On Time, On Task and Organized: Using Technology to Build Executive Function Skills

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Who is Shelley, and what is TechPotential?

Technology for learning & executive function challenges
- Certified AT Professional (ATP), Rehabilitation Eng’g Technologist (RET)
- 30+ years AT experience

Former director of assistive technology at Stanford Univ.
- Helped create Schwab Learning Center at Stanford (for LD & ADHD)

Assistive technology services – SanFran Bay Area & online
- AT Assessment, Training, Support, Implementation
- Professional development for schools
- Lecture/demo classes, hands-on workshops, webinars
- Online training, tech assistance, and consulting

TechPotential short for “Technology to Unlock Potential”
- My philosophy on “why use technology”
Executive Functioning Challenges

Executive Functions: mental processes required to manage oneself and one’s resources to achieve a goal

- Frontal lobe of brain – multiple functions in play

“Producing challenges” vs. “learning challenges”

- Not related to intelligence, but to how you apply it

EF challenges can produce great frustration and anxiety

Popular Executive Functions analogies

- CEO of a company, or executive management team
- Orchestra conductor – coordinate diverse musicians
- Coaching staff of football team – multiple specialized coaches who analyze situation, strategize, execute plan, evaluate, revise
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Direct attention and shift focus</td>
</tr>
<tr>
<td>Organization</td>
<td>Organize materials, information, and workspace</td>
</tr>
<tr>
<td>Working Memory</td>
<td>Mentally hold/manipulate information while completing task (interim steps, rules) Prepare info for encoding (concept formation)</td>
</tr>
<tr>
<td>Memory Retrieval</td>
<td>Retrieve info from memory</td>
</tr>
<tr>
<td>Planning</td>
<td>Prioritize &amp; sequence actions to achieve goal</td>
</tr>
<tr>
<td>Activation</td>
<td>Get started, sustain effort, finish</td>
</tr>
<tr>
<td>Sense of Time</td>
<td>Estimate time, awareness of time passage</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>Inhibition, impulse control, emotional control</td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td>Evaluate self, adjust behaviors as needed</td>
</tr>
<tr>
<td>Cognitive Flexibility</td>
<td>Change view or adapt approach as needed to fit circumstances (schedule, problem-solving)</td>
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Good News and Bad News

Bad news:
- Technology alone cannot fix time, attention, organization, and other executive function problems

Good news:
- Coupled with proven and thoughtfully-selected strategies, technology can greatly improve performance and productivity

Goal:
- Use technology to support, facilitate, or enhance strategies
Basic Executive Functioning Strategies

- **Externalize!** – out of head, into “real world”
- Make visual or tangible
- Break into smaller manageable parts
- Impose structure, framework, routine
- Be explicit – step-by-step vs. “clean your room”
- Provide strategies & models, all taught by adults
- Remove supports gradually as strategies and routines are internalized
- Recognize and understand how you think, process, respond (metacognitive)
The Technology Iceberg

Tech tools available

Tech tools we discuss today

Visit TechPotential.net/ATtoolbox for additional options
Strategies and Tools to help STAY FOCUSED

Reduce external, internal distractions
- Ear plugs, noise-canceling headphones
- White Noise app or music
- Assistive listening system (increase ratio of foreground/background sounds)
- Classroom sound field systems

Manage computer/tablet distractions
- Computer utility to “mask” screen clutter
- Parental control settings
- Block access to selected websites/programs for period of time

Incorporate physical movement
- See Self-Regulation section
Digital Distraction Cycle

Digital devices can be distracting and compromise learning

For students who need AT, digital devices may be unavoidable

- Compounding the problem, some students who need AT have ADHD

**Trigger**
diverts or redirects attention

**Response**
click link, open file, start different task

**Reward**
more interesting, less frustrating, creates illusion of multitasking, more triggers (think YouTube!)

**Goal: break the cycle**
- Reduce or eliminate triggers
- Prohibit response
- Disconnect from reward
Tools to manage visual clutter

