_tools_for_teachers/samr_model). Copyright n.d. by Auburn School Department. Used under fair use for educational purposes.

Example(s)

1. Substitution – Volunteers can submit online volunteer application forms.
2. Augmentation – Volunteers can offer online event registration so attendees can modify their registration and receive automated confirmations and updates.
3. Modification – Volunteers can collaborate in SharePoint spreadsheets for event planning, tracking, and evaluation.
4. Redefinition - Volunteers can produce and publish their impact stories and their "why" to help raise awareness, and to recruit additional volunteers and sponsors.

Reference(s)

Auburn School Department. (n.d.). SAMR model [Diagram]. Auburn School Department. https://www.auburnschl.edu/departments/technology_team/tech_tools_for_teachers/samr_model

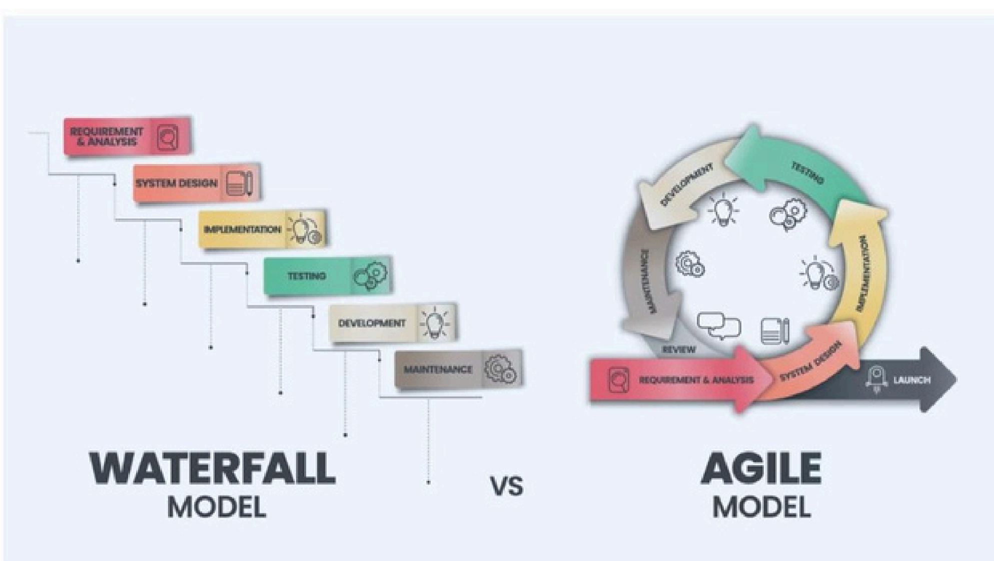
Puentedura, R. R. (2013). SAMR: A contextualized introduction. Retrieved from http://www.hippasus.com/rrpweblog/

Edutopia. (2019, May 15). ***A powerful model for understanding good tech integration***. Retrieved from https://www.edutopia.org/article/powerful-model-understanding-good-tech-integration/

Waterfall

Figure 24

Waterfall versus Agile.



From ***Agile vs. Waterfall*** [Diagram], by BairesDev, 2023, ***BairesDev Blog*** (https://www.bairesdev.com/blog/agile-vs-waterfall/). Copyright 2023 by BairesDev. Used under fair use for educational purposes.

In this model, a linear framework of steps is provided as a guide for project teams. In this methodology, "each step is dependent on the output of the previous step" (BairesDev, 2023). BairesDev (2023) suggests this model is a good fit for projects that:

- do not expect changes or unexpected developments,
- do not prioritize customer or stakeholder feedback,
- do not undergo multiple levels of testing or redevelopment, and
- have a well-defined timeline.

(BairesDev, 2003)

Example

This model can be used during the semi-annual volunteer handbook review and redesign.

1. Analysis - What has changed, or needs updating?
2. Design – Bring up to date with current imagery and organization verbiage.
3. Develop – Make the changes and updates.
4. Implement – Distribute to volunteers.
5. Review – Begin a list of items to address in future updates.

Reference(s)

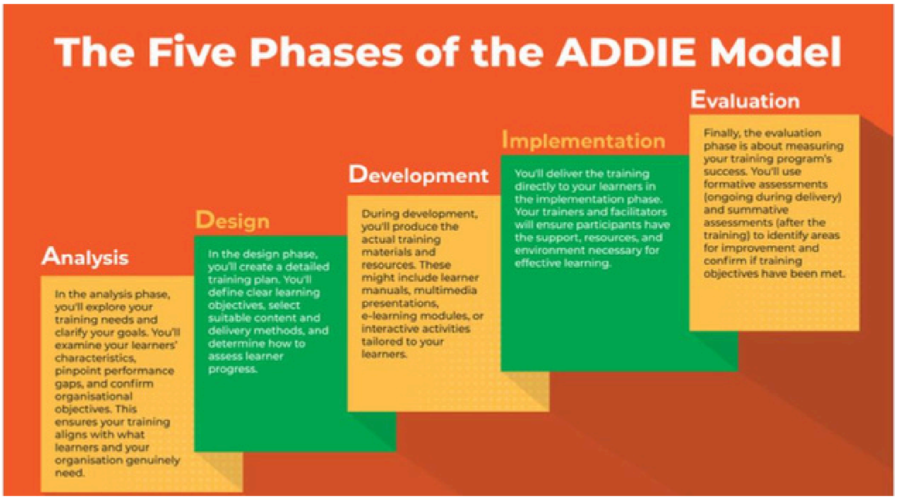
BairesDev. (2023). ***Agile vs. Waterfall*** [Diagram]. BairesDev. https://www.bairesdev.com/blog/agile-vs-waterfall/

Kirvan, P., Lutkevich, B., & Lewis, S. (2024, November 15). ***WhatistheWaterfallmodel? Definition and guide***. TechTarget. Retrieved from https://www.techtarget.com/searchsoftwarequality/definition/waterfall-model

ADDIE | Analysis, Design, Development, Implementation, and Evaluation

Figure 25

The five phases of ADDIE.



From ***RTO's guide to using the ADDIE model for instructional design***[Diagram], by RTO Learning Materials, n.d., ***RTO Learning Materials*** (https://rtolearningmaterials.com.au/blog/rtos-guide-to-addie-model/).

ADDIE is a framework comprising five phases that is widely used to guide the development and delivery of training and education (RTO, 2025). There is no substantiated origin for this model; it is thought to be a term used to describe a framework of instructional design based on the acronym ADDIE (Molena, 2003). Nadiyah and Shahbodin (2025) elaborate on the five phases:

1. Analysis – Define the learning givens, needs, and preferences (i.e., environment, design, interaction, instruction, outcomes, materials, assessment)
2. Design – Integrate the learning theories and models into the framework of the chosen design model to meet learning objectives and outcomes.
3. Development – Develop a draft and prototype.
4. Implementation – Implement the prototype.
5. Evaluation – Obtain user feedback to guide evaluation. Repeat cycle as needed.

Example

Utilize the ADDIE model to implement community outreach education initiatives.

1. Analysis – Define goals within the framework of organizational strategic goals, mission, and core values. Assess desired outcomes, materials, resources, connections, partnerships, and other relevant factors.
2. Design – Integrate desired outcomes (i.e., education material distribution vs educational classes vs trainings vs self-care support, etc.)
3. Develop – leverage the community stakeholders to develop an education initiative
4. Implement – launch initiative
5. Evaluation – solicit community and stakeholder feedback. Adjust, repeat.

Reference(s)

Molenda, M. (2003). In search of the elusive ADDIE model. ***Performance Improvement, 4***(2), 34–36.

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RTO Learning Materials. (2025). ***RTO guide to using the ADDIE model for instructional design***. Retrieved from https://rtolearningmaterials.com.au/blog/rtos-guide-to-addie-model/

Cognitive Load

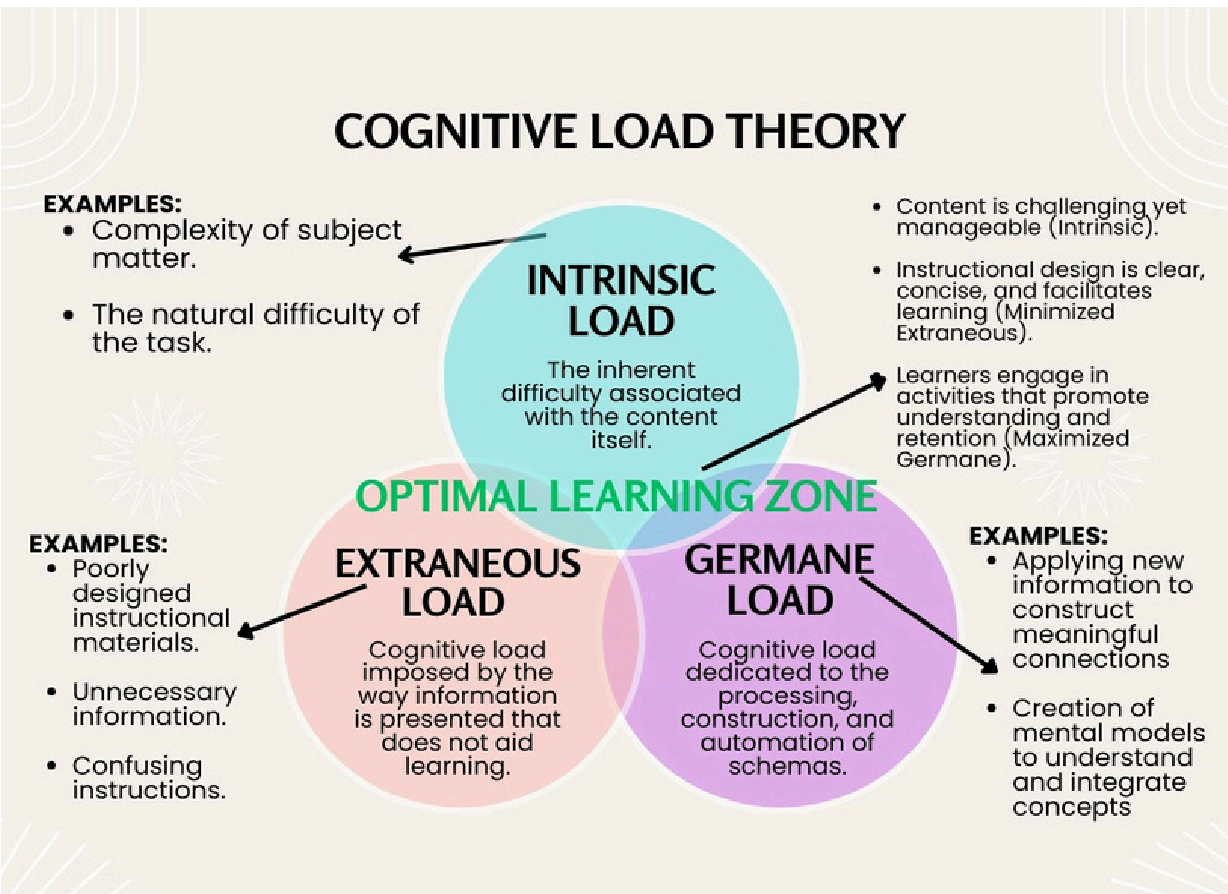
Module 3

Cognitive Load Theory

Cognitiveload theory provides a framework for understanding the mental processes involved in learningand the limitations of our working memory. Clark and Mayer (2024) define learning as a changeinknowledge caused by experience. Cognitive load theory builds on this by examining how ourbrains process, store, and manage information during learning.

