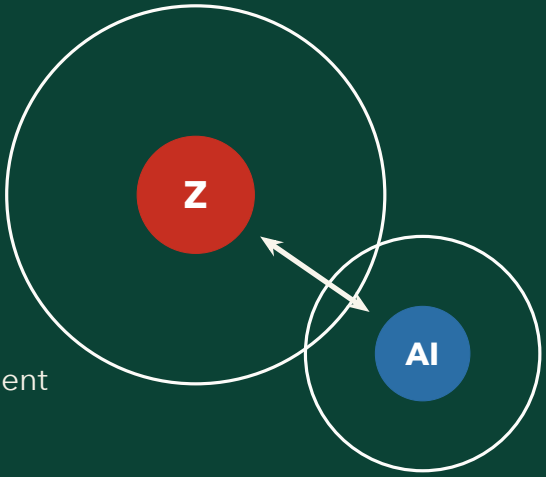
AI WORKSHOP | SESSION 03

# AI × Zotero

Pick apps your AI can use:

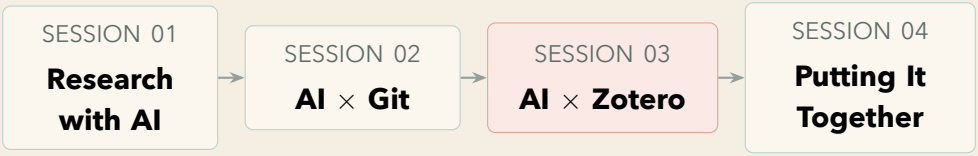
a literature library for you and your agent




Shih-Yang Lin | Department of Economics, National Dong Hwa University

October 14, 2026 | Room A101, HSSB II

# Where We Are in the Series




Git tracks

**how your research output changes**

Zotero tracks

**where your research claims come from**

Workshop page: shihyanglin.github.io/ai-workshop

# What You Will Build Today

**Beaver** beaverapp.ai

An AI assistant that lives inside Zotero.

- Cited answers from your library
- Highlight and annotate PDFs
- Organize tags and collections
- Batch work across many papers

Plus Max: $20/month

**Today: Codex + Zotero + skills**

The same pattern, built by you.

- `query-zotero-library`
- `annotate-zotero-pdf`
- `manage-zotero-library`
- Any agent, any app it can reach

No extra subscription

**Leave with most of a $20/month tool, on the AI plan you already have.**

Beaver, "Pricing," accessed October 14, 2026.

# Today's Plan

**01 | Why apps still matter**
LLMs do not replace apps. They change *which* apps we pick.

**02–04 | Set up, use, check**
Install and set up sync while you listen. Then learn Zotero for humans and test your sync.

**05 | Zotero + LLM**
Let Codex query, highlight, and organize your own library.

**06 | Wrap-up**
One workflow you can repeat every day.

01

# Why Apps Still Matter

LLMs do not replace apps. They change which apps we should pick.

# Recall Session 01: What Makes AI Different

| | Codifiable | Noncodifiable |
|---|---|---|
| Manual | Robots | Physical AI |
| Cognitive | **Enterprise software** | **AI** |

*Note:* AI's defining feature is cognitive work that relies on noncodifiable knowledge. Codifiable cognitive work was already automated by software, and still is.

- **Codifiable** knowledge can be written down as exact rules.
  - Gives **deterministic** results.
  - **Costs less**: a specialized tool is a tiny model for one task, while a general LLM uses billions of parameters for the same job.
- **Noncodifiable** (tacit) knowledge cannot, and that is where AI is new.

Ide and Talamàs (2025, *JPE*), Table 1.

# LLMs Do Not Make Apps Obsolete

**Ask an LLM to *be* your reference manager**

- Invented DOIs and authors
- Page numbers that drift
- Citation format changes every run
- Forgets your library next session

**What an app guarantees**

- Exact, structured records
- Same output every time
- Persistent storage on your disk
- Fast, cheap, no tokens spent

**Codifiable work wants an App. Noncodifiable work wants an LLM.**

# Split Literature Work into Tasks

**Codifiable → App**

- Capture metadata
- Link the PDF to its record
- Format citations
- Sync across devices
- Store highlights, tags, and collections exactly