Full screen, hide other apps, close unneeded toolbars and tabs

HazeOver (Mac) / Dropcloth (PC)
- Simple utilities dim, blur, or hide all but current app or frontmost window

Screen masking - shades page except for horizontal reading strip
- Read&Write for Google - Screen Mask tool (Chrome)
- Claroread ScreenRuler (Mac, PC) - configurable
- Reading Focus Cards (Mac PC)

Webpage simplifier - reformats “main” article, eliminates clutter
- Read&Write for Google - Simplify Page tool (Chrome)
- Mercury Reader, Just Read (Chrome)
- Safari Reader (Mac, iOS)
- Edge Reading View (Windows)
Shade or hide visual clutter

HazeOver (Mac)

Dropcloth (Windows)
Screen mask reduces visual complexity, aids focus & tracking
Turtle Facts

By Alina Bradford, Live Science Contributor | October 1, 2015 11:44pm ET

Turtles are reptiles with hard shells that protect them from predators. They are among the oldest and most primitive groups of reptiles, having evolved millions of years ago. Turtles live all over the world in almost every type of climate.

According to the Integrated Taxonomic Information System (ITIS), the turtle order, Testudines (or Chelonia), splits into two suborders, Cryptodira and Pleurodira, and then further splits into 13 families, 75 genera and more than 300 species.

“Turtle,” “tortoise” and “terrapin” are often used interchangeably as synonyms, but there are distinct differences between the types of chelonians, according to the San Diego Zoo:

- Turtles spend most of their lives in water. They are adapted for aquatic life, with webbed feet or flippers and a streamlined body. Sea turtles rarely leave the ocean, except to lay eggs in the sand. Freshwater turtles live in ponds and lakes, and they climb out of the water onto logs or rocks to bask in the warm sun.
- Tortoises are land animals. Their feet are round and stumpy, adapted for walking on land. They also dig burrows with their strong forelimbs, and slip underground when the sun gets too hot.
- Terrapins live on land and in water, usually in swamps, ponds, lakes and rivers.

With so many different types of turtle, there is no average size. The largest sea turtle species is the leatherback turtle. It weighs 600 to 1,500 lbs. (272 to 680 kilograms) and is about 4.5 to 5.25 feet (139 to 160 centimeters) long, according
Tools to short-circuit distraction cycle

Boredom, frustration => seek something more rewarding

Block access to time-waster websites and apps
  ▸ Black list = user cannot access these sites/apps
  ▸ White list = user can only access these sites/apps

Internet content-control services (Mobicip, Net Nanny, Blocksi)
  ▸ Black list and white list websites, filter content categories (e.g., adult sites)
  ▸ Set time limits and schedules for Internet access
  ▸ Monitor Internet activity (summaries, control remotely)
  ▸ Only control Internet access, not applications (so OK option for Chromebooks)

“Parental Controls” built into device operating system
  ▸ Black list and white list websites
  ▸ Limit access to certain apps
  ▸ Schedule access to entire device

Cold Turkey (Mac, PC) - dedicated website and app blocker
Cold Turkey (Mac, PC)

Create black/white “Block Lists” for combos of sites & apps

› Apply Block List(s) for selected duration (15 min., 2 hrs.) or for pre-defined schedule (weekdays from 9am to 2:30pm)

Once started, cannot be stopped (apply wisely!)
Popular Strategy for Handling Information Overload

From geekculture.com – used with permission

Tuned out? or Overwhelmed by disorganization?
Key organization strategy: A Place for Everything

Without designated “place” for materials or info, they won’t be organized and won’t be findable

- 6-Second Rule: If it can’t be placed in 6 seconds, it likely won’t be

Pre-define organizational framework and “places” for:

- **Physical** – papers, materials for active assignments, personal items
- **Digital** – folders on drive corresponding to physical folders
- **Information** – reference, review prior learning (see Memory section)
- **Tasks/responsibilities** – task manager, planner (see Planning section)
- **Schedule** – time-specific items
- **Fleeting thoughts** – means to capture ideas “on the go”, place later