Figure 26

CognitiveLoad Theory



At its core, the theory recognizes that our working memory has limited capacity. When these limits are exceeded, learning becomes ineffective. The theory identifies three distinct types of cognitive load:

Intrinsic load represents the inherent complexity of the material being learned. This load varies based on the learner's prior knowledge and the complexity of the content itself. Effective instruction carefully manages this essential processing to enhance learning (Clark & Mayer, 2024).

Extraneous load is the unnecessary mental effort caused by poor instructional design. This includes confusing layouts, irrelevant information, or unnecessarily complex explanations. As Clark and Mayer (2024) emphasize, well-designed courses minimize extraneous processing through thoughtful design strategies.

Germane load is the productive mental effort that contributes to deeper understanding. This includes activities that help learners construct schemas and apply knowledge. Courses should intentionally foster this generative processing to maximize learning and create lasting memories (Clark & Mayer, 2024).

In simple terms, cognitive load can be understood as the total mental effort required by a learner's brain when processing new information. Instructional designers must carefully balance these three types of cognitive load—reducing extraneous load, managing intrinsic load, and optimizing germane load—to create effective learning experiences.

Example

Cognitive load theory would apply during any instructional design project. If instructors were designing online professional development for training on new gradebook software at a school, they would minimize unnecessary cognitive burdens because learners have limited working memory capacity (Sweller, 2020). The designer would manage the intrinsic load by referring to what the staff currently uses for a gradebook. The course would refer to terms and names that the staff knows and break each component into smaller bits of information. The designer would minimize extraneous load by using a variety of learning experiences. The necessary content would be concise, include well-organized images, highlight important steps, and show each step necessary. Staff could easily follow the steps needed to learn the new gradebook. The training would maximize germane load by asking staff to work in groups and practice what they are learning during the training. The professional development would include scenarios asking the staff to solve problems using the new gradebook.

Reference(s)

Clark, R. C., & Mayer, R. E. (2024). ***E-learningand thescienceofinstruction:Provenguidelines forconsumersanddesignersofmultimedia learning***John Wiley & Sons, Inc.

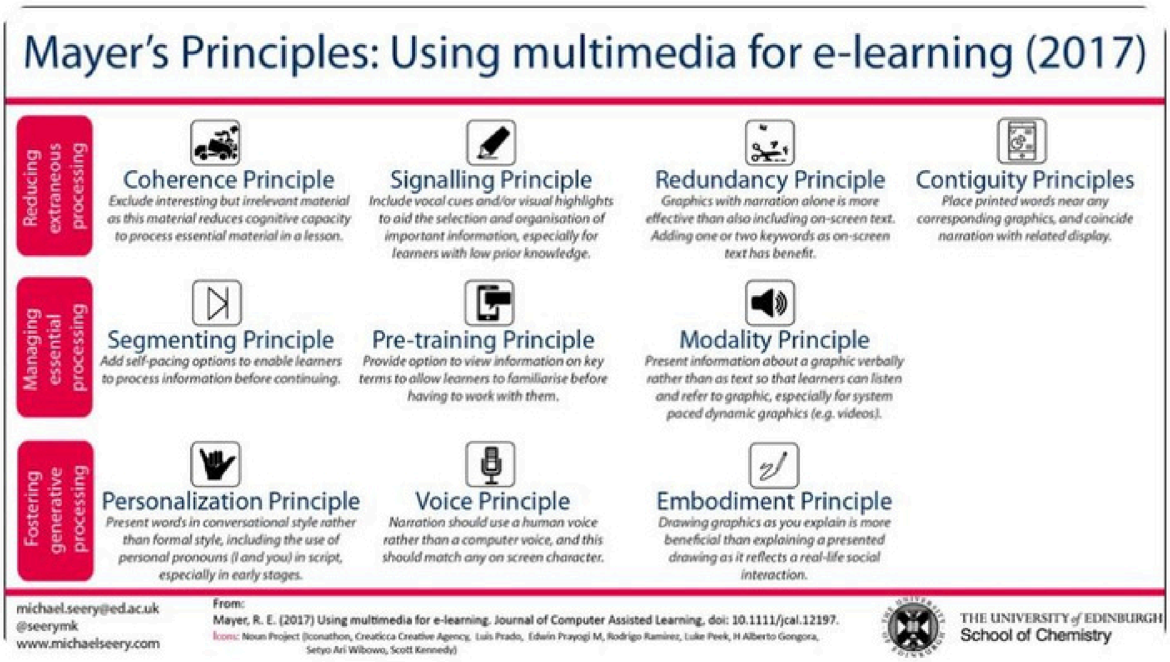
Sweller, J. (2020). Cognitive load theory and educational technology. ***EducationalTechnology Research and Development***, ***68***(1), 116.

Managing Cognitive Load

Multimedia Principle

Figure 26

Mayer'sPrinciples: Using multimedia for e-learning.



From ***Using multimedia for e-learning: Scientific support for the split-attention principle***, byB. Meyer, 2017, ***Journal of Computer Assisted Learning, 33***(6), p. 557. https://doi.org/10.1111/jcal.12165. Copyright © 2017 The Authors. Published by John Wiley& Sons Ltd.

Cognitive theory of multimedia learning (CTML) is a "continuing and evolving attempt to understand how meaningful learning works" (Mayer, 2024). Multimedia is the use of verbal and visual components together to present information (Richter et al., 2016). Mayer(2005) proposed three key assumptions in multimedia learning, which Akçayir et al (2012) elaborate:

1. Dual-channel – Information can be presented and learned through two key channels: visually and auditorily.
2. Limited Capacity – Each channel has limited capacity for processing at a given period (aka, cognitive load).
3. Active Processing – The learner actively joins the learning process.
    a. The learner "selects" visual and auditory information via eyes and ears,
    b. the "selected" information is processed into "mental interpretations," and
    c. finally, the information is integrated into pre-existing knowledge from the learner's long-term memory.

   (Akçayir and Akçayir, 2012)

To limit extraneous cognitive load, Mayer and Jackson (2005) proposed five principles:

1. Coherence – Avoid irrelevant information, even if it is interesting.
2. Signaling – Use cues (arrows, highlights, circles, etc) within learning materials to help learners efficiently identify and pay attention to the essential parts of the materials

3. Redundancy – Learning is more effective with animation/narration than with animation/narration/captions, since the addition of the third contend becomes "distracting."
4. Spatial Contiguity – Visuals and Text should be placed close together for better learning.
5. Temporal Contiguity – Narration should be timed and incorporated to play along with animations, and not played after or before the narration.

   (Mayer and Jackson, 2005)

Akçayir et al (2012) detail three principles to manage intrinsic cognitive load,

1. Segmenting – Present information and materials in "smaller portions" and allow the learner to "control the speed of multimedia."
2. Pre-Training – Provide key concepts, skills, characteristics, vocabulary, etc. prior to learning.
3. Modality – Learning is more effective as narration paired with visuals, instead of on-screen text.

and the three principles for managing germane cognitive load:

1. Multimedia Principle – learners learn more effectively when "exposed to both words and images" but to not use both forms of words (spoken and printed) at the same time.
2. Personalization – Learners learn more effectively when information has a conversational style and tone rather than formal.
3. Voice Principles – Learners learn better when words are spoken by a human rather than machine.
4. Image Principles – Adding interesting visuals do not improve learning if they are not relevant to the material
   (Akçayir and Akçayir, 2012)

Example

I will examine signaling and segmenting in more detail in the following sections. Here are some of the other principles that will apply to adult training, learning, and development:

- Dual-channel – Volunteer and staff training modules include pictures combined with narration.
- Limited Capacity – Onboarding modules will feature a limited number of key pieces of information. For consistency, each module focuses on only 3-4 pieces of key information.
- Active Learning – Learners will have the opportunity to engage in discussions, practices, etc.
- Coherence – Standardized information emails can be sent out to new volunteers that are designed to keep information clear and not overwhelming.
- Redundancy- Online modules will not combine the use of text captions with narration. Learners have the choice of spoken or text, but will not be provide both at the same time, to reduce cognitive load and distraction.

- Spatial Continuity – Relevant text is placed near accompanying imagery and uses signaling cues (see below) within modules.
- Temporal Continuity and Modality– Modules will incorporate narration with the imagery and will not break them into separate parts.
- Pre-Training – Before a new staff or volunteer begins onboarding and training modules, 1-on-1 opportunities will be provided to review important information ahead of time, such as how to locate, log in, and navigate the training site.
- Multimedia Principle – All learning modules include the pairing of images and words. When teaching about best practices for a vendor table setup, use pictures of tables and visual cues to illustrate different aspects of a vendor booth.
- Personalization – Modules will use simple language that is not formal.
- Voice Principle – A person will record the narrations, not AI.

Reference(s)

Akçayir, G., & Akçayir, M. (2022). Multimedia learning principles in different learning environments: a systematic review. Smart Learning Environments, 9(1), 10. https://slejournal.springeropen.com/articles/10.1186/s40561-022-00200-2

Mayer, R. E. (1997). A cognitive theory of multimedia learning: implications for instructional design. Journal of Educational Psychology, 91(2), 358–367. https://media.repository.chds.hsph.harvard.edu/static/filer_public/ca/62/ca625803-3d73-4855-b3e1-765870ce3772/2023_jwaxman_monograph_cogtheory_multimed.pdf

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning (pdf). ***Instructional Science***. Retrieved from https://www.researchgate.net/publication/253772914_Nine_Ways_to_Reduce_Cognitive_Load_in_Multimedia_Learning

Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. ***Educational Psychology Review, 36***(1), 1–25. https://research.ebsco.com/c/36ffkw/search/details/re3lsq5jbb?limiters=FT%3AY&q=A%20cognitive%20theory%20of%20multimedia%20learning%2C%20Mayer

Mayer, R. E., & Jackson, J. (2005). The case for coherence in scientific explanations: Quantitative details can hurt qualitative understanding. ***Journal of Experimental Psychology: Applied, 11***(1), 13.

