

# How To Accommodate Different Learning Styles in Computer-Based Instruction

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1. There are different definitions of learning styles.
  - A. Are they consistent enough to distinguish a pattern that is usable from a teaching point of view?
    1. Masterman, M. (1970) The nature of paradigm growth, in I. Lakatos, & A. Musgrave, *Criticism and the Growth of Knowledge*. (Cambridge, Cambridge University Press). Learning styles research is multiparadigmatic with no accepted theoretical orthodoxy.
  - B. If not, which one(s) shall we use in putting together teaching programs?
    1. Robotham, D. (1999) The application of learning style theory in higher education teaching. <http://www.chelt.ac.uk/el/philg/gdn/discuss/kolb2.htm>. Summarizes difficulties in applying learning styles to teaching.
2. Is learning style a constant or a variable? Does an individual always use the same approach over time? Does he or she use the same approach for all kinds of problems?
  - A. Evidence learners adapt their learning style based on perceptions of the requirements of the task
    1. Messick, S. (1984) The nature of cognitive styles: problems and promise in educational practice. *Educational Psychologist*, 19: 59-74.
    2. Streufert, S. & Nogami, G.Y. (1989) Cognitive styles and complexity: implications for industrial and organisational psychology. in: C.L. Cooper & I. Robertson (Eds) *International Review of Industrial and Organisational Psychology*. (Chichester, Wiley).
  - B. Suggestion that learning style varies according the learning task
    1. Talbot, R. (1985) Situational influences on learning styles. *Industrial and Commercial Training*, 23 (1): 19-28.
  - C. Possible for learning style to change during the course of a study
    1. Barris, R., Kielhofner, G. & Bauer, D. (1985) Educational experience and changes in learning and value preference. *Occupational Therapy Journal of Research*, 5: 243-256.
3. How should we apply learning-style concepts to teaching?
  - A. Should we put together programs that use the learning style the individual prefers, i.e., make the teaching style fit the learning style of the learner?
    1. Kolb, D.A. (1976) *Learning Style Inventory. Technical Manual*. (Massachusetts, Institute for Development Research). Students are likely to reject a learning

environment that is at variance with their own learning styles.

- B. Or should we put together programs that fit with different learning styles to force the students to broaden their approaches to learning, i.e., make the teaching style differ from the learning style of the learner?
  - 1. Kolb, D.A. (1984) *Experiential Learning: Experience as the Source of Learning and Development*. (New Jersey, Prentice-Hall Inc.). There are potential long-term benefits where there was an intentional mismatch between learning style and instructional style.
  - 2. Matthews, D.B. (1991) The effects of learning style on grades of first year college students. *Research in Higher Education*, 32 (3): 253-268. Argues that mismatching may be appropriate for developmental reasons, matching leads to more positive attitudes, more knowledge and skills, particularly in novel and new situations.
- 4. If learning styles change, does it make any sense to put together a program fitted to a particular learning style? Is it likely that we will have classes made up of individuals, all with the same learning-style preference? If they start that way, will they stay that way?
- 5. Does it make sense to construct courses that accommodate different learning styles simultaneously? Each module has something for visual learners, something for global learners, etc.

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## Environmental

- chronotype (time)
- lumen type (lighting)
- auraltype (background sound)
- kinesthetictype (body position)
- calortype (temperature)

## Preferred sensory channel

- visual (readings, illustrations, media, handouts, maps, diagrams)
- auditory (lectures, discussion, read aloud, tapes, study partner)
- kinesthetic (demonstration, field trips, draw concepts, create models)

## Felder-Silverman

- sensing (details, facts) or intuitive (simulations)
- visual (images) or verbal (sound)
- inductive (facts > general) or deductive (general idea to specific)
- active (exercises) or reflective (work alone at own pace)
- sequential (beginning to end) or global (overview with links)

## Grasha-Riechmann

- competitive (compare score or speed) or collaborative (chat room, virtual teams)
- avoidance (excel at web-based) or participant (discussion forums)
- dependent (prescribed route) or independent (exploration)

## Gregoric and Butler

- concrete (practical applications) or abstract (implications for use)
- sequential (prescribed path) or random (simulations and exploration)

## Kolb

- concrete experience (feelings)
- active experimentation (doing)
- reflective observation (watching)
- abstract conceptualization (thinking)

## Herrmann Brain Dominance

- left cerebral (logical flow, research results)
- left limbic (prescribed route, progress reports)
- right cerebral (explore, play)
- right limbic (dialog, interaction)