**Noncodifiable → LLM + you**

*Find and understand*

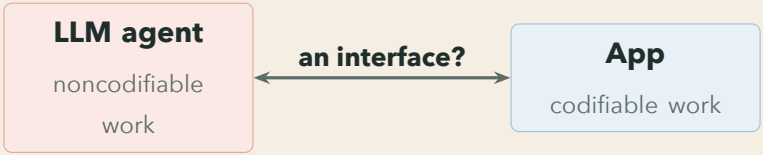
- Find a paper from a vague memory
- Explain a paper in plain words
- Answer questions with page citations
- Make reading guides and quizzes

*Organize and connect*

- Highlight by my own color rules
- Sort papers into collections
- Build a literature matrix
- Map how papers connect

Right panel: most NotebookLM features, applied to your own Zotero library.

# Pick Apps Your Agent Can Reach




**Three features of an AI-friendly app (from Session 01):**

1. **Open data**: plain text or documented formats, not a black box.
2. **An API or CLI**: the agent can call it without clicking.
3. **Local and scriptable**: the agent can run it on your own machine.

An app your agent cannot reach makes you the copy-paste layer.

# Example: ReadCube Papers vs. Zotero

| | ReadCube Papers | Zotero |
|---|---|---|
| Reading and capture | **Excellent** | **Good** |
| Citation plugin | **Yes** | **Yes** |
| Where data lives | Vendor cloud | Your disk (SQLite + files) |
| Data format | Closed; export only | Open source, documented |
| Agent access | **No local API for agents** | **Local API on your laptop** |

**Human only**

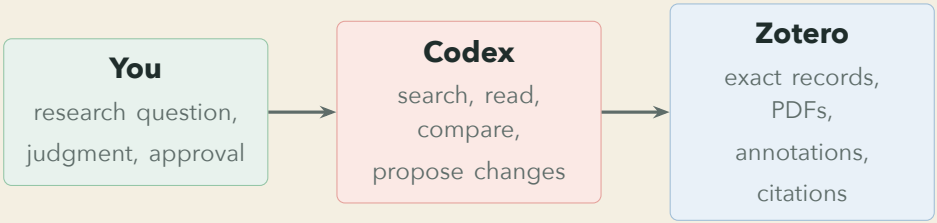
Both are fine.
Pick the one you enjoy.

**Human + agent**

Zotero, because the agent can read and write the library.

Based on the instructor's own use of both apps; check current vendor documentation.

# The Division of Labor We Want




- Zotero **stores** what must be exact.
- Codex **orchestrates** what needs tacit judgment.
- You **decide** what counts as evidence and what gets written.

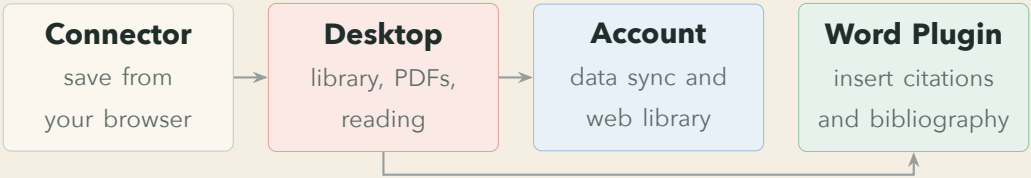
Same idea as Session 01: AI as the orchestrator, software as the SOP.

02

# Install and Set Up

Start the downloads now. Set up sync while you listen to the next part.

# Install Four Pieces of Zotero




1. Download Zotero Desktop at `zotero.org/download` (includes the Word plugin).
2. Install the Zotero Connector for your browser (same page).
3. Register a free account at `zotero.org/user/register`.

Zotero, "Quick Start Guide" and "Zotero Connectors."

# Turn On the Local API

**In Zotero Desktop**

1. Open Settings.
2. Go to Advanced.
3. Check “Allow other applications on this computer to communicate with Zotero.”

**Keep it local**

- Zotero must be running.
- Only programs on this computer can connect, with no password.

**Check it works** (Terminal):

```
curl "http://localhost:23119/api/users/0/items?limit=1"
```

Any JSON reply (even `[]`) means the agent can now reach your library.

Zotero, “Local API.”