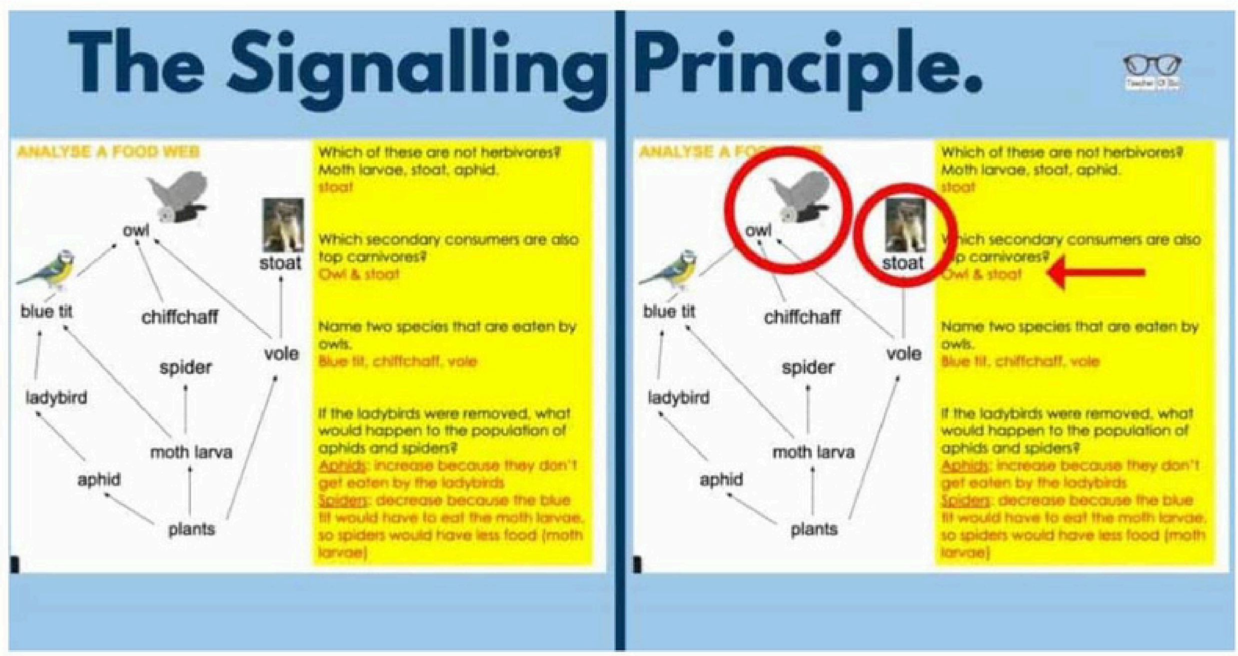
Richter, J., Scheiter, K., & Eitel, A. (2016). Signaling text-picture relations in multimedia learning: A comprehensive meta-analysis. ***Educational Research Review, 17***, 19–36.

Sweller, J., van Merriënboer, J. J., & Paas, F. (2019). Cognitive architecture and instructional design: 20 years later. Educational Psychology Review, 31(2), 261–292. https://www.sciencedirect.com/science/article/pii/S036013151930171X

Signaling

Figure 27

The Signaling Principle



From ***Mayer's 12 Principles of Multimedia Learning — Signaling Principle***, by LaurenHays, 2021, on the Digital Learning Institute website. Retrieved from https://www.digitallearninginstitute.com/blog/mayers-principles-multimedia-learning

Signaling means to be intentional in the placement of cues (i.e., arrows,circles,highlights,etc.) to draw a learner's eyes to specific components of the learning materialattherelevanttimes. This reduces cognitive load because learners do not have to expendpartoftheirmentaleffort on hunting and identifying the relevant information or components.Thegoaloflearningisfor learners to "create a meaningful, coherent representation or model"oftheconceptbeingtaught rather than "just memorizing a set of isolated facts" (Schneideretal,2018,p.377).Signaling helps learners to "distinguish between learning-relevant and learning-irrelevantinformation," which reduces frustration and cognitive overload (Richter et al,2016).

When working with adult learners, one of the key considerationsineducationaldesignisthe level of prior knowledge. Schneider, et al (2018) proposed that signalingis"especiallybeneficial for high-prior-knowledge learners" and that "low-prior-knowledgelearnersbenefit…aswell" (Schneider, et al, 2018)

Example

When teaching new staff and volunteers about safe ways to talk about sensitive topics, 3 key Do's and Don'ts can be highlighted by placing green checkmarks beside a the Do's and red "X"s for the Don'ts.

Reference(s)

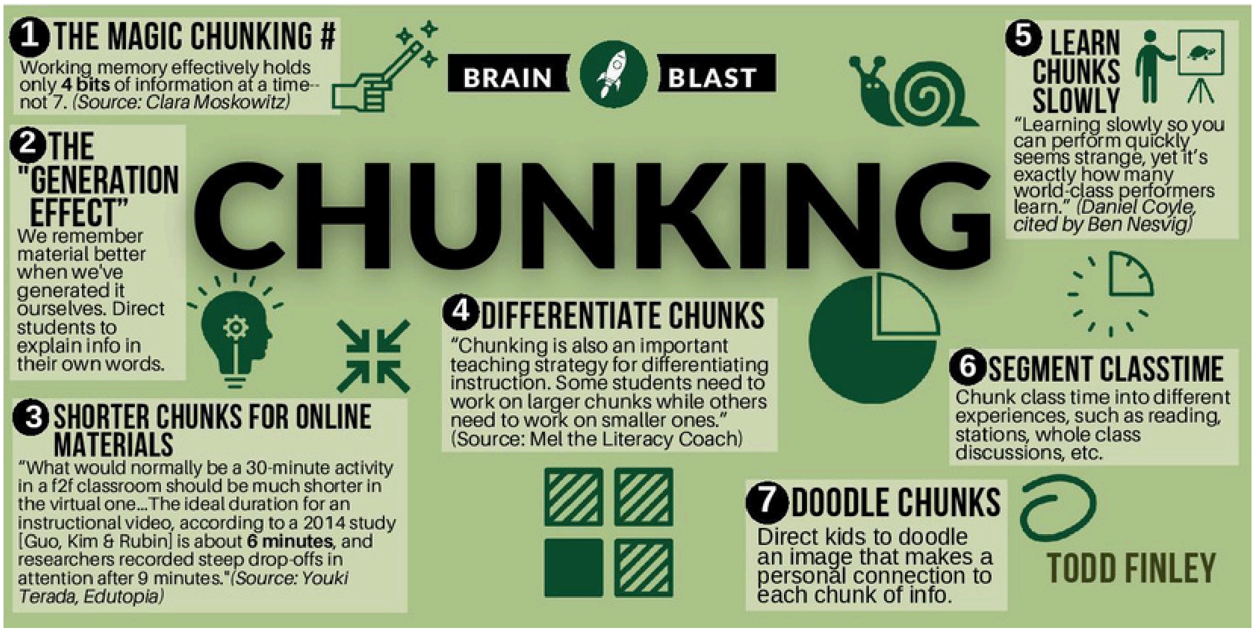
Richter, J., Scheiter, K., & Eitel, A. (2016). The effect of signaling depends on extraneous cognitive load. ***Applied Cognitive Psychology***. https://pmc.ncbi.nlm.nih.gov/articles/PMC8354981/

Schneider, B., Xie, H., van Gog, T. et al. (2018). Signaling as a cognitive guide in multimedia learning. ***Schneider & colleagues***. ResearchGate. https://www.researchgate.net/publication/232494695_Signaling_as_a_Cognitive_Guide_in_Multimedia_Learning

Chunking

Figure28

The art and science of chunking.



rom ***The art and science of CHUNKING*** [Infographic], by T. Finley, 2022, August 9, X (formerly Twitter). https://x.com/finleyt/status/1557202077243379712

Chunking is the learning principle that concludes that information is more effectively learned whenitis presented in spaller parts, or "chunks." This principle is based on the knowledge that "asthenumber of attributes we have to deal with increases, our capacity for accurately dealing withthem decreases" (Georgiou, 2010, p. 616). Pappas (2023) outlines three key instructional designstrategies for chunking:

1. Classify and prioritize content to remove irrelevant content
2. Group and divide course content into sections so learners don't feel "lost."
3. Organize the course structure to have a logical flow.
   (Pappas, 2013)

Example

During volunteer onboarding training, modules can be created to cover volunteer introductory materials. Volunteer onboarding could be broken into the following 5-6-minute modules: Organization Intro, Local chapter overview, Volunteer Expectations, Volunteer Resources, and Next Steps.

