Standing on the Shoulders of Giants: Stacking & Innovation in Scientific Research

By Thelmal Huang / Elsevier Taiwan / th.huang@elsevier.com / Phone: 0930-660-745
拉斐爾 – 雅典學院 畫作
Introduction
• What problem are you trying to solve? Why?
• What have others done before you?

Methods
• What will you do to study the problem?
• Describe the conditions of your experiment exactly

Results
• Report the results of your experiment objectively
• Just the facts!

Conclusion
• What do the results mean for the problem you are trying to solve. Do they prove anything? Is further study needed?

References
• Let everybody know whose knowledge you’ve built on.
• Reference lists are the record of the dialogue of science
Tasks / Activities

- Search information/new literature
- Sort and organize information
- Read information
- Evaluate research need and likelihood of funding
- Identify collaboration partners
- Identify relevant funding agencies
- Write proposals
- Submit proposals
- Plan research
- Conduct/supervise experiments/research
- Collaborate with partners
- Discuss/share/check findings against literature
- Submit/track drafts
- Edit after review, resubmit
- Attend/organize conferences/seminars
- Develop metrics
- Collect relevant data
- Measure performance
<table>
<thead>
<tr>
<th>Early Undergraduate</th>
<th>Late Undergraduate</th>
<th>Graduate</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire basic knowledge</td>
<td>Get to know a field's foundations</td>
<td>Specialize</td>
<td>Become expert</td>
</tr>
<tr>
<td>Awareness of hot topics, recent developments</td>
<td>Conduct guided experiments</td>
<td>Start reading very directed</td>
<td>Exhaustive reading within a small topic</td>
</tr>
<tr>
<td>Learn to read systematically</td>
<td>Start writing papers, reports etc.</td>
<td>Explore subfields in detail</td>
<td>Follow particular niche journals</td>
</tr>
<tr>
<td>Building arguments</td>
<td>Learn to develop own hypotheses</td>
<td>Write graduation thesis</td>
<td>Build a scientific network</td>
</tr>
<tr>
<td>Assess differing opinions</td>
<td></td>
<td></td>
<td>Publish; become part of the scientific discourse</td>
</tr>
<tr>
<td>Get excited about the wealth of knowledge</td>
<td></td>
<td></td>
<td>Teach</td>
</tr>
</tbody>
</table>
研究中所需要的資訊類型

<table>
<thead>
<tr>
<th>資訊類型</th>
<th>百分比</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental Knowledge</td>
<td>28%</td>
</tr>
<tr>
<td>Deepen &amp; Apply Methodologies</td>
<td>42%</td>
</tr>
<tr>
<td>Add Currency from the Field</td>
<td>68%</td>
</tr>
<tr>
<td>Broaden Perspective</td>
<td>45%</td>
</tr>
</tbody>
</table>
研究工作中的堆疊
6.5 hours per week searching and gathering information

5.8 hours per week organizing, analyzing and applying information

42 is the average age when biomedical researchers receive their first grant from the National Institute of Health

15% is the approval rate for National Science Foundation grant applications by new researchers
To Find & To Discover-2

- **STATIC CONTENT**: 2D images redrawn and colored.
- **3D e-ROUTE**: 3D model created and can be viewed at any coordinates.

All 2D images stacked on top of each other to make the final 3D model.
To Find & To Discover -3
To Find & To Discover -4
Challenges facing librarians

- Shrinking library budgets due to economic downturn
- Increased scrutiny and pressure on demonstrating return on investment
- Broader range of research products available in the market

“Libraries are attempting to face a future in which almost every fixed point has disappeared. Users are changing; content is changing; research is taking new forms.”

Derek Law
Centre for Digital Library Research
As Open Sources of Chemical Information Become More Common, What Role Can a Publisher Play?

“...As certain types of content become commoditized, sometimes by sheer volume alone, publishers must learn how to create products that integrate content from many different sources and which can be curated with a specific end-user workflow in mind.

Outsell 2010