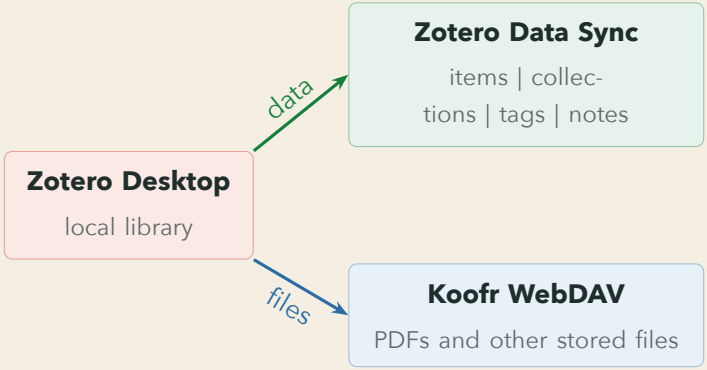
# Install the Research Skills for Your Agent

```
git clone https://github.com/errard70101/social-science-research-skills.git
cd social-science-research-skills
python -m pip install -e .
python scripts/install.py --skill annotate-zotero-pdf --target codex
```

- One command installs three skills; the other two are dependencies.
- Open a **new** Codex session and check that these skills are listed: `query-zotero-library`, `manage-zotero-library`, `annotate-zotero-pdf`.
- Other agents: use `--target claude`, `copilot`, `opencode`, or `antigravity`.

github.com/errard70101/social-science-research-skills

# Zotero Sync Has Two Pipelines




- Your Zotero account syncs metadata, with or without file sync.
- Koofr replaces only the file storage for your personal library.
- **Using Koofr does not mean you stop using Zotero's servers.**

Zotero, "Syncing," updated June 17, 2026.

# Choose Your File Sync

| | Zotero Storage | Koofr WebDAV |
|---|---|---|
| Setup | Easiest, official | Needs Koofr + WebDAV |
| Personal library | Supported | Supported |
| Group libraries | **Supported** | **Not supported** |
| PDFs in web library | Yes | No |
| Free space | 300 MB | Depends on Koofr plan |
| Support | Zotero | Each vendor separately |

Pick Zotero Storage for simplicity and groups; pick Koofr for more personal space.

Zotero, “Syncing”; Koofr, “Koofr with Zotero via WebDAV.”

# Koofr Step 1: Create an App Password

1. Sign up at `koofr.eu`.
2. Turn on two-factor authentication.
3. Open Account Settings, then Preferences.
4. Under Password, create an app-specific password.
5. Name it `Zotero–WebDAV`.

**Not your login password**

WebDAV requires an app-specific password.

It may be shown only once. Save it in a password manager now.

Koofr Help, “How Do I Connect a Service to Koofr through WebDAV?”

# Koofr Step 2: Enter WebDAV in Zotero

**Path**

Zotero Settings
↓
Sync
↓
File Syncing
↓
WebDAV

**Connection**

| | |
|---|---|
| URL | `https://app.koofr.net/dav/Koofr` |
| Username | your Koofr email |
| Password | the app-specific password |

Then click **Verify Server**.

Zotero stores files in a `/zotero` folder under that URL. If asked to create it, say yes.

Koofr Help; Zotero, “Sync Preferences.”

# Install Checklist: Keep This Open

- ☐ Zotero Desktop opens.
- ☐ Connector icon appears in the browser.
- ☐ Logged in under Settings → Sync.
- ☐ Koofr `Verify Server` succeeds.
- ☐ Local API check returns JSON.
- ☐ Codex lists the three Zotero skills.

**Pick one test paper now**

A journal article page with a DOI and a PDF you can legally download.

Stuck? Raise your hand and keep listening. We will not need the agent until Part 05.

03

# Zotero for Humans

Collect, check, organize, read, cite. The codifiable half of the work.