Include student in defining organizational framework

- Match student’s mental organization schema
- “Buy in”
Tools to help GET ORGANIZED

Accordion files & pockets vs. 3-ring binders
- 6-Second Rule: If it can’t be placed in 6 seconds, it won’t

Pockets in backpack categorized by “next action”
- To Turn In
- Give to Parents, Give to Teacher
- Homework for Tonight
- Reference (e.g., schedule, daily checklists)

Cloud drive (Google Drive, iCloud, Dropbox, etc.)
- Access anywhere, reduce multiple versions
- Predefine organizational framework (including “next actions”)

Digital notebook + web clipper utility
- Evernote, OneNote, others – “cumulative knowledge bank”
Digital Notebook

Digital version of spiral notebook
- Easily organize, rearrange
- Highlight, annotate
- Tag with dates, keywords
- Attach related files, emails
- Record audio, sync w/ notes (OneNote)

Clip material from Web, docs
- Retains link to source

Robust search, indexing
- Quick retrieval – "external brain"
- Grammar rules, solved math problems, writing models, checklists, vocabulary, reference info, etc.
Tools to aid ORGANIZATION and RETRIEVAL

Digital notebook as "auxiliary brain"

- Single pre-organized "space" for collecting & sorting digital information
- Consistent organizational structure support retention

Cumulative knowledge bank

- Quick-access reference for rote memory facts, models of solved problems, procedures, checklists, grammars rules, vocabulary words, software instructions, keyboard shortcuts, templates, etc., etc.
- Any prior learning for reference or review (repetition)

Benefits individuals who struggle with:

- Organization and planning
- Memory issues (TBI, other)
- Rote memorization
- Slow retrieval speed
- Slow processing speed
- Working memory challenges
Working Memory and how it is used

Part of short-term memory to hold info long enough to use it
- “Desktop of the mind” or “Your brain’s RAM”

Working memory and academic tasks

- **Reading**: Retain info while reading, make connections/inferences to support comprehension
- **Writing**: Brainstorm and organize ideas (group, categorize, sequence) during composition
- **Planning**: Break large project into a sequence of discrete tasks, set priorities, evaluate in context of time
- **Taking notes**: Hold incoming auditory, visual, and textual info in memory until relevance is clear; formulate summaries
- **Problem-solving**: Hold necessary instructions, evaluate possibilities and procedure, sequence steps, monitor progress and results
- **Concept formation**: Recognize whole-part relationships, organize new learning prior to encoding into memory
Strategies & Tools to aid WORKING MEMORY

Externalize!!
- Out of head => onto paper or screen
- Tangible, not transient - “think on screen”

Overlay framework/structure
- List, outline, table, diagram, mind map
- Guides thinking and learning

Make it visual (colors, images, shapes)

Break into parts, facilitate manipulation
- Outliner/mind mapping software – “dynamic digital working memory”

Support student’s preferred cognitive organization method
- Students mentally organize information differently
- Facilitate concept formation (recognize/clarify whole-part relationships)
Working memory, concept formation, & retrieval

Incoming info is complex and disorganized

...it doesn’t “stick”

Organizing info reduces size so WM can hold more

Once in WM, info can be re-organized, rehearsed, encoded

Info encoded and stored in organized manner is easier to retrieve (part of broader, organized “concept”)

Encoded info moves to short-term memory, then stored and linked to info in long-term memory

Image credit: Teresa Doyle, Ph.D. (used with permission, captions adapted)
Graphic Organizer Software as “Idea Processor”

Features that help diverse learners:

Show ideas and relationships...
- Linear text (outline)
- Visually, freeform (diagram, mind map)

Visual/tangible working memory
- Ideas as text, images, symbols, recorded voice
- Use colors to differentiate topics, groups
- Brainstorm to free idea generation
- Drag-and-drop to organize, group, sequence

Collapse/expand topics to aid focus

Add details to predefined framework
- Custom templates or use predefined
Book report in Inspiration as...