Reference(s)

Bartsch, L. M., & Shepherdson, P. (2023). Chunking, boosting, or offloading? Using serial position to investigate long-term memory's enhancement of verbal working memory performance. ***Attention, Perception, & Psychophysics, 85***, 1566–1581. https://doi.org/10.3758/s13414-022-02625-w

Finley, T. [@finleyt]. (2022, August 9). ***The art and science of CHUNKING | Brain Blast*** [Infographic]. X. https://x.com/finleyt/status/1557202077243379712

Georgiou, I. (2010). Tools for seven and the sausage machine: Searching for conclusions in Miller's 1956 magical paper. ***Systems Research and Behavioral Science***, ***27***(5), 461–476. https://doi.org/10.1002/sres.1022

Pappas, C. (2013, June 3). ***3 chunking strategies that every instructional designer should know*** [Blog post]. eLearning Industry. https://elearningindustry.com/3-chunking-strategies-that-every-instructional-designer-should-know

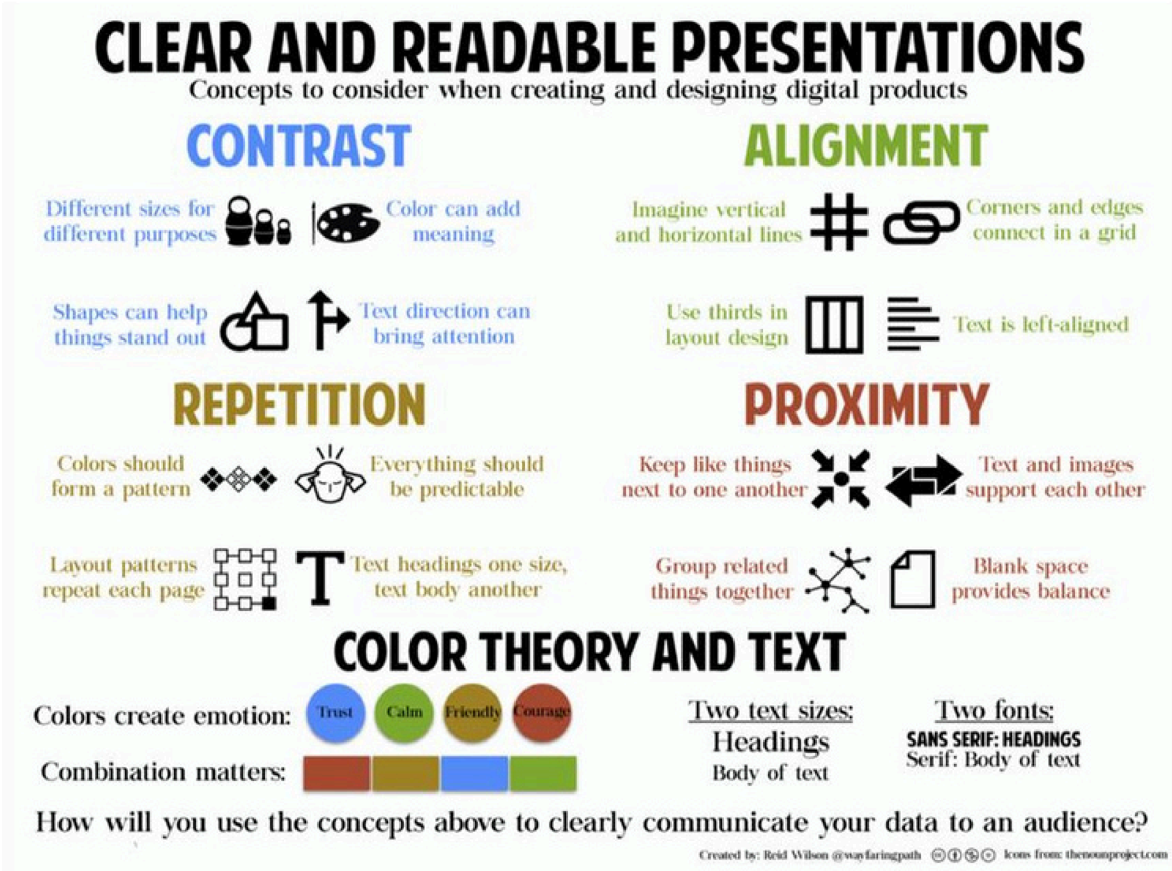
Shaffer, L. S. (1982). Hamilton's marbles or Jevon's beans: A demonstration of Miller's magical number seven. ***Teaching of Psychology***, ***9***(2), 108–110. https://doi.org/10.1207/s15328023top0902_17

Thalmann, M., Souza, A. S., & Oberauer, K. (2017). How does chunking help working memory? ***Journal of Experimental Psychology: Learning, Memory, and Cognition***. Retrieved from https://www.researchgate.net/publication/324804549_How_Does_Chunking_Help_Working_Memory

Visual Cognitive Load/C-R-A-P

Figure 29

Clear and Readable Digital Presentations



From ***Visual Design for Digital Learning: C.R.A.P. Principles – Clear and Readable Presentations*** [Graphic], by Digital Learning Institute, n.d., on the Digital Learning Institute website. Retrieved from https://www.digitallearninginstitute.com/blog/visual-design-for-digital-learning-c-r-a-p-principles

Visual cognitive load involves the mental load needed for learners to process and retain relevant information from visual materials. "Split-attention" is what happens then a learner is presented with more than one piece of visual information that is important for learning (Schroeder, 2018). When learners experience "split-attention," they are distracted and learn less effectively (Schroeder, 2018). C.R.A.P. provides a framework of guidance to design visual materials with cognitive load in mind. Visuals have an increasing presence in information presentation for learners, who "need to attend to, search through, and evaluate this information in order to integrate it. (Linger, et al, 2009), these steps can overwhelm cognitive load if designers are not careful to provide information that is designed in such a way to minimize cognitive load.

Figure 30
C- Contrast

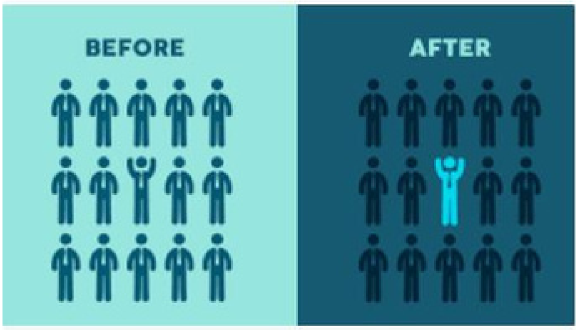


Figure 31
R-Repetition

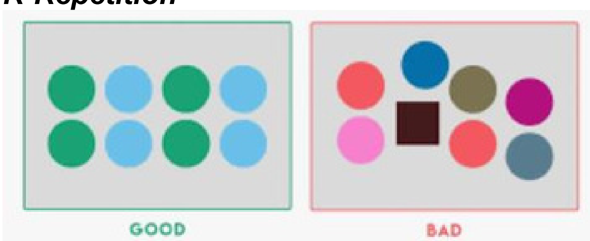
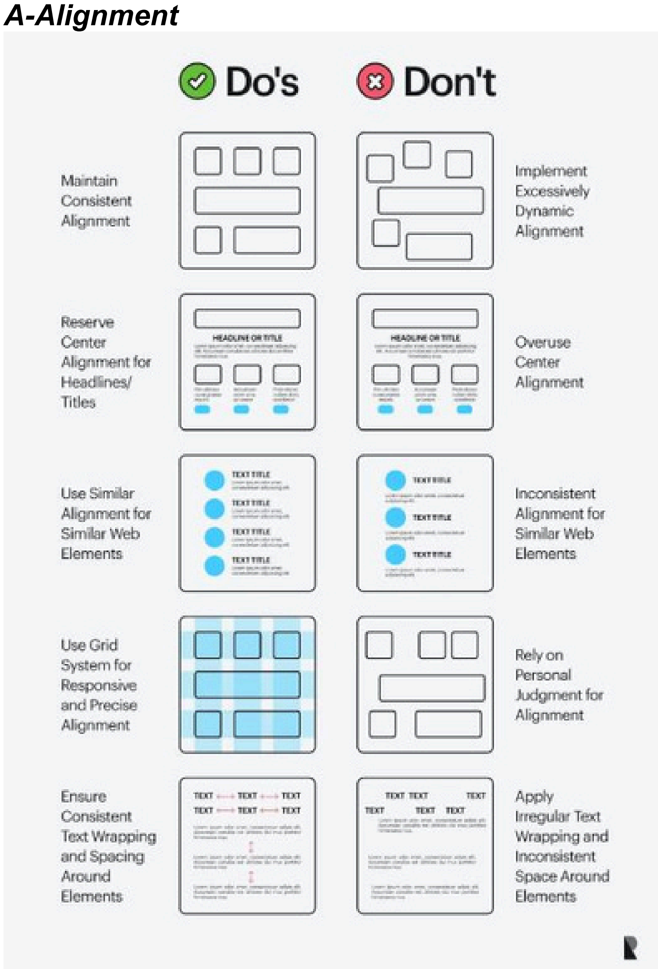


Figure 32
A-Alignment



https://www.ramotion.com/blog/alignment-in-web-design/

Figure 34

P-Proximity

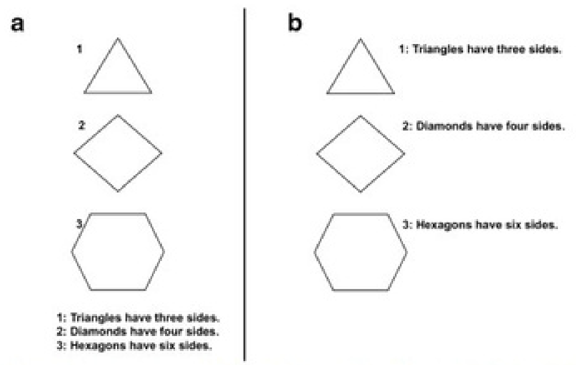


Fig. 1 Two basic design variations when learning the properties of shapes. a Spatially distant design. b Integrated design

Example:

In email communication to volunteers, important information, such as dates and times, is in bold fonts or colors. Font and formatting are consistent throughout the email. All sections of the email are aligned to the left with consistent vertical spacing. Staff contact information is located immediately following staff names and titles.

Reference(s)

Digital Learning Institute. (n.d.). ***Visual Design for Digital Learning: C.R.A.P. Principles – Clear and Readable Presentations*** [Graphic]. Retrieved from https://www.digitallearninginstitute.com/blog/visual-design-for-digital-learning-c-r-a-p-principles

Klingner, J., Tversky, B., & Hanrahan, P. (2009). Effects of visual vs. verbal presentation on cognitive load in vigilance tasks. ***Stanford University Technical Report***. https://research.ebsco.com/c/36ffkw/search/details/pomjembspb?limiters=FT%3AY%2CRV%3AY&q=Effects%20of%20visual%20vs.%20verbal%20presentation%20on%20cognitive%20load%20in%20vigilance%20tasks

