

Table 1: Definitions of learning types

Learning type	The learning experience
Acquisition	Learning through acquisition is what learners are doing when they are listening to a presentation or podcast, reading from books or texts or websites, and watching demos or videos. This is probably still the most common type of learning in formal education. The student is playing a relatively passive role while the teacher uses the transmission mode of teaching... We cannot avoid learning through acquisition. Students need to learn what others have discovered, to hear about expert ways of thinking and practising, and what is known already about the subject. Enabling students to build on the work of others is fundamental to formal education and the progressive development of ideas.
Collaboration	Learning through collaboration embraces mainly discussion, practice, and production. Building on investigations and acquisition it is about taking part in the process of knowledge building itself. It is distinct from learning through practice because although it builds something this is necessarily done through participation and negotiation with peers. It is distinct from learning through production, because although it produces something this is through debate and sharing with others.
Discussion	Learning through discussion requires the learner to express their ideas and questions, and to challenge and respond to the ideas and questions from the teacher, and/or from other students. The discussion may or may not end with an agreed outcome. The pedagogic value is the reciprocal exchange and critique of ideas, and how this leads to the development of a more elaborated conceptual understanding.
Investigation	Learning through investigation guides the learner to explore, compare and critique the texts, documents and resources that reflect the concepts and ideas being taught. Rather than having to 'follow the storyline', as in learning through acquisition, they are in control of the sequence of information, and can 'follow their own line of inquiry', making them more active, and giving them a greater sense of ownership of their learning, taking a critical and analytical approach, and thereby coming to a fuller understanding of the ideas.
Practice	Learning through practice enables the learner to adapt their actions to the task goal and use the feedback to improve their next action. Feedback may come from self-reflection, from other students, from the teacher, or from the activity itself - if it shows them how to improve the result of their action in relation to the goal of the activity. This helps them to develop, understand and use the knowledge and skills of a discipline. It is sometimes referred to as 'learning by doing', or 'learning through experience'.
Production	Learning through production is doing some assignment, of any size and duration. It is the way the teacher motivates the learner to consolidate what they have learned by expressing their current conceptual understanding and how they used it in practice. The motivation is typically the feedback, score or grade learners receive when their output is assessed by the teacher. Producing an output generates a representation of the learning enabled by the other types. In its simplest form it is the learner's expression of their current thinking, which enables the teacher to see how well they have learned, and to respond with feedback, guidance and further explanation.

Table 2: Definitions of ‘learning types’ in terms of typical technologies used

Learning type	Conventional technology	Digital technology
<i>Acquisition</i>	Reading books, documents, papers; Listening to teacher presentations face-to-face, lectures; Watching demonstrations, master classes.	Reading multimedia resources, websites, digital documents and resources; Listening to podcasts, webcasts; Watching animations, videos.
<i>Collaboration</i>	Small group project, discussing other students' outputs, creating a joint output.	Small group project, using online forums, wikis, chat rooms, etc. for discussing other students' outputs, creating a joint digital output.
<i>Discussion</i>	Tutorials, tutor groups, student seminars (students leading discussion), discussion groups, class discussions.	Online tutorials, tutor groups and seminars, email discussions, discussion forums, web-conferencing tools (synchronous and asynchronous), social media.
<i>Investigation</i>	Using text-based study guides; Analysing the ideas and information in a range of materials and resources; Using books, people, field trips, to collect data for analysis; Comparing texts, searching and evaluating information and ideas.	Using online advice and guidance; Analysing the ideas and information in a range of digital resources; Using digital tools to collect and analyse data; Comparing digital texts, using digital tools for searching and evaluating information and ideas.
<i>Practice</i>	Doing practice exercises; using tools; doing practice-based projects, labs, field trips, face-to-face role-play activities.	Using digital tools, models, quizzes, simulations, digital games, microworlds, virtual labs and field trips, online role-play activities.
<i>Production</i>	Producing their own representations of what they have learned, using statements, essays, reports, accounts, designs, performances, artefacts, animations, models, videos.	Producing and storing digital documents, representations of designs, performances, artefacts, animations, models, resources, slideshows, photos, videos, blogs, e-portfolios.

Definitions are taken from Chapters 6-11 in Laurillard, D. (2012). *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology*. New York and London: Routledge.

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