...Outline

...Diagram

...Branched Map

Key point: which matches student’s thinking style?
### Graphic organizer software as Swiss Army knife

<table>
<thead>
<tr>
<th>Templates to scaffold writing <strong>content</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>▸ Adjust scaffolding to meet student’s needs, progress</td>
</tr>
<tr>
<td>▸ Create your own or use premade templates</td>
</tr>
</tbody>
</table>

### Break writing **process** into discrete manageable steps

| Plan/Prepare - brainstorm (“RapidFire” mode), audio record ideas |
| Organize - drag & drop, collapse/expand to aid focus |
| Write - add detail (Notes), express as complete sentences |
| Examine/Eval/Edit - “Transfer” to Word, proof-listen with text-to-speech |
| Repair/Revise - apply spelling/grammar checks, rewrite |

### Checklists – break unwieldy projects into parts; sequence tasks

### Notetaking template => Study guide

### Support UDL (Universal Design for Learning)

| Create once, distribute 4 ways (diagram/outline, paper/digital) |
World War I as an Inspiration Diagram...

- **Context**: World War I - Study Guide
- **Causes**: Background, Nationalism, Past History
- **Effect**: Germany crushed, League of Nations formed
- **Timeline**: June 21, 1914, September 15, 1914, April 22, 1915, April 6, 1917, June 28, 1919
- **Military Figures**: Joseph Joffre, Sir John French
- **Leaders or rulers**: Kaiser Wilhelm II, Tsar Nicholas II, Emperor Franz Josef
- **People**: Politicians, Woodyrow Wilson, Sir Edward Grey
- **World War I - Study Guide**: This student used the Online Symbol Search in add detail to the diagram as well as dragging in information from the Internet for synthesizing and paraphrasing.

In response to a policy of unrestricted submarine warfare by the Germans, the United States President Woodrow Wilson asks Congress to declare war on Germany. This ended the United States' three-year stance of neutrality during World War I.
World War I - Study Guide

I. Context

A. Background

World War I began as a conflict between Austria-Hungary and Serbia. Bosnian Serbs wanted freedom from the Austro-Hungarian Empire. A member of the Bosnian Serb nationalist movement, Gavrilo Princip, assassinated the heir to the Austro-Hungary throne, Franz Ferdinand, in Sarajevo on June 28, 1914. What followed was far from a localized conflict. The major powers of Europe and beyond, bound to each other in a network of treaties and alliances (and their own national interests) joined the conflict that would become the First World War.

B. Parties involved

1. Central Powers
   a. Germany
   b. Austria-Hungary
   c. Italy
      Later joined allies
         changed alliances
         (1) Italy
            Later joined allies

II. Causes

A. Nationalism

B. Past history

A complex web of alliances, family ties and treaties bound countries to one another and pulled them into war. When Austria-Hungary declared war on Serbia, Russia (bound to Serbia) rose to her defense. Germany and Austria-Hungary, by treaty, were unified against Russia. France was bound to Russia by treaty, and Great Britain was bound to both France and Belgium (which was invaded by Germany). The conflict spread across the globe to related countries and colonies.

III. Effects

A. Germany crushed

Germany emerged from World War I bitterly defeated. At the Treaty of Versailles, German delegates...
Using Inspiration to break project into sequential, manageable “chunks”

- Less intimidating, easier to get started
- Drag & drop to build plan
- Assign interim “due date” to each subtask

**Explorer Project**

1. Thoroughly research an explorer of North America
2. Summarize what you learned in a variety of ways (timeline, report, map, diorama, outline)
3. Teach this to your classmates - 15-minute presentation, quiz

Due date: one month

**A. Starting places**
- 1. Choose an explorer
- 2. Sources of information
  - a. Library
  - b. Websites

**B. Oral presentation**
- 1. Decide: Keynote, PowerPoint, Inspiration, or ??
- 2. Draft presentation
- 3. Edit & finalize

**C. Time line**
- 1. Find time line in book
- 2. Draw on poster

**D. Outline of explorer's life**
- 1. Use Inspiration or Word Outline

**E. Description of voyage**
- 1. ??

**F. Trace voyage on world map**
Strategies & Tools to MANAGE TASKS / PLAN WORK

Capture info to “inbox” (temporary)
  ‣ Quick, convenient - “forget with confidence”

Use single framework to manage tasks, plan time to work on them
  ‣ Calendar or planner? Paper or digital?