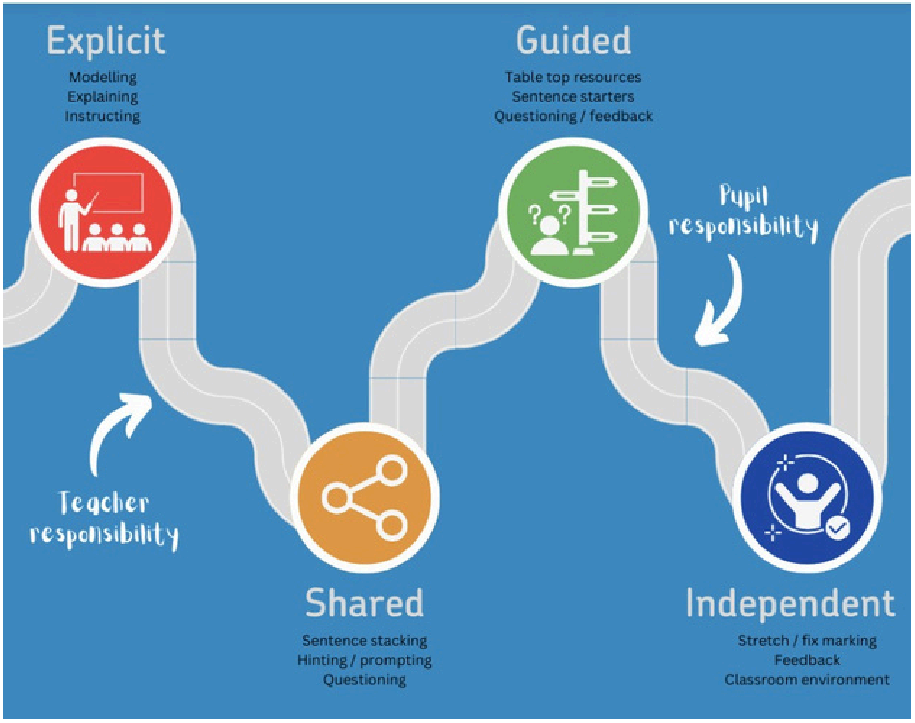
Schroeder, N. L., & Cenkci, A. T. (2018). Spatial contiguity and visual split-attention effects in multimedia learning. ***Educational Psychology Review***. https://research.ebsco.com/c/36ffkw/search/details/gnupmgoahj?limiters=FT%3AY%2CRV%3AY&q=Spatial%20contiguity%20and%20visual%20split-attention%20effects%20in%20multimedia%20learning%2C%20Schroeder

Strategies for Student Learning

Scaffolding

Figure 35

Ascaffolding model



From ***Differentiation vs Scaffolding: a joint approach to adaptive teaching*** [Infographic], by Testbase, 2024, on the Testbase website. Retrieved from https://www.testbase.co.uk/differentiation-vs-scaffolding-a-joint-approach-to-adaptive-teaching/

Scaffolding provides intentional support for learners, enabling them to achieve learning outcomes successfully. When learners have insufficient background knowledge, they struggle to be successful in solving problems, even if the problems are well-designed (Ge et al., 2003). Scaffolding ensures that learners have sufficient background knowledge and skills in place. Kim (2011) notes some theories that have been suggested to support student learning with technology:

1. Scaffolding hypermedia to foster self-regulated learning (Azevedo, 2005)
2. Software-based metacognitive scaffolding for online inquiry (Quintana, et al, 2005)
3. Epistemic scaffolds to guide tech-supported, explanation-driven inquiry.

Memmert, et al (2003) provided a framework for identifying issues related to student learning success and the corresponding design requirements and principles, shown in the two figures below. Additionally, the third figure supports their conclusion that AI scaffolding can be used to support learning.

Figure 36
Learner requirements for problem solving.

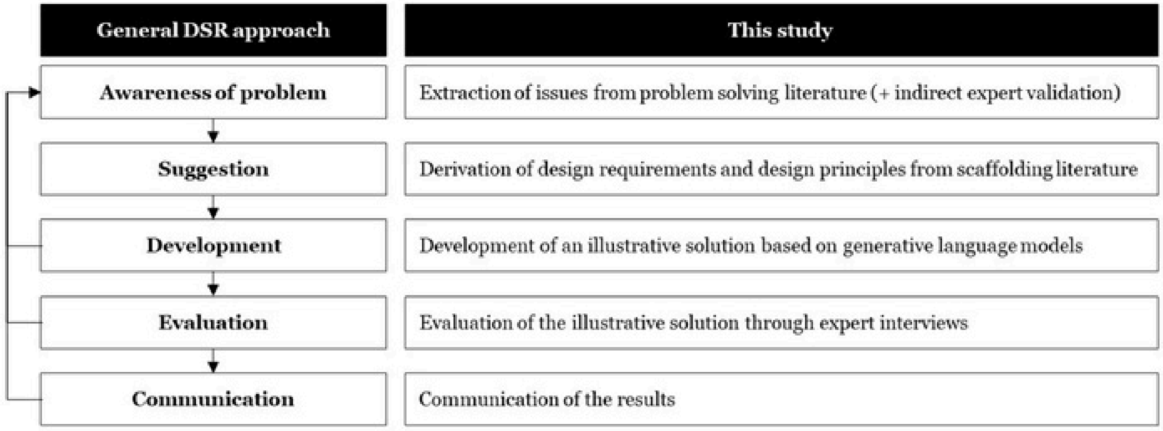


Figure 3. Our DSR Approach Based on Kuechler and Vaishnavi (2012)

From Memmert, L., Tavanapour, N., & Bittner, E. (2023). Learning by doing: Educators' perspective on an illustrative tool for AI-generated scaffolding for students in conceptualizing design science research studies. Copyright 2023 by the Journal of Information Systems Education.

Figure 37

Designprinciples for learner shortcomings for problem-solving.

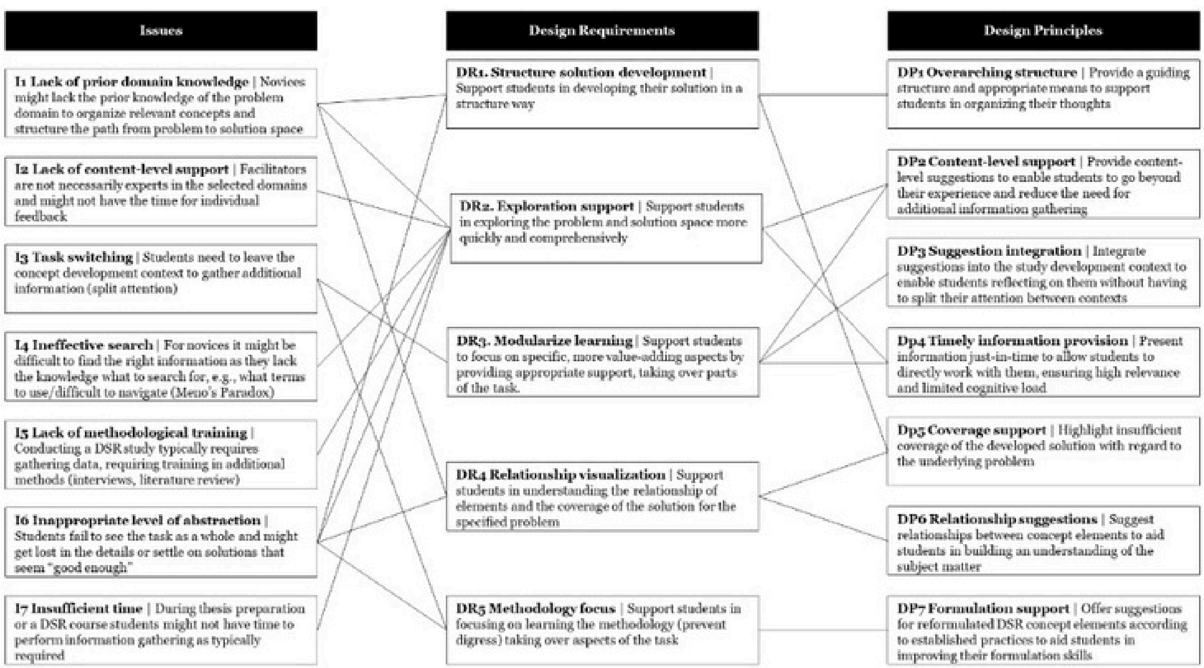
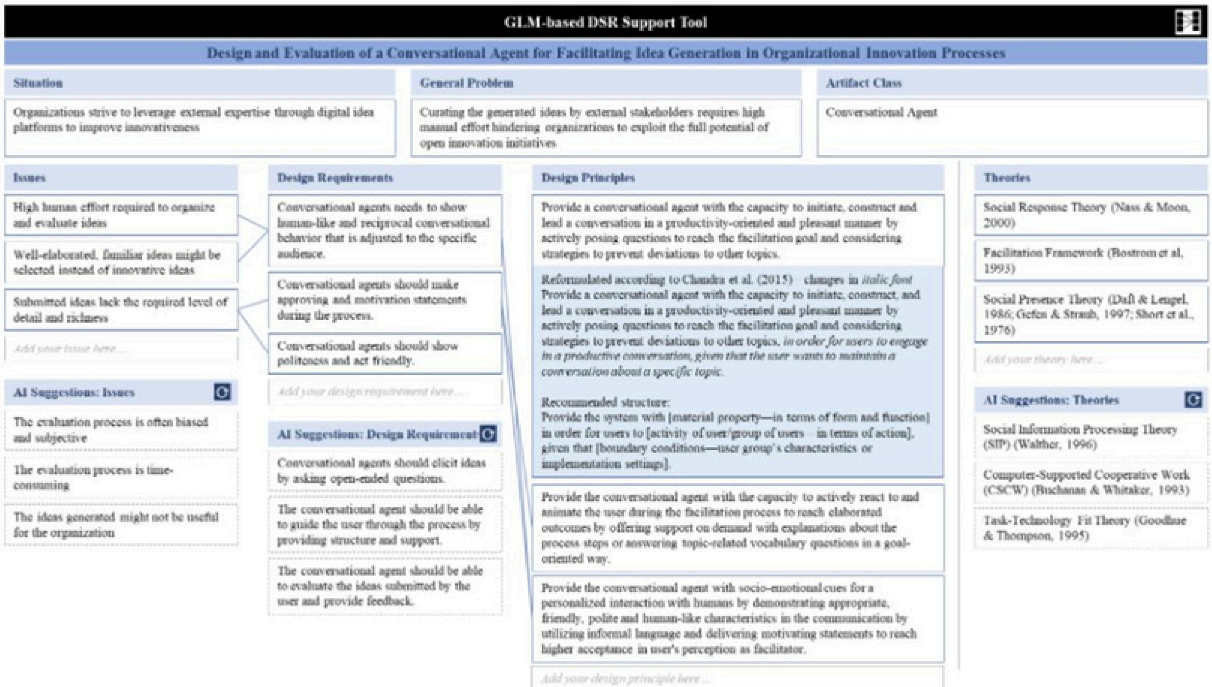


Figure 4. DSR Study Concept

From Memmert, L., Tavanapour, N., & Bittner, E. (2023). Learning by doing: Educators' perspective on an illustrative tool for AI-generated scaffolding for students in conceptualizing design science research studies. Copyright 2023 by the Journal of Information Systems Education.

Figure 38
UsingAltocreate learner scaffolding.