#### Levine's Neurodevelopmental

- attention (self control)
- temporal sequential ordering (time)
- spatial ordering (3-D)
- memory (store and recall)
- language (speech, symbols, syntax)
- neuromotor (coordination)
- social cognition (interaction)
- higher order (creative, solve problems)

#### Myers-Briggs

- extravert or introvert
- sensors or intuitors
- thinkers or feelers
- judges or perceivers

#### Gardner's Multiple Intelligences

- visual or spatial
- verbal or linguistic
- logical or mathematical
- bodily or kinesthetic
- interpersonal or intrapersonal
- naturalist

#### Riding's Dimensions

- wholistic (exploration) or analytic (logical arguments)
- verbal (text) or imager (media)

#### Vials' Four Continuums

- simultaneous or sequential
- connecting (relationships) or compartmentalizing (categories)
- inventing (fill in the blank) or reproducing (multiple choice)
- 2-D (computer screen) or 3-D (rotating image)

<http://tip.psychology.org.theories.html>

<http://www.cyg.net/~jblackmo/diglib/styl-f.html#learnbib>

<http://www.resourceroom.net/Surfin/learnstylesites.htm>

<http://www.virtualschool.edu/mon/Academia/KierseyLearningStyles.html>

## **Learning Theories (<http://tip.psychology.org/theories.html>)**

[ACT\\* \(J. Anderson\)](#)  
[Adult Learning Theory \(P. Cross\)](#)  
[Algo-Heuristic Theory \(L. Landa\)](#)  
[Andragogy \(M. Knowles\)](#)  
[Anchored Instruction \(J. Bransford & the CTGV\)](#)  
[Aptitude-Treatment Interaction \(L. Cronbach & R. Snow\)](#)  
[Cognitive Dissonance Theory \(L. Festinger\)](#)  
[Cognitive Flexibility Theory \(R. Spiro\)](#)  
[Cognitive Load Theory \(J. Sweller\)](#)  
[Component Display Theory \(M.D. Merrill\)](#)  
[Conditions of Learning \(R. Gagne\)](#)  
[Connectionism \(E. Thorndike\)](#)  
[Constructivist Theory \(J. Bruner\)](#)  
[Contiguity Theory \(E. Guthrie\)](#)  
[Conversation Theory \(G. Pask\)](#)  
[Criterion Referenced Instruction \(R. Mager\)](#)  
[Double Loop Learning \(C. Argyris\)](#)  
[Drive Reduction Theory \(C. Hull\)](#)  
[Dual Coding Theory \(A. Paivio\)](#)  
[Elaboration Theory \(C. Reigeluth\)](#)  
[Experiential Learning \(C. Rogers\)](#)  
[Functional Context Theory \(T. Sticht\)](#)  
[Genetic Epistemology \(J. Piaget\)](#)  
[Gestalt Theory \(M. Wertheimer\)](#)  
[GOMS \(Card, Moran & Newell\)](#)  
[GPS \(A. Newell & H. Simon\)](#)  
[Information Pickup Theory \(J.J. Gibson\)](#)  
[Information Processing Theory \(G.A. Miller\)](#)  
[Lateral Thinking \(E. DeBono\)](#)  
[Levels of Processing \(Craik & Lockhart\)](#)  
[Mathematical Learning Theory \(R.C. Atkinson\)](#)  
[Mathematical Problem Solving \(A. Schoenfeld\)](#)  
[Minimalism \(J. M. Carroll\)](#)  
[Model Centered Instruction and Design Layering \(A. Gibbons\)](#)  
[Modes of Learning \(D. Rumelhart & D. Norman\)](#)  
[Multiple Intelligences \(H. Gardner\)](#)  
[Operant Conditioning \(B.F. Skinner\)](#)  
[Originality \(I. Maltzman\)](#)  
[Phenomenonography \(F. Marton & N. Entwistle\)](#)  
[Repair Theory \(K. VanLehn\)](#)  
[Script Theory \(R. Schank\)](#)  
[Sign Theory \(E. Tolman\)](#)  
[Situated Learning \(J. Lave\)](#)  
[Soar \(A. Newell et al.\)](#)  
[Social Development \(L. Vygotsky\)](#)  
[Social Learning Theory \(A. Bandura\)](#)  
[Stimulus Sampling Theory \(W. Estes\)](#)  
[Structural Learning Theory \(J. Scandura\)](#)  
[Structure of Intellect \(J. Guilford\)](#)  
[Subsumption Theory \(D. Ausubel\)](#)  
[Symbol Systems \(G. Salomon\)](#)

## Triarchic Theory (R. Sternberg)