

Original Paper

Fractal Learning: A Minimum Viable Instruction Approach to Democratizing and Accelerating Education

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Abstract

In an era of radical and accelerating change, traditional discipline-specific curricula and institutions are increasingly ill-suited to address the life goals of diverse learners. We suggest that equally radical approaches need to be taken in redesigning education. This paper describes a proof-of-concept workshop—termed “Fractal Learning”—that embodies a minimum viable instruction (MVI) approach. Fractal learning replaces rigid curricula with a flexible, repeatable, goal-oriented framework, leveraging technology, cloud-based resources, and metacognitive scaffolding to accelerate learning and problem-solving skills. The design elements, workshop framework, and iterative cycle are intended to be a provocative suggestion for a more democratized and personalized educational paradigm.

Keywords

Fractal Learning, Minimum Viable Instruction, Self-Learning, Heutagogy, Iterative Learning, Metacognition, Innovation in Education

1. Introduction

The rapid transformation of work and societal structures demands that individuals be equipped to learn and adapt quickly and continuously. Conventional curricula, often rooted in discipline-specific silos, struggle to meet the demand for timeliness and agility. This paper proposes a shift in educational practice: replacing comprehensive, pre-defined curricula with a brief, goal-oriented “launch workshop” designed to initiate a learner’s journey toward self-directed problem solving and innovation. The concept of fractal learning—where iterative cycles of learning, reflection, and application build upon one another—is introduced as a framework to democratize and accelerate learning for a wide range of populations, from high school and college students to professionals and retirees.

2. Goals and Rationales

The primary goals of this educational methodology are:

- Universal Preparedness: Equip individuals with the skills needed to navigate a rapidly changing world.
- Goal-Driven Learning: Shift the focus from content mastery to achieving personalized, meaningful objectives.
- Accelerated and Democratized Learning: Utilize technology and cloud-based resources to break down traditional knowledge hierarchies and departmental silos.
- Flexibility and Affordability: Create learning experiences that are adaptable, cost-effective, and radically accessible.

By engaging learners with their own goals from the outset, the instructional design fosters intrinsic motivation and iterative refinement of both learning processes and outcomes.

3. “Minimum Viable” Approach

Central to this approach is identifying the briefest possible teaching timeline that enables learners to begin their journey. Minimum Viable Product (MVP) is a concept rooted in lean startup and product design methodologies, radically accelerating development by generating designs with just enough core features to satisfy early adopters and provide feedback for future iterations. The MVP approach encourages rapid prototyping, iterative development, and continuous refinement based on user interactions and real-world testing. Rather than investing extensive time and resources in a full-featured product from the outset, the MVP strategy allows creators to quickly validate assumptions, learn from user behaviors, and gradually evolve a more robust solution. This lean method not only reduces waste by preventing the overdevelopment of unnecessary features but also aligns product offerings more closely with actual market needs.

Similarly, the concept of Minimum Viable Instruction (MVI) in this proposal takes inspiration from the MVP framework by focusing on the essential instructional elements needed to kickstart a learner’s journey. Instead of delivering an exhaustive, pre-determined curriculum, MVI emphasizes providing a lean, goal-oriented launch workshop that equips learners with the core skills and methodologies required to begin addressing their personal objectives, intelligently leveraging an obvious resource: a massive and constantly expanding networked library of both content and methodological guidance. This approach promotes iterative learning, where participants continuously refine their strategies and expand their knowledge based on real-world discovery and reflective practice. Just as the MVP allows for continuous product improvement through user engagement, MVI supports a dynamic, learner-centered model that adapts to individual needs and evolving goals. Both concepts advocate for starting small, learning quickly, and iterating towards greater complexity and personalization over time.

4. Method

4.1 The Fractal Learning Workshop

The workshop is conceived as a “launch” mechanism—an initial, minimum viable instruction package that kickstarts the learner’s journey. It consists of a series of steps that help learners build a personalized toolbox of learning and problem-solving skills, structured as the first cycle in an iterative series. The design intentionally minimizes pre-created content, using instead a scaffolding approach to connect participants to diverse, cloud-based resources. We assume that the learner is able to productively self-teach in following cycles, although such a workshop can be repeated with a coaching or tutor-directed component.

4.2 Workshop Framework and Iterative Cycle

The workshop unfolds over approximately three hours and comprises a brief intro plus a series of seven iterative steps, each designed to focus on distinct aspects of learning and goal achievement:

- 1) What Do I Want to Do?
 - Objective: Encourage participants to articulate a personal goal.
 - Activity: Participants generate alternatives and then select one primary goal, diagramming their thoughts to visualize the idea.
- 2) What Do I Need to Know to Do It?
 - Objective: Identify knowledge gaps and establish learning priorities.
 - Activity: Participants list required knowledge items, prioritize and order them based on urgency, timeline or foundational need.
- 3) Where Can I Learn That?
 - Objective: Map out accessible learning resources.
 - Activity: Through web searches (including AI dialogues if useful) and resource mapping, learners identify where to acquire the necessary knowledge.
- 4) What Ideas Does That Give Me?
 - Objective: Stimulate ideation by integrating new information.
 - Activity: Using large poster paper and post-it notes, participants rapidly generate ideas for action items and adjust their initial goal based on insights gained.
- 5) What Can I Try Out?
 - Objective: Develop actionable, short-term experiments.
 - Activity: Participants choose one idea to prototype, considering criteria such as ease of implementation and potential impact.
- 6) How Would It Work?
 - Objective: Design a prototype and evaluation metrics.
 - Activity: Learners sketch out a prototype, simulate its implementation, and establish criteria for assessing its success.
- 7) What Do I Want to Do (Next)?