# A Downloads Folder Is Not a Library

**What most hard drives look like**

- `paper.pdf`
- `paper-final.pdf`
- `download(7).pdf`
- Authors, years, DOIs scattered

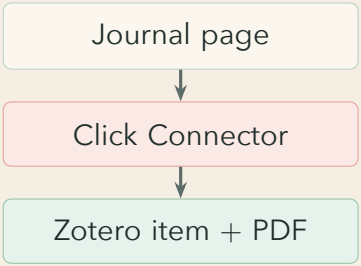
**What research actually needs**

- Correct, structured metadata
- PDFs, highlights, notes linked
- Search, cite, sync, verify
- An agent can find the page

**Zotero links every PDF to its metadata, notes, and citations.**

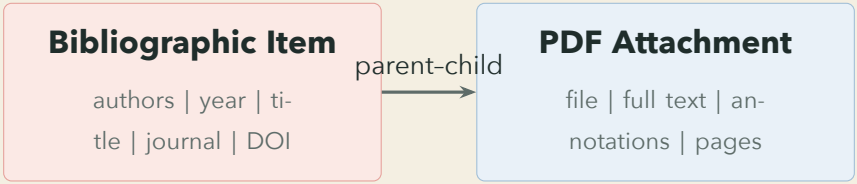
# Save Your First Paper with the Connector

1. Keep Zotero Desktop open.
2. Open the article's journal page.
3. Click the Connector icon next to the address bar.
4. Save to `My Library`.
5. In Desktop, check the item and its PDF.




If the Connector saves only a "Web Page," you are not on the article page. Do not accept the wrong metadata.

# One Paper, Two Objects




- Item without PDF: you can cite it, but the agent cannot read it.
- Standalone PDF: full text, but no reliable identity.
- **Goal:** the correct item linked to the correct PDF.

# Check Metadata Before You Cite

**Minimum checklist**

- Item type
- Title
- Authors or editors
- Year, journal, volume, issue
- DOI or stable URL

**Why check now?**

- Typos spread to every citation
- Bad capitalization pollutes BibTeX
- The wrong PDF misleads the agent
- Duplicates split notes and tags

# Collections and Tags Answer Different Questions

**Collections | Which project is it for?**

- `0 Working Projects`
- `Inflation Inequality`
- `Teaching / Macrofinance`

One item can live in several collections.

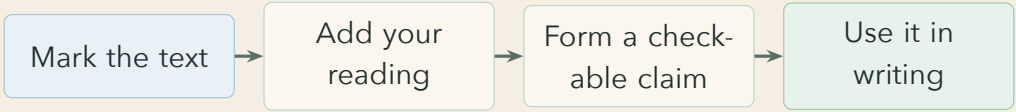
**Tags | What is its status or theme?**

- `to-read`
- `reviewed`
- `identification`

Tags work across projects.

**Start small:** a few collections first; add stable tags once a need repeats.

# Reading Is More Than Highlighting




- An annotation keeps the **exact position and page**.
- A note keeps **your interpretation, questions, and uses**.
- An AI summary must never pose as the author's own words.

# Let Zotero Maintain Your Bibliography

**Word, LibreOffice, Google Docs**

1. Add/Edit Citation
2. Search by author or title
3. Choose a citation style
4. Add/Edit Bibliography

**LaTeX**

1. Export BibTeX or BibLaTeX
2. Keep citation keys stable
3. Track the `.bib` file in Git
4. Later: try Better BibTeX

Do not hand-edit a bibliography as plain text. Fix the Zotero item, then refresh.

# Checkpoint 1: One Usable Piece of Evidence

1. Save one paper from its article page with the Connector.
2. Confirm the item and its PDF attachment.
3. Check authors, year, journal, and DOI.
4. Create a `Workshop Demo` collection and add the item.
5. Add one highlight or note.

**Done when:** you can open the PDF from the item, and find the item from the PDF.

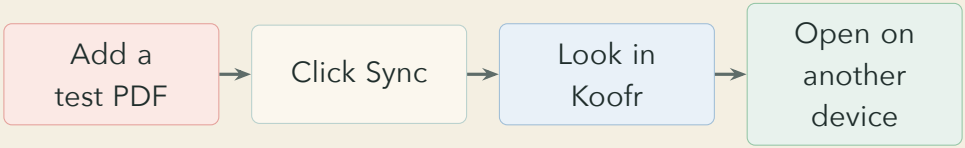
If the Connector or PDF download fails, fix the item before moving on.

04

# Check Your Sync

Prove your PDFs sync, and keep a backup that sync cannot replace.

# After Verify Server, Run a Visible Test




- You may see `.zip` files in Koofr's `zotero` folder. That is normal.
- Never rename, move, or tidy those files by hand.
- Real success: another Zotero install downloads and opens the PDF.

Koofr, "Koofr with Zotero via WebDAV," updated April 2025.