From Memmert, L., Tavanapour, N., & Bittner, E. (2023). Learning by doing: Educators' perspective on an illustrative tool for AI-generated scaffolding for students in conceptualizing design science research studies. Copyright 2023 by the Journal of Information Systems Education.

Example

When volunteers first begin presenting, they are invited to watch multiple presentations by seasoned presenters, provided with support to record themselves practicing, and then connected with a mentor to start presenting small sections of programming in public, gradually building up to larger portions of a presentation. This scaffolding allows volunteers to gradually increase their confidence and speaking fluidity over the course of several months.

Reference(s)

AVIANTY, A., Friantini, et al. (2023). Influence of problem-solving understanding on math learning outcomes. ***Frontiers in Education***. https://www.frontiersin.org/articles/10.3389/feduc.2023.1088556/full

Ge, X., & Land, S. M. (2003). Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions. ***EducationalTechnology Research and Development***, ***51***(1), 21–38. https://doi.org/10.1007/BF02504515

Kim, M. C., & Hannafin, M. J. (2011). Scaffolding problem solving in technology-enhanced learning environments (TELEs): Bridging research and theory with practice. ***Computers & Education, 56***(2), 403–417. https://www.sciencedirect.com/science/article/abs/pii/S0360131510002526

Memmert, L., Tavanapour, N., & Bittner, E. (2023). Learning by doing: Educators' perspective on an illustrative tool for AI-generated scaffolding for students in conceptualizing design science research studies. ***Journal of Information Systems Education***, ***34***(3), 279–292. https://research.ebsco.com/c/36ffkw/search/details/feognmlwu5?limiters=FT%3AY%2CRV%3AY&q=Scaffolding%20problem%20solving%20in%20technology-enhanced%20learning%20environments%3A%20Bridging%20Research%20and%20theory%20with%20practice%2C%20Kim

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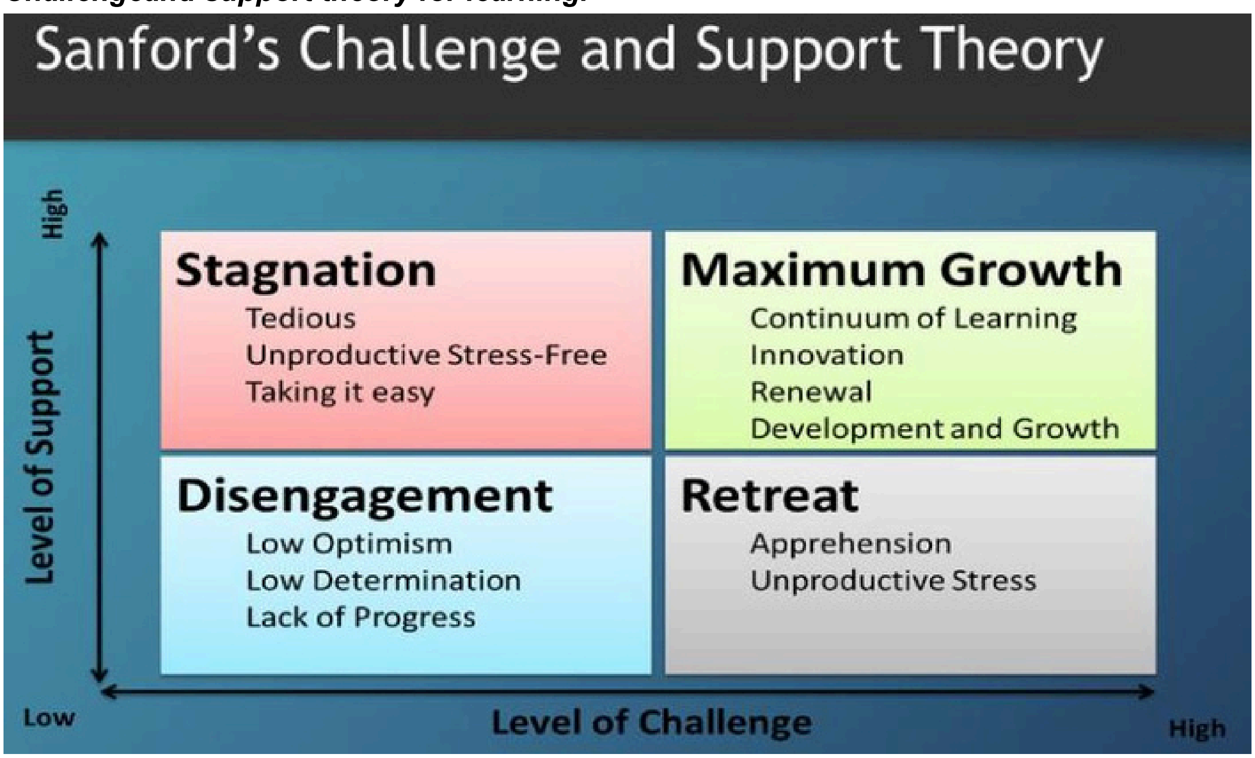
Levels of Challenge

Figure 38

Challengeand support theory for learning.



From ***Sanford's Challenge and Support Theory*** [Diagram], in ***Matrix of Student Success: A 2x2 w/ Social + Academic Engagement***, by Deep Thoughts Ed, 2024, July 7. Retrieved from https://deepthoughtshed.com/2024/07/07/matrix-of-student-success-a-2x2-w-social-academic-engagement/

Levels of challenge are based on the theory that learners need to be challenged "optimally and continually, because if they are challenged too much or not enough, it can lead to loss of learning potential (Davis, 2015). Davis (2015) suggests three key components for challenging learners effectively:

1. The speed and difficulty of learning are continually adjusted
2. Instructor expectations align with student aptitudes.
3. Reduce the variation in student learning.
   (Davis, 2015)

Productive struggle means enabling learners to recognize and persist through struggles for the purpose of learning (Chen, 2024). The tables below illustrate the types of "uncertainty" that induce productive struggling and its anticipated learning outcomes.

Figure 39

Typesandroles of learner uncertainty.

TABLE 1 Types and roles of scientific uncertainty in sensemaking.

	Conceptual uncertainty	Epistemic uncertainty
Definition	Subjective experience of being unsure or unconfident about one's conceptual understanding	Subjective experience of being unsure or unconfident about one's epistemic understanding
Role in sensemaking	Drive students to activate prior knowledge (e.g., content and everyday knowledge), identify the gap within it, or assess limitations of their existing conceptual understanding	Drive students to find a way to generate a tentative hypothesis, claim, evidence, and model for further investigation—to reduce epistemic uncertainty and eventually conceptual uncertainty
Complementary interactions	Conceptual and epistemic uncertainty are neither stable nor independent of each other, but are dynamically evolving and codependent; for example, conceptual (epistemic) uncertainty evolves to another conceptual (epistemic) uncertainty through struggling with conceptual (epistemic) uncertainty as the sensemaking process unfolds	

Figure 40

Sourcesoflearner uncertainty and how to use that uncertainty to design learning.

TABLE 3 Four sources of scientific uncertainty.

	Insufficiency	Ambiguity	Incoherence	Conflict
Definition	A condition in which students are aware that they need to pursue deeper understanding—conceptual or epistemic—to explain, interpret, or make sense of a phenomenon	A condition in which meaning of available understanding—conceptual or epistemic—is vague, unsure, undefined, unclarified, and/or open to multiple interpretations	A condition in which there is inconsistency, disconnect, or lack of clarity between current and new understanding—conceptual or epistemic	A condition in which students cannot integrate contradictory information into an existing understanding—conceptual or epistemic
Cognitive condition	Struggle with an absence of understanding, a recalling of relevant knowledge, or a mismatch between what is recalled and newly presented information about the new target phenomenon	Struggle in distinguishing between one and another meaning or deciding which meaning is intended	Struggle in explaining and integrating newly encountered information and current understanding in a consistent and comprehensible way	Struggle in explaining encountered events as they violate/contradict one's existing understanding
Role in sensemaking	Drive students to problematize an everyday phenomenon and explore the gaps in their existing understanding	Drive students to clarify, elaborate, and discuss which meaning and perspectives work better for supporting their claims, perspectives, and decisions	Drive students to generate coherent connections between current and new understanding across vertical and horizontal curricula	Drive students to explore discrepancy between what they know or believe and the target phenomenon and develop better explanations
Pedagogical use	Conceptual insufficiency: Problematizing everyday phenomena, language, and experience, rather than directly telling what they do not know	Conceptual ambiguity: Creating point-of-need conditions to explicitly articulate different meanings or nuances of language to describe a phenomenon	Conceptual incoherence: Providing opportunities to explicitly compare and integrate current and new understanding to build a coherent knowledge structure, rather than directly giving information	Conceptual conflict: Encouraging students to explore conflicting events and generate alternate explanations to understand and resolve conflicts, rather than merely replacing misconceptions with more accurate scientific knowledge
	Epistemic insufficiency: Providing opportunities to plan (e.g., forming questions to problematize phenomena) and enact investigations and generate argumentation	Epistemic ambiguity: Creating an open space to discuss how to interpret fuzzy and unclear data to make sense of blind spots, and varying evidence to support claims, perspectives, and decisions	Epistemic incoherence: Creating an open space to discuss how to put all evidence and/or epistemic resources together to generate a coherent explanation	Epistemic conflict: Challenging students by providing contradicting ideas/methods/positions or counter-evidence/argument to negotiate conflicts through discussion

Example

When supporting a volunteer board through annual goal setting, provide them with a toolkit of information, statistics, previous goals, and accomplishments. Include a template for goal setting topics and then break them into groups where each member engages in constructive discussion about an area of focus that they are specifically interested in and engaged with. Then let them complete the task of setting out appropriate goals and be able to back up those choices when they present them later to the full board.