- Objective: Reflect on the process and plan the next steps.
- Activity: Participants revisit their goal, exploring options to narrow focus, expand ambition, or pivot entirely, while continuing to reflect on the process itself, learning and designing their own learning / problem solving methodologies as they learn.

Each step is punctuated with brief individual work, journaling, group sharing, and the introduction of related frameworks and methodologies (e.g., Ikigai, systems thinking, agile mindset, design thinking, Lean Startup). This multi-modal approach reinforces learning through repetition and adapts to the evolving goals of each participant.

5. Discussion

The fractal learning workshop exemplifies a shift from traditional instruction to an agile, learner-centered model. By centering the process around individual goals and iterative cycles of learning, the methodology addresses key challenges in modern education:

- Customization and Relevance: The process begins with learners' intrinsic interests, ensuring that the content remains relevant and engaging.
- Cognitive Flexibility: The incorporation of metacognitive tools encourages self-awareness, enabling learners to adjust their approaches dynamically.
- Scalability: With minimal new curriculum development and maximum support from up-to-date cloud-based resources, the model is highly adaptable across diverse settings and populations.

6. Prototype Launch Workshop Design

Below is a prototype design for a fractal-style launch workshop, consisting of the minimum viable instructional framework required to empower a user or users to design and redesign their own curricula over successive self-guided iterations. The framework itself is based on common problem-solving and design thinking methodologies.

6.1 Structure and Timeline

Seven steps, described below, each approximately 20 minutes, plus 30 minutes for introduction (about 3 hours total). Four activities in each step, roughly 5 minutes each (some variations from step to step):

- a) Individual work
- b) Journal (how did it feel / work?)
- c) Share observations
- d) Introduce related frameworks and methodologies

6.2 Introduction

- a) Discuss goals of the workshop:
 - Make real progress on a real-world goal you choose.
 - Introduce you to important theories and methodologies for accomplishing goals.
 - Help you develop your own style and toolbox of methods.

- Help you develop your own curriculum and learning strategy.

b) Describe activities:

We'll be doing a series of activities based on a basic "launch method".

- Along the way, we'll be pointing out other methods, tools, and ways of thinking that might be useful.
- You'll also be thinking about the process as you go ... analyzing your own thinking about thinking and asking questions to help you be more conscious of your own processes.

c) Describe meta tools:

- Part of the experience is finding what search/research and meta/journaling tools help you be productive and creative. Here are example tools with built-in prompts (links or key words). We encourage you to switch tools periodically to change your frame of reference and give you a new perspective, e.g. switch from paper journal with notes, to Google doc with links, to a mind mapping platform, to an artist sketchbook with doodles or images, to a notes app on your phone.

d) Scaffolding resources:

- Includes complete workbook available physically and online; resource links to key topics; example journaling tool(s); example queries and keywords; search engine(s) including AI search and assistant tools; media channels (e.g. YouTube); common content aggregation sites.

6.3 Step One: What Do I Want to Do?

a) Individual Work:

- Pick something you want to do. It can be large or small, personal or work-oriented, but should be something you care about and want to work on. Write it down on a napkin.
- Pick two other things you might want to do, write them down on two other napkins.
- Do you want to change your choice?
- Do a quick diagram of what you want to do on the back of the napkin.

b) Prompts for Journaling:

- How do you think of what you want to do? As an idea, a goal, a vision, a future state?
- Was it easier to come up with one thing to do, or three?
- Why did you choose what you did?
- What's a better representation of it, the words or the diagram? Did you learn anything from doing the diagram?

c) Introduce Related Frameworks and Methodologies:

- Ikigai (personal goal setting)
- Visioning (visualizing future state)
- Scenario planning (from future studies)
- SMART criteria (specific, measurable, attainable, relevant, time-bound)

6.4 Step Two: What Do I Need to Know to Do That?

a) Individual Work:

- Make a list of what you think you need to know to do what you want to do.
- Push yourself a bit, we want at least 10 things on the list ... what else might be useful?
- Put 3 stars by what you think are the 3 most important things.
- Is there an order you need to learn them in? Put a 1, 2, and 3 to indicate the order.

b) Prompts for Journaling:

- What do you think of the list? Are you surprised by how much you don't know?
- Does it make what you want to do seem easier or harder?
- Do you think you have to learn everything on the list to get started?

c) Introduce Related Frameworks and Methodologies:

- Systems thinking (what systems are involved in what you want to do)
- Mind mapping (cluster analysis, pattern recognition)
- Critical Path Method (defining dependencies in projects)
- Agile mindset (iterative vs. waterfall; moving forward with partial knowledge)

6.5 Step Three: Where Can I Learn That?

a) Individual Work:

- Start doing a web search to find sources related to your learning priorities.
- Collect links in a web document (e.g. Google doc)
- Draw a quick map on paper of the different categories of sources / topical areas.
- What's the least I can do in terms of research to get started? Annotate on the map.
- A learning break of 5 to 30 minutes allows participants to do preliminary research, based on the map above.

b) Prompts for Journaling:

- How do I prefer to find resources?
- How do I prefer to learn? (text, graphics, video, book, lecture, practice, etc.)
- What's available online vs. what might need a more structured approach or commitment (e.g. primary research, a formal course, degree or certification)
- How much of what I want to do requires practice in addition to learning?

c) Introduce Related Frameworks and Methodologies:

- Research methods (observation, induction and deduction, primary and secondary research, experience and intuition, experimental method)
- Search (techniques, query methods, knowledge theory)
- Evaluating information (author, purpose, accuracy, currency, relevance, etc.)

6.6 Step 4: What Ideas Does That Give Me?

a) Individual Work:

- On large poster paper, quickly redo your “do” statement and diagram from the napkin. Make any changes you want.
 - Think about what you’ve learned, look at different parts of the diagram, ... any ideas about what might move you forward, get a piece of it done?
 - Write some ideas down on post-its and put them on the diagram where they are relevant.
 - Push yourself, come up with 5-10 ideas as quickly as possible.
- b) Prompts for Journaling:
- Was it hard to come up with ideas?
 - Did being pushed, doing it quickly, help or hurt?
 - How do you normally generate ideas? Do you have a technique or process?
- c) Introduce Related Frameworks and Methodologies:
- Creativity theory (e.g. divergent/convergent thinking)
 - Creative thinking techniques (e.g. Thinkertoys)
 - Arts-based creative techniques (Surrealist exercises)
 - Group creativity (e.g. brainstorming)

6.7 Step 5: *What Can I Try out?*

- a) Individual Work:
- Go over your ideas on the diagram and think about which ones you could try out relatively soon, let’s say in the next month.
 - You can modify the idea so it’s easier to do sooner rather than later.
 - If you have more than one idea in that category, think of some other criteria, so you can pick one to try out. For example, which idea is the easiest (least effort) to do? Which would show results faster?
 - Take another large piece of poster paper and write the idea in the middle.
- b) Prompts for Journaling:
- Was it hard to break it down into short-term goals?
 - What kind of criteria do you normally use to select from a group of ideas or things to do?
 - Do you have a process or system that you practice regularly?
- c) Introduce Related Frameworks and Methodologies:
- Agile (review iterative, etc.)
 - Design thinking (prototyping, what’s a prototype)
 - Lean Startup (Minimum Viable Product)

6.8 Step 6: *How Would It Work?*

- a) Individual Work:
- On the poster paper with your idea, sketch out what a “prototype” version of this would be. How would you actually try it out in the real world, ASAP with the least effort?
 - Take a minute to imagine that you implemented your prototype.

- Now that it's done, what do I think about it? Was it a success? Did I learn anything from what I tried? What about the real world, how did it react?
- Write down 3 possible metrics for how you would evaluate the prototype.
- b) Prompts for Journaling:
 - Was it hard to break it down into short-term goals?
 - What kind of criteria do you normally use to select from a group of ideas or things to do?
 - Do you have a process or system that you practice regularly?
- c) Introduce Related Frameworks and Methodologies:
 - User feedback (formal and informal techniques from product testing, user design, etc.)
 - MVP launch (e.g. Lean Startup / Agile market testing concepts)

6.9 Step 7: What Do I Want to Do (next)?

- a) Individual Work:
 - On a third piece of poster paper, write your latest statement of what you want to do, right in the middle.
 - Draw 3 lines in different directions from there.
 - On one line write "FOCUS DOWN", on another "FOCUS UP", on another "PIVOT"
 - If you were to FOCUS DOWN your effort, pick just one aspect to concentrate on, what would that be?
 - If you were to FOCUS UP, make it a more ambitious or big picture goal, what would that be?
 - If you were to PIVOT to something entirely different, what would that be?
 - Pick one of the three, just for a moment.
 - Think about the process we used to get here, and also the other processes and methods we talked about. How is this process working for you?
 - Think about redesigning it. What method do you think would be appropriate to your new goal?
- b) Review Related Frameworks and Methodologies
 - Show list / collage of methodologies
 - Discuss iterative / cyclical model

7. Summary

In a world of accelerating change, education must evolve to become more flexible, accessible, and tailored to individual needs. The fractal learning workshop provides a promising proof-of-concept for a minimum viable instruction approach that can democratize learning and promote rapid, iterative skill development. Future research should focus on empirical evaluations of this model across different cohorts and contexts, as well as on the long-term impacts of such iterative, goal-directed learning practices.

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