# WebDAV Covers Your Personal Library Only

**My Library**

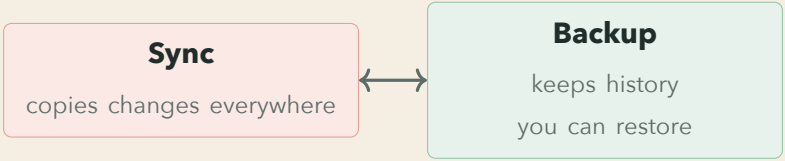
- Metadata: Zotero Data Sync
- PDFs: Koofr WebDAV
- Good for personal research

**Group Libraries**

- WebDAV does not sync group files
- Group files need Zotero Storage
- Access set by group settings

Zotero, “Syncing,” section “WebDAV.”

# Sync Is Not Backup




Deletions, mistakes, and corruption sync too. Sync cannot replace a backup.

**Never** put your live Zotero data directory inside a Dropbox, iCloud, Google Drive, or Koofr sync folder.

To back up the data directory, quit Zotero first, then copy it somewhere independent.

Zotero, "Syncing," section "Alternative Syncing Solutions."

# Checkpoint 2: Prove Sync Actually Works

1. Logged in to your Zotero account; data sync shows no errors.
2. File sync for My Library is set to WebDAV.
3. Koofr URL, email, and app password are filled in.
4. `Verify Server` succeeds.
5. The test PDF syncs and opens on another device or a clean install.

**Success:** the PDF opens inside Zotero.

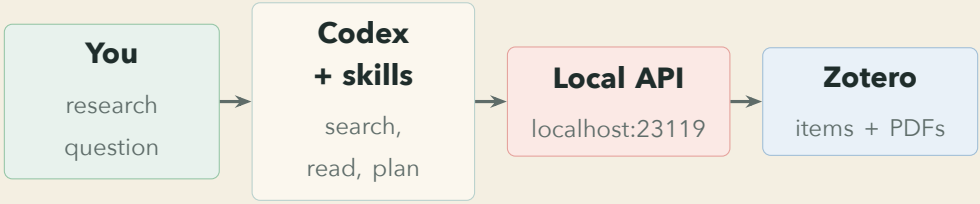
**Not yet:** you only see a file name in Koofr.

05

# Zotero + LLM

Now let the agent reach the library. It reads freely; it writes only with your approval.

# How Codex Reaches Your Library




- No cloud upload of your library; everything stays on your laptop.
- No Web API key needed for reading.
- A **skill** is a written SOP: it tells the agent exactly how to call the API safely.

Zotero, "Local API," updated July 29, 2026.

# Three Skills, Mapped to the Task Split

| Skill | LLM does | Zotero does | Boundary |
|---|---|---|---|
| `query-zotero-library` | find, read, compare | return items, PDFs, notes | read-only |
| `annotate-zotero-pdf` | locate the passage | store the highlight exactly | no edits or deletes |
| `manage-zotero-library` | propose tags and collections | apply the approved plan | no metadata, no PDFs |

Each skill pairs one **noncodifiable** judgment with one **codifiable** record.

# Query Your Library, Not the Chat Window

| Approach | Convenient because | Research risk |
|---|---|---|
| Paste PDFs into chat | Starts immediately | Short-lived context, scattered sources |
| Let AI search the web | Broad coverage | Not the version you trust or read |
| Search the repo | Close to your output | PDFs usually live elsewhere |
| **Query Zotero** | **Your library is the entry point** | Still check PDF pages |

# Demo 1: A Source-Grounded Literature Query

```
Use $query-zotero-library.

Which papers in my library criticize business cycle accounting,
and what are their main arguments?

Compare at most three, using only the PDF text. List any gaps
in the evidence.
```

- Ask the way you remember it: a vague question is enough.
- Name the **evidence boundary**: PDF text only.
- Every claim comes back with a **link to its page**; the skill adds it.

# One Step Back to the Source

```
zotero://open-pdf/library/items/<key>?page=<page>&annotation=<highlight>
```

**Read it now**

*"Open the evidence for claim 2."*

The agent runs `open` (macOS), `start` (Windows), or `xdg-open` (Linux), and Zotero jumps to the page.

Works in any agent that can run a command.