Reference(s)

Chen, Y.-C., Jordan, M., Park, J., & Starrett, E. (2024). Navigating student uncertainty for productive struggle: Establishing the importance for and distinguishing types, sources, and desirability of scientific uncertainties. ***Science Education***, ***108***(4), 1099–1133. https://doi.org/10.1002/sce.21864

Davis, M. H., & Hackathorn, J. (2015). Theory of sustained optimal challenge in teaching and learning. ***Techne: Research in Synthesis of Knowledge***, 19(1), 55–65. https://journals.sagepub.com/doi/10.1177/1541931213601584

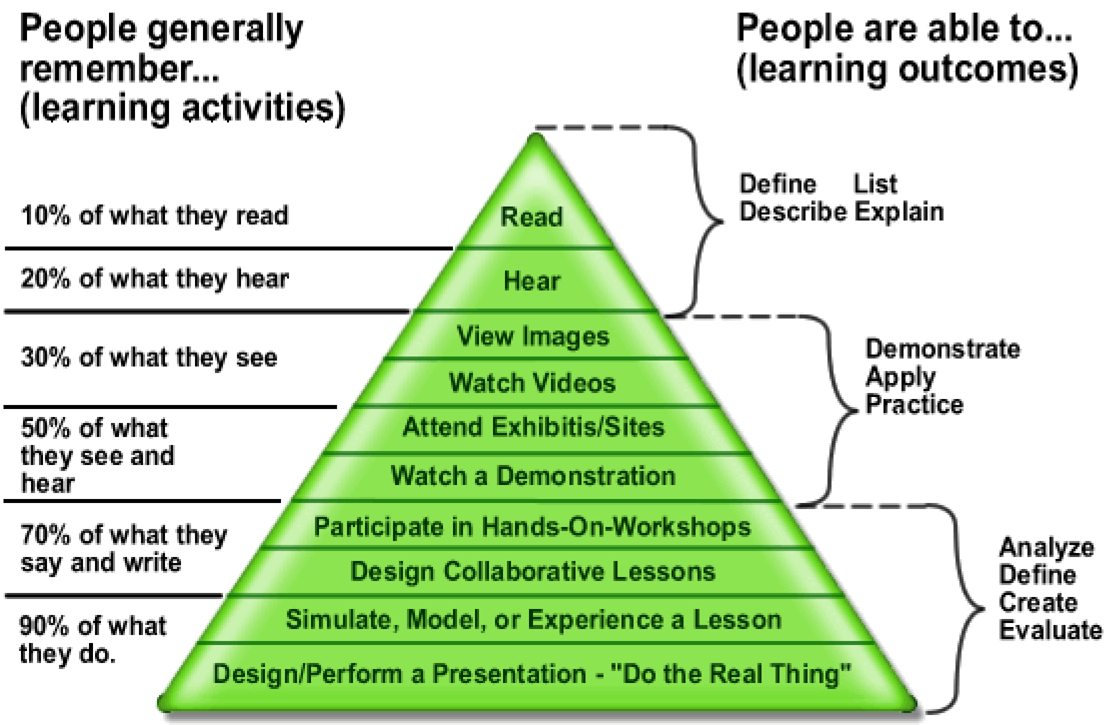
Tayler, J., et al. (2024). Learning in challenge-based contexts: designing optimal tasks. ***Learning Environments Research***. https://journals.sagepub.com/doi/10.1177/14697874241230459

Wisniewski, B., & Zwaan, R. (2024). Productive struggle: balancing challenge and support. ***Journal of Educational Change***. (Review, open access).

Active Learning

Figure 41

Active learning outcomes triangle.



From ***Active Learning Pyramid*** [Graphic], in ***Active Learning***, by UBC Wiki, n.d. Retrieved from https://wiki.ubc.ca/Course:EDCP371_951_2010/Active_learning

"Active learning engages students in the process of learning through activities and/or discussion in class as opposed to passive listening to an expert" (Freeman, et al, 2014). Nguyen, et al propose 8 strategies for successfully implementing active learning:

1. Explanation – Describing the benefits and purpose of the active learning component (typically before learning begins)
    a. Establish expectations
    b. Explain the purpose
2. Facilitation – promoting engagement in the activity and keeping it running smoothly.
    a. Learners- engage with students during the activity
    b. Encourage learners – create a motivating and supportive environment.
3. Planning
    a. Choose appropriate activities – in terms of time constraints, difficulty level, engaging activity, relevant, etc.
    b. Create group policies – team sizes, role assignment, responsibility delegation, group selection, etc.
    c. Align the course – intentionally connecting multiple parts of a course together with the activity. Additionally, align the activity with grade expectations.
    d. Solicit and review student feedback.
    (Ngyuen, et al, 2014)

Example

When new volunteers are interested in getting involved with advocacy efforts, training could include opportunities to practice "telling their story," or presenting "their ask" for others who can help guide them in tweaking or strengthening their skills in speaking about advocacy issues.

Reference(s)

Freeman, S., et al. (2014). Active learning increases student performance in STEM. ***PNAS, 111***(23), 8410–8415. https://www.pnas.org/content/111/23/8410

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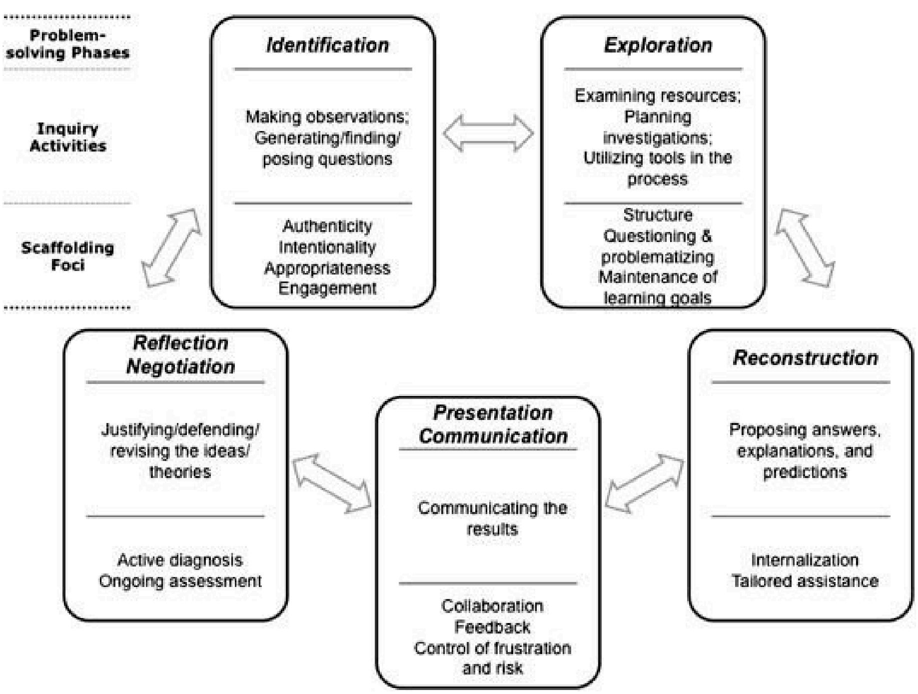
Problem-Solving Tasks

Figure 42
The problem-solving method.



From ***Scaffolding problem solving in technology-enhanced learning environments (TELEs)*** [Diagram], by M. C. Kim & M. J. Hannafin, 2011, ***Computers & Education, 56***(2), 403–417. https://www.sciencedirect.com/science/article/abs/pii/S0360131510002526. Copyright © 2011 Elsevier Ltd.

In problem-solving learning, learners are provided with methods and tools that they can apply to solve a defined problem (Duran-Nova & Torres, 2024). Duran-Nova & Torres investigated designs for problem-solving methods:

Figure 42
TRIZ – TheContradiction Method

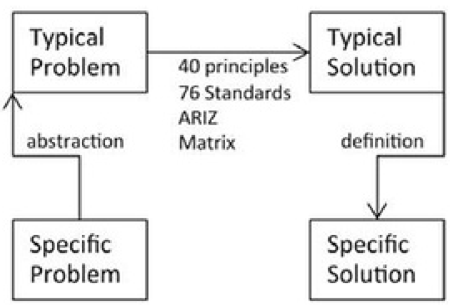


Figure 1. Basic representation of TRIZ's strategy

Figure 43
SCAMPERMethod

Letter	Meaning	General questions
S	Substitute	What can be substituted? Which elements could be added? Sounds? Lights?
C	Combine	What can be blended, mixed, or included? Which parts can be repeated, duplicated, triplicated, etc.?
A	Adapt	What is similar to the "objective?" Does its shape suggest something? A new colour, smell, texture?
M	Modify (also, Magnify or Minimize)	What can be made larger or smaller? Longer or thicker? More compact or shorter?
P	Put to other use	What are the other ways to use it? Does its shape suggest other uses?
E	Eliminate (also Elaborate)	Which parts can be eliminated? What if there is no product?
R	Reverse (also Rearrange)	What happens if the assembly is reversed? Can it be turned inside out? Upside down?

Table 1. SCAMPER questions, adapted from (Gero et al., 2013)

Figure 44
Kj-Technique

Step	Activity	Description
1	Question	On a board, the team defines the focus question (problem).
2	Alternatives	In silence, members propose alternatives using notes.
3	Grouping	In silence, the team groups similar or related alternatives.
4	Filtering	Duplicated ideas are deleted, while the related ones are linked (e.g., arrows).
5	Development	Each group of ideas is analysed as a potential solution, being expanded, restricted, or decomposed. If necessary, the cycle repeats.

Table 2. The Five Steps of the KJ-technique, adapted from (Kawakita, 1991)

(Duran-Nova & Torres, 2024).

Example

If community engagement is a concern, staff and volunteers could be tasked with "problem-solving" how to increase engagement during development opportunities. Break the group into smaller groups and ask them to come up with solutions that will be shared and discussed with the full group. Then, let the whole group plan with 3-5 "action items" based on the problem-solving discussions.

Reference(s)

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Knowing the Learner

Module 4

Learner and Context Analysis

Dick and Carey Model

The Dick and Carey model, also known as the Systems Approach Model, represents a comprehensive and systematic framework for instructional design first introduced in 1978 in "The Systematic Design of Instruction" (Instructional Designers of Penn State, 2018). This influential model stands apart from earlier linear approaches by emphasizing the interconnections between all design elements and incorporating crucial feedback loops throughout the process.

This model's iterative nature makes it particularly effective—instructional designers can continuously refine and modify components based on evaluation data, ensuring the entire instructional system evolves to better meet learner needs. Rather than viewing instruction as simply delivering content, the Dick and Carey model conceptualizes instruction as a complete system aimed at helping learners achieve specific outcomes (Dick & Carey, 2015).

Steps	Definition/Description
1. Identify Instructional Goals	Determine what learners should be able to do after completing instruction by analyzing needs, examining existing goals, or conducting needs assessments.
2. Conduct Instructional Analysis 3. Analyze Learners and Contexts	Break down the instructional goal into specific component skills and knowledge required for successful performance.
4. Write Performance Objectives	Identify characteristics of target learners, including prior knowledge, skills, attitudes, and the learning environment where skills will be used.
	Specify exactly what learners can do, under what conditions, and to what standard after instruction.
5. Develop Assessment Instruments, 6. Develop Instructional Strategy	Create assessments directly tied to performance objectives that measure learner achievement of each objective.
7. Develop and Select Instructional Materials	Plan the specific instructional activities, including pre-instructional activities, content presentation, learner participation, assessment, and follow-through.
	Create or select instructional materials based on the instructional strategy, including instructor guides, student materials, and media.
8. Design and Conduct Formative Evaluation 9. Revise Instruction	Test instructional materials with representative learners to identify areas for improvement before full implementation.
	Use data from formative evaluation to improve the effectiveness of instruction through targeted revisions.