Break projects into sequenced tasks
  ‣ “Assignment Calculator” => interim due dates
  ‣ Outliner, graphic organizer for planning

Set alerts and reminders
  ‣ Link calendar items to mobile device, watch

Dedicated daily planning time!

Main framework: Calendar or Task Planner?

“When is it DUE?”

“What should I be DO-ing right now?”

Calendars good for time-specific items, reminders, blocking out time (scheduling outcomes)

Task planners good for setting priorities & managing workflow (sequencing actions toward goal)

Work best in conjunction with each other

- Simple place to start: Google Calendar + Google Tasks
Digital or paper calendars/planners?

Advantages (features) of digital system
- Legible, searchable, easy to edit
- Enter tasks with speech recognition
- Clip assignments from school website
- Set alarms, alerts
- Filter tasks by criteria (class, urgent, “this week”) => less overwhelming
- Sync between all devices => more likely used
- Shared calendar (adults monitor, provide coaching)

Advantages (features) of paper system
- Student may prefer handwriting (kinesthetic connection to info => better retention)
- May be more readily accessed, require less effort
- Familiar, less intimidating
Types of “task frameworks”

- **Time-based** (calendar): tasks located in time
- **List-based**: tasks grouped by categories (e.g., classes)
- **Workflow-based** ("Kanban"): task grouped by “where am I in process?”
- **Graphic**: for visual learners

Match to student’s cognitive organizational preferences

- More important than the specific product
Wunderlist: list-based task management app

**Classes**

**Assignments for this class**

**Auto-enters due date on calendar**

**Checklist helps break task into steps, sequence**

**Notes - copy from Web with Chrome extension “Add to Wunderlist”**
“Kanban” board – manage workflow

Origin: ’53 Toyota production

Key points

‣ Make each task visual/tangible
‣ Tasks move through a process: e.g., To Do, Doing, Done
‣ Drag & drop tasks to reflect progress toward completion
‣ Manage workflow: Limit work in progress (“Doing”) to 2-3 items

Personal Kanban software

‣ Trello
‣ Taskboard Visual Organizer
‣ www.personalkanban.com
Trello: Kanban-type task management app

Columns show task status (e.g., To Do, Doing, Done)

Task cards can be moved between columns to help manage workflow

Create different “Board” for each class
DropTask: graphic task management app

- Drag-&-Drop to organize
- Filter by Effort, Importance, or Urgency
- Tasks within Projects within Classes

Dedicated daily planning time

“Daily” and “Dedicated” - very important!
- Goals: establish routine, see value of having a “plan”

1) Collect information throughout day in daily “inbox”
- Temporary holding place for “stuff” to process later
- “Forget with confidence” – small notebook, Reminders app, voice memo

2) Planning time: process “stuff” in inbox, school site, email
- Requires action? => Move to proper “place” (planner, calendar, alerts)
- Save for reference later? => Move to long-term “place” (digital notebook)

3) Decide when to act on tasks
- Can I do it in 2 minutes or less? => Do it!
- Can I do it in one sitting? => Decide when, estimate time needed
- Do I need to complete this in parts? => Break into manageable chunks

4) Review status of current tasks, make changes if needed
Tools & strategies to GET STARTED & STAY PRODUCTIVE

Procrastination!
- Avoiding tasks that feel overwhelming, frustrating, hopeless

Break project into explicit tasks (less intimidating)
- Demystifies “what is required of me?”, reduces anxiety
- Assignment Calculator as an example

Make time “real”
- Visual timers, apps – time as concrete vs. abstract concept

Work in short, defined intervals with breaks
- Typically 15-30 minutes each
- Specific goal for each interval (“complete 3 math problems”)

Use checkboxes – keep completed items visible
- Mark as completed, recognize progress => motivation to keep going!