**Read it later**

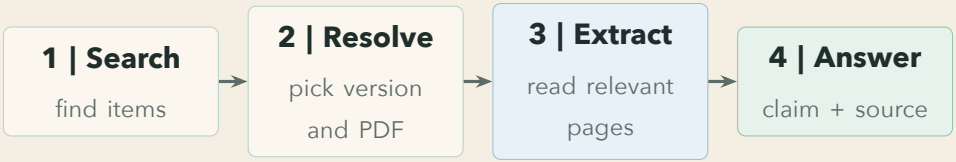
*"Save this comparison as a note, with the links."*

Click a link in Obsidian or any Markdown note, and Zotero jumps to the page.

Keys sync, so links work on every device.

Chat windows may strip `zotero://` links; let the agent open them instead.

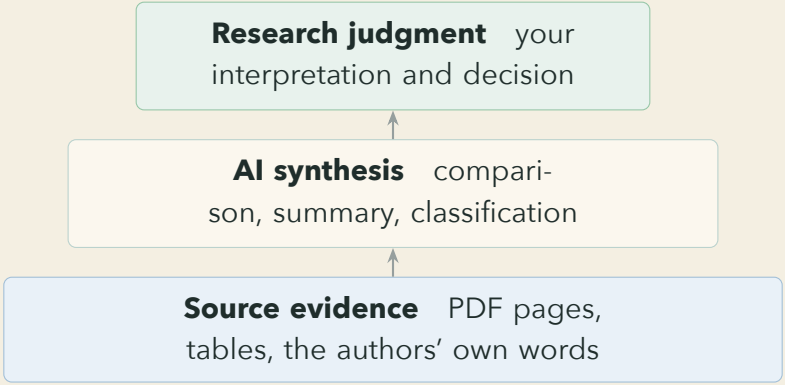
# What Happens Behind the Query




Metadata only proves a paper exists. Claims about content must come from the PDF pages.

No PDF, failed text extraction, or thin evidence? The right answer states the limit; it does not invent a plausible summary.

# Read the Answer in Three Layers




- An item key does not mean the full text was read.
- A PDF summary does not mean the claim is proven.
- An AI draft is not a research conclusion.

# Demo 2: Let Codex Highlight the Evidence

```
Use $annotate-zotero-pdf.

Read my highlight color rules in my Obsidian vault (06 SOPs).
Then highlight the key claims and evidence in Chari, Kehoe, and
McGrattan (2007), following those rules.

Add a short margin comment and the tag workshop-demo to each.
Show the full batch plan and ask for one exact plan ID. Do not
write before I approve.
```

- **LLM**: decides whether a sentence is a claim, evidence, or a problem, and picks the color.
- **App**: stores each mark at exact coordinates you can reopen anytime.
- Your rules live in a note, so the agent applies them the same way every time.

# One Batch, One Approval




- **No per-annotation clicks:** one reviewed plan ID covers the batch.
- If the library or PDF changes, the old plan expires; plan again.
- Same passage twice on a page? Add context; never guess.
- Afterward, check both the Reader view and the annotation sidebar.

Zotero, "Local API" and "Write Requests"; `annotate-zotero-pdf` safety contract.

# Demo 3: Organize with a Reviewable Plan

```
Use $manage-zotero-library.

Find the papers from Demo 1 and propose a plan:
  1. add them to the Workshop Demo collection;
  2. add the tag workshop-reviewed.

Show before and after for each paper and the exact plan ID.
Do not write until I approve.
```

- Collection membership and tags are easy to undo.
- Title, authors, DOI, and PDFs stay untouched.
- Practice on a test collection before a real project.

# Before You Approve, Read Four Columns

| Item | Before | After | What you judge |
|---|---|---|---|
| Paper A | no demo tag | add demo tag | Right version? |
| Paper B | not in collection | add to collection | Right collection? |
| Paper C | already reviewed | unchanged | Really a no-op? |

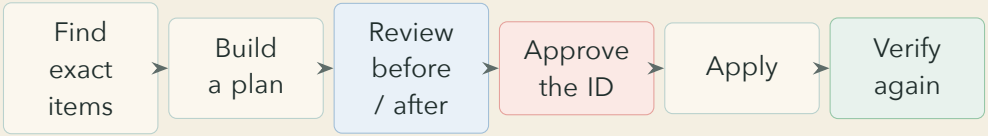
**Plan ID**

Binds the exact changes you saw.

