Philosophy and Computer Use: How and Why Mathematics Teachers Differ From Others

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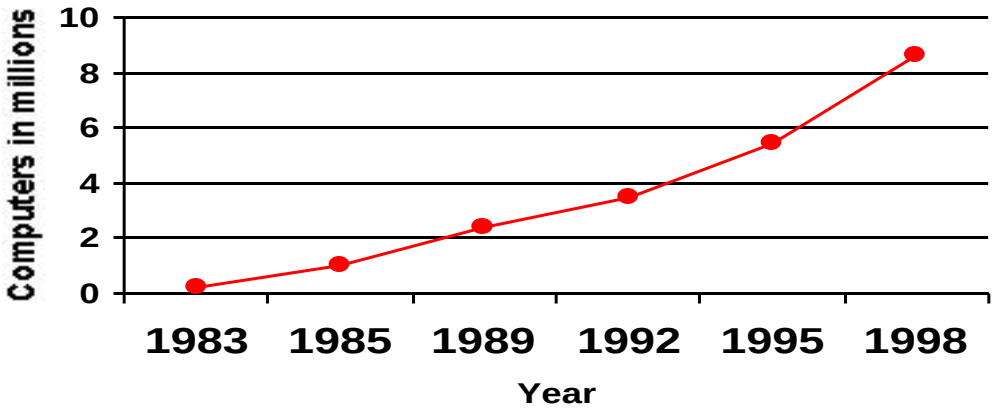
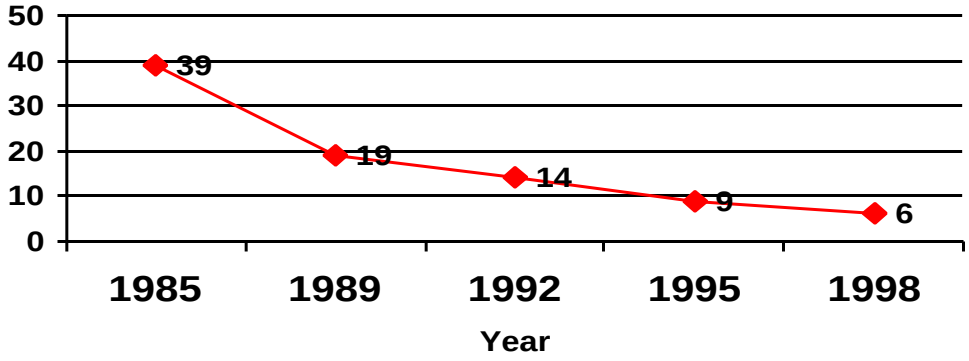
Total instructional computers in USA, 1983 to 1998



Students per computer in US Schools



Teaching, Learning, & Computing--1998

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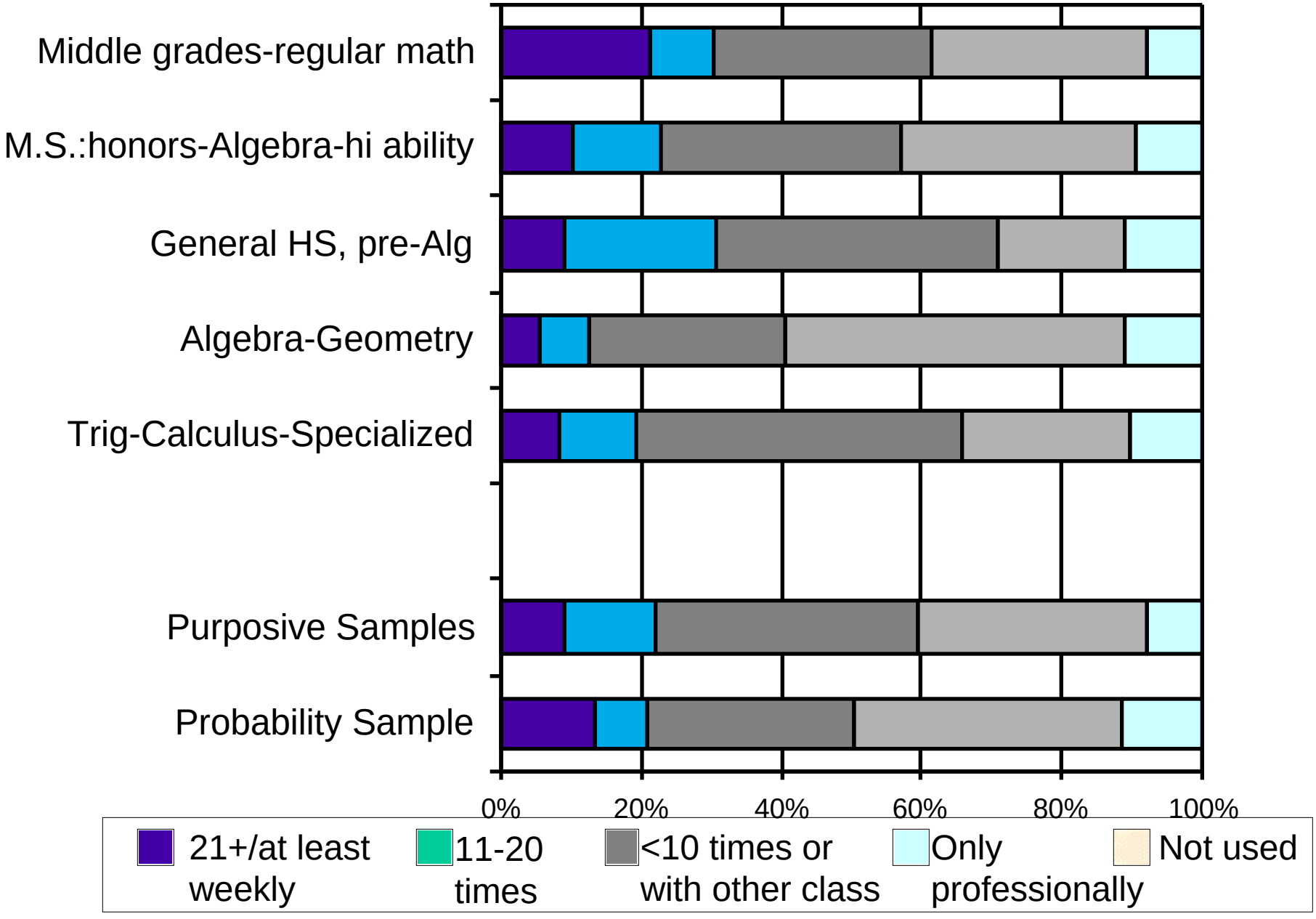
- A representative sample of all U.S. teachers in grades 4-12
- Plus a sample of teachers from schools in major reform projects and schools with the top 1% of per-capita technology
- Over 4,100 teachers in 1,100 schools participated, nearly 70% of those sampled
- Teachers completed 20+ page questionnaires
  - Four different versions; heavily overlapping questions
- Principals and school technology coordinators completed separate questionnaires

