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APRIL 2026
VOLUME 1

LEVERAGING ONLINE REVIEWS FOR SERVICE IMPROVEMENT: SENTIMENT ANALYSIS OF SUKI-YA PAVILION

TIME SERIES FORECASTING USING THE PROPHET MODEL

MEDIA SOSIAL DAN KESIHATAN MENTAL PELAJAR

SMALL CHANGES, BIG IMPACT: THE ROLE OF THRESHOLD SELECTION IN EXTREME RISK ASSESSMENT

VISUALIZING CORRELATION STRUCTURES IN DATA USING R: METHODS AND APPLICATIONS

2756-7729

FROM PERIODIC TABLE TO PLAYGROUND: HOW A CHEMIST AND A CODER CREATED A DIGITAL TEXTBOOK

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Imagine trying to understand the rules of a complex board game, but instead of playing it, you're only allowed to look at a single image of the board. For many students, that's exactly what the Periodic Table feels like: a confusing wall of letters and numbers that seems more like a secret code than a map of our world.

But what happens when you take that static image and turn it into a high-tech, interactive textbook? That is the magic created when science meets the logic.

The "Map of Everything" and Why It's So Hard to Read

To a scientist, the Periodic Table is the ultimate cheat sheet. It explains why some metals explode in water, why some gases glow under electricity, and why gold stays shiny forever. It's organized by "Atomic Numbers," placing elements into families (called Groups) that behave in similar ways.

However, if you aren't a science major, the table is an "Impenetrable Maze." It's Invisible; You can't see atoms pulling on each other, so the definitions stay dry and boring. It's dull; On a printed page, the table doesn't react. It doesn't move. It's just ink on paper.

To bridge this gap, we turned to digital transformation by a collaboration where the Chemist (the brain) and the Designer (the builder) used spreadsheet accessible yet powerful database logic to bring the table to life.

Phase 1: The Rulebook
Before any "cool" buttons are made, the Chemist has to build the Foundation. Think of this as the "Rulebook" for the universe.

- Setting the Laws: The Chemist fills a hidden sheet with the real-world properties of every element. These are not just numbers; they are the "Laws of Physics" that the spreadsheet must follow.
- The "If-Then" Logic: The Chemist defines the families. For example: "If an element is in Group 18, it's a Noble Gas." This gives the computer the instructions it needs to categorize everything correctly later on.

Phase 2: The Logic
Once the science is solid, the Designer steps in to build the Connectivity. They turn a spreadsheet into a User Interface (UI). A spreadsheet (like Microsoft Excel, Google Sheets) can serve as a lightweight educational app because it combines data management, computation, and interactivity, which is why it can act as a simple app for learning.

- Fishing for Data: Using formulas like VLOOKUP, the Designer connects the visible table to the Chemist's hidden database. When a student clicks an element, the spreadsheet "reaches back" and pulls the correct info instantly.
- Student-Proofing: To make sure no one accidentally deletes the math, the Designer adds Security block. They lock important cells and create easy dropdown menus, ensuring the tool is easy to use and impossible to break.

Phase 3: The Final Polish
The last step is Refinement. Both experts come together to double-check that the logic is flawless and the data is perfect. A pilot test where students act as respondents helps identify unclear questions, technical issues, or areas for improvement before the main study is conducted. Feedback from the pilot allows the designer to revise and refine the development for more accurate and reliable results. It's the ultimate quality control.

The Result: A Digital Textbook

The finale product is more than just a file; it's a Digital Textbook. While the Chemist guarantees that every scientific details is 100% accurate, the Designer ensures that navigating through the data is smooth and engaging. As depicted in Figure 1 shows the example of the user interface. In this digital playground, students aren't just memorizing letters, but they are exploring an interactive world where the building blocks of existence finally come to life.

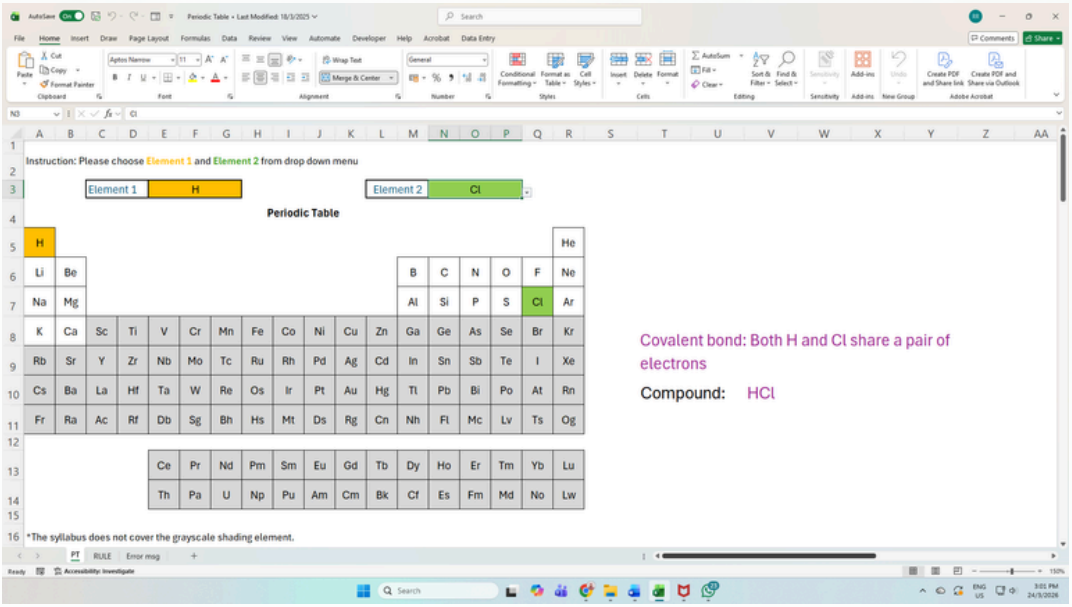

Figure 1: Example of User Interface