**Library version**

If the library changes, the plan expires.

# Six Gates for Every Write




Codex writes only after you approve the **exact plan ID**.

Timeout or server error mid-write? Re-read the library first. A blind retry can apply the same change twice.

# Zotero’s Authorization Dialog Has Three Choices

**Allow**

Permits only the next successful write.

Use this in class.

**Always Allow**

Remembers an unscoped local key.

Store it in the OS keychain.

**Deny**

Refuses this write.

Always available.

Codex should never pick Always Allow for you, or put a key in a prompt, plan, log, or repo.

Zotero, “Local API,” section “Authorizing Writes.”

# Beyond Zotero: More Skills in the Same Repo

| Skill | What it does |
|---|---|
| `manage-latex-bibliography` | Finds missing citations in a LaTeX project and adds verified BibTeX entries |
| `summarize-academic-paper` | Writes a two-page LaTeX summary of an economics paper for seminar prep |
| `literature-search-repec` | Searches IDEAS/RePEc for working papers, journal articles, and citations |
| `rename-and-organize-references` | Proposes author-year-title file names for a messy PDF folder |

Same pattern every time: the agent proposes, a deterministic tool executes, you review.

github.com/errard70101/social-science-research-skills

# Checkpoint 3: One Query, One Approved Write

1. Pick a small, clear research question.
2. Ask Codex to search Zotero first, not to answer from memory.
3. Limit it to 2–3 highly relevant papers.
4. Check that every item key and page matches the PDF.
5. Approve one tag or annotation plan, choose `Allow`, and verify in Zotero.

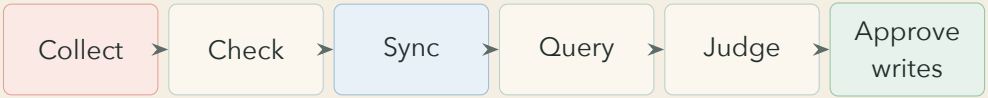
**Done when:** you can say who proposed, what you approved, and what actually changed.

06

# Putting It Together

Choose tools by task. Keep every claim traceable to its source.

# One Complete Zotero × Codex Workflow




**Zotero keeps (codifiable)**

- Bibliographic identity
- PDFs and page numbers
- Annotations and notes

**Codex helps (noncodifiable)**

- Search and compare
- Extract evidence
- Propose reviewable changes

# Three Takeaways

1. **Split work by knowledge type.** Codifiable work goes to apps; noncodifiable work goes to LLMs.

   Zotero stores the citation; Codex judges which papers matter.

2. **Pick apps your agent can reach.** Open data, an API, and local access let the two work together.

   Zotero has a Local API; ReadCube does not.

3. **Stay the judge.** The agent searches, explains, and proposes; you verify and approve.

   Every claim traces to a page; every write needs your plan approval.

Next session: combine Git, Zotero, skills, and agents into one repeatable workflow.

# Homework: Redo It with Your Own Research

1. Create a collection for a real research project.
2. Add 5–10 core papers with checked metadata.
3. Sync files with Koofr and make one independent backup.
4. Ask Codex to compare three papers' identification strategies.
5. Review and approve one tag, collection, or annotation plan.

# References i


- Ide, Enrique, and Eduard Talamàs. 2025. “Artificial Intelligence in the Knowledge Economy.” *Journal of Political Economy* 133 (12): 3762–3800.
- Zotero. “The Basics.” **zotero.org/support/quick_start_guide.**
- Zotero. “Syncing.” Updated June 17, 2026. **zotero.org/support/sync.**
- Zotero. “Local API.” Updated July 29, 2026. **zotero.org/support/dev/web_api/v3/local_api.**
- Zotero. “Web API Write Requests.” Updated July 29, 2026. **zotero.org/support/dev/web_api/v3/write_requests.**

# References ii


- Koofr. “How Do I Connect a Service to Koofr through WebDAV?” **koofr.eu/help/koofr_with_webdav.**
- Koofr. “Koofr with Zotero via WebDAV.” Updated April 2025. **koofr.eu/blog/posts/koofr-with-zotero-via-webdav.**
- Lin, Shih-Yang. 2026. “Social Science Research Skills.” **github.com/errard70101/social-science-research-skills.**