This comprehensive understanding of learners, including their academic motivation, learning preferences, and contextual needs, enables instructional designers to create targeted, effective learning experiences that align with performance objectives while accommodating the specific characteristics of the learner population.

Example

As an instructional designer at a mid-sized university, I was tasked with developing a new online graduate course in educational leadership. Rather than diving straight into content creation, I employed the Dick and Carey model to ensure a systematic approach.

I met with the subject matter expert to identify the core instructional goal: preparing students to develop data-driven school improvement plans. Through careful analysis, we determined the essential skills students would need and examined the unique characteristics of our working professional student population.

With established, clear performance objectives, I developed authentic assessments that measure students' ability to analyze school data and create implementation plans. These assessments directly informed my instructional strategy, which balanced theoretical foundations with practical applications relevant to the students' professional contexts.

As I developed the course materials, I maintained focus on the interconnected nature of the Dick and Carey model. When initial testing with a small student group revealed confusion around data analysis procedures, I quickly revised those specific modules while ensuring the changes aligned with the established objectives and assessments.

This systematic, iterative approach allowed me to create a cohesive learning experience that addressed the specific needs of the graduate students while maintaining rigorous academic standards—demonstrating the practical value of the Dick and Carey model in higher education instructional design.

Reference(s)

Dick, W., & Carey, L. (2015). ***The systematic design of instruction*** (8th ed.). Pearson.

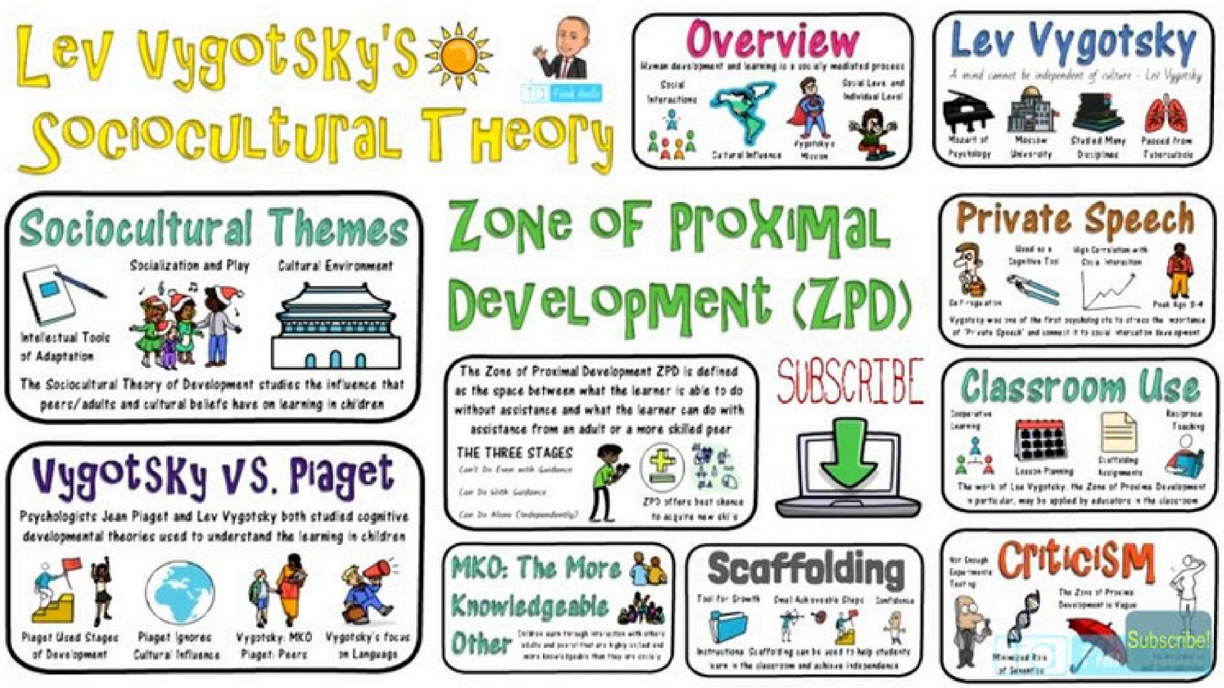
Instructional Designers of Penn State. (2018). Dick and Carey model of design***. Pressbooks***. https://psu.pb.unizin.org/idhandbook/chapter/dick-carey/

Sociocultural Factors

Sociocultural Theory

Figure 45

Lev Vygotsky's Sociocultural Theory



Infographic summarizing Lev Vygotsky's Sociocultural Theory, including key concepts such as the Zone of Proximal Development, scaffolding, private speech, and comparisons with Piaget. Adapted from ***Lev Vygotsky's Sociocultural Theory*** [Video], by Frank Adam, 2021, YouTube. https://www.youtube.com/watch?v=_fWm7cF8-WM

Sociocultural theory proposed that all learning happens through socialization and exposure to the culture (John-Steiner, et al, 1996). Eun (2016) highlights the four major domains of Vygotsky's theory:

1. Sociocultural domain – learning happens through social interactions.
2. Ontogenetic domain – society adopts practices and tools to support socialization.
3. Phylogenetic domain – human cognitive and social patterns evolve.
4. Microgenetic domain – language development occurs through socialization, over time.

Vygotsky's Zone of Proximal Development suggests that learners grow in knowledge and skill as they interact with a "more knowledgeable other," highlighting the important role that educators play in learning. "Collaboration between teacher and learner bridges the gap between the individual and society, facilitating the development of a creative product—new knowledge" (Rigopouli, et al, 2025). When considering instructional design implications, it is also crucial to remember that "prioritizing student thinking leads to better student learning" (Jeong et al, 2022).

Examples

New public presenters, whether staff or volunteers, likely have a wide range of experience in public speaking, audience engagement, program facilitation, content knowledge, etc. According to the sociocultural learning theory, new presenters can learn how to be effective presenters by working together in peer learning groups. This could include practicing presentation delivery or role-playing audience questions and responses. Others in the peer group can offer feedback based on their own experience and prior knowledge.

Additionally, applying the Zone of Proximal Development and scaffolding might look like pairing new presenters with a presenter mentor who will work with the new presenter to co-present portions of the presentation, in a growing amount, until they are ready to present on their own. A mentorship scenario also capitalizes on the "More Knowledgeable Other (MKO)" as the seasoned presenter can share knowledge with the new presenter as they work together to provide programming.

Reference(s)

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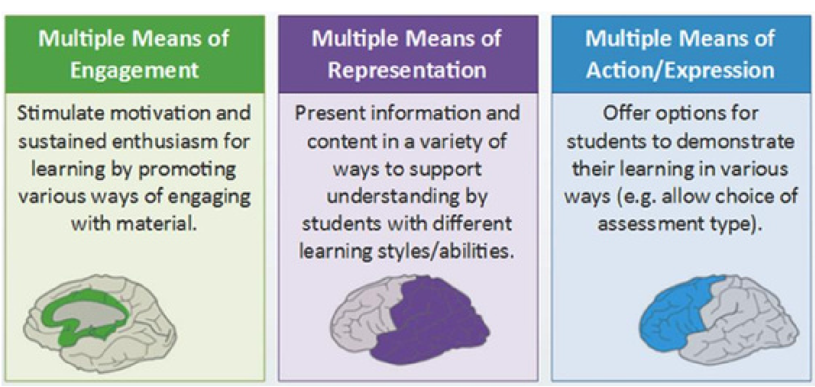
Universal Design for Learning

Figure 45

The three core



Visual representation of Universal Design for Learning (UDL) principles emphasizing engagement, representation, and action/expression. Adapted from ***Thoughts on UDL***, by J. D. Hunt, 2019, ***Home.blog***. https://jdh33431.home.blog/2019/06/22/thoughts-on-udl/

UDL is a framework for designing learning opportunities that acknowledges and supports the diversity of learners and ensures accessibility for all (Barteaux, 2014). Designing instruction for diverse learners means including multiple options, which Booth et al. (2018) outlined with a variety of research-based applicable examples:

1. Engagement – the “why.”
    a. Provide time for learners to practice or apply learning.
    b. Ensure assignments or tasks support the learning objectives.
    c. Use (accessible) technology to “enhance” learning.
    d. Use collaborative learning.
    e. Include “real-world” examples and experiences.
    f. Provide multiple content sources.
    g. Provide examples or modeling.
    h. Share clear expectations (i.e. syllabus, overview, examples, and rubrics).
    i. Provide notes and summaries (before, during, and after learning).
    j. Include a variety of activity formats.
    k. Respect learner diversity.
    l. Use scaffolding.
    m. Assess for engagement.
2. Representation – the “what”
    a. Design outcomes that support various learner preferences.
    b. Utilize cues for key information.
    c. Include transcripts of audio/visual materials.
    d. Include “real-world” examples and experiences.
    e. Allow choices for learning outcome format.
    f. Provide prompt feedback.
    g. Share clear expectations (i.e. overviews, examples, and rubrics).
    h. Provide learning materials in multiple formats.
    i. Ensure simple and accessible navigation and technology.
    j. Use concept mapping tools, organizers, or knowledge objects,
    k. Use engaging platforms (i.e. social media).
3. Action and expression – the “how.”
    a. Provide accessible technology choices.
    b. Provide clear expectations (i.e. examples and rubric).
    c. Provide choices and flexible options for skill demonstration.
    d. Provide prompt feedback.
    e. Provide opportunities to practice with support.
    f. Provide assessments with diversity in mind.
    g. Provide concept mapping tools or organizers.

(Booth, et al., 2018)

Examples

Multiple means of engagement – Provide real-life scenarios to illustrate the importance of a topic and learning goal. Have volunteers pair up or form small groups to discuss how to apply their learning to the volunteer area that interests them the most.

Multiple means of representation – Provide new staff and volunteers with a well-organized handbook that covers important topics. Additionally, provide a series of short videos with graphics or images and narration that review each of the manual topics.

Multiple means of action and expression allow new volunteers or staff to engage in reflective journaling, participate in a "role-play review," or create a way to share in their volunteer collaborative community platform.

Reference(s)

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