Visualize and reinforce routines
- Personal routine managers: Brili (watch/mobile); Octopus by Joy (watch)

“Assignment Calculators”: break projects into parts

Generic online tools to...

- Break project into explicit smaller tasks
- Set due dates for each task
- Link to helpful resources for completing each step

Deployed at many universities

Idea: adapt for graphic organizers

- Create templates for standard tasks
- Short/medium/long paper, lab report, study for test, reading, problem set, etc.
- Stack with some easy items at beginning to build momentum
Pace task completion, maintain motivation

Parkinson’s 3rd Law: Work expands to fill the available time for completion
  ‣ Extra time may not mean more work completed

Pomodoro Technique (“tomato” in Italian)
  ‣ Shorter work sessions, regular breaks can improve mental agility
  ‣ Shorter targeted work intervals can also improve focus, motivation (“Hey, I’m actually getting things done!”)
  ‣ pomodorotechnique.com

How it works
  ‣ Define task (be specific: “read one section, take notes”)
  ‣ Set timer to one “pomodoro” interval (15-30 minutes)
  ‣ Work until timer rings (or even race the clock)
  ‣ Short break (movement, cookie, go outside – not screen time)
  ‣ After four “pomodori”, take longer break (15-30 minutes)
  ‣ Move to next task (perhaps different type to alleviate boredom)
Brili Routines

Guides kids through everyday routines
- Interactive platform (engaging)
- Developed with psychologists and behavior experts
- Goal: Build executive function skills (vs. imposing limits) to lessen anxiety, build confidence

How it works
- Set up “routine” (sequence of tasks) in Parent Mode for different parts of day (morning, after school, bedtime)
- Routines displayed as visual timeline in Kid Mode
- Durations auto-adjust to child's ability to complete tasks
- Adults can monitor on separate device
- Integrated reward system

Available for iOS, Android (also Pebble Watches)
- Though discontinued, Pebbles still work, available, cheap!

Tools to aid SELF-REGULATION, COGNITIVE FLEXIBILITY, and SELF-MONITORING

Incorporate movement
- Fidget tools to self-regulate attention
- Sit-stand desk, wiggle cushions, etc.

Calming toolbox
- Stress ball, positive pictures, music

Pre-think strategies
- Prepare and practice for transitions, unexpected situations
- Diagram software to make decisions and outcomes visual/tangible

Checklists to track progress, motivate, provide confidence
- Visual checklists (e.g., COPS) – see Planning section

Monitor time spent on apps, websites – adjust accordingly
Incorporate movement to aid self-regulation

Fidget toys/tools (quiet ones!)

Inflatable seat cushion
  - Bumps (sensory input)
  - Semi-inflated (“wiggle room”)

Work at whiteboard
  - Permits gross motor movement

Sit-stand desk or table
  - AlphaBetter adjustable student desk

Bluetooth headset
  - Dictate using speech recognition software while pacing
Preview options to build cognitive flexibility skills

- Anticipate what comes next
- Prepare for possible changes

Use templates, scripts, diagrams

- How to deal with changes or undesirable outcomes
- How to adapt to unexpected situations
- Helps internalize this process
Identify & monitor your biggest distractions

RescueTime “automagically” tracks:
- Time spent on websites
- Time spent in applications

Bird’s-eye view of time usage
- User ranks apps and websites as productive or distracting
- Watches usage, sends alerts & summaries

Benefits:
- Increase awareness of how time spent
- Internalize good time management skills
Matched with the right tools, students can more easily demonstrate their potential.
For more information & other AT resources...

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www.TechPotential.net
408-737-2092

For more info on technology described herein, visit the AT Toolbox:
www.TechPotential.net/ATtoolbox