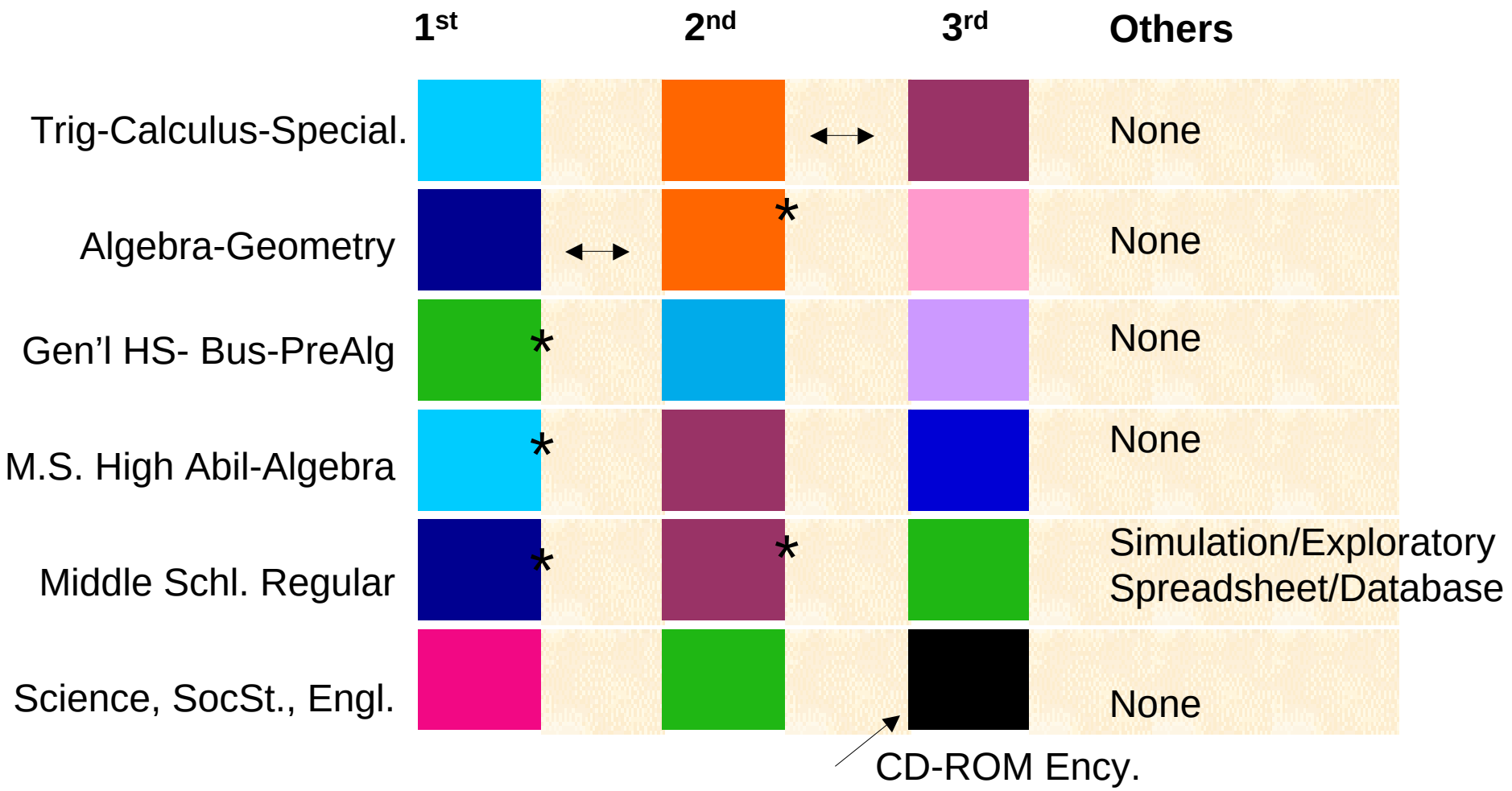
The Math Teacher Sample in TLC

- The sampling process disproportionately selected active computer-users and reform-oriented teachers within schools
  - BUT data was re-weighted to reflect a “simple random sample” of teachers, so the effective sample looks like the following:
- Probability Sample:
  - About 150 middle school and 150 high school teachers
- Combined probability and purposive samples
  - Nearly 600 teachers, including 300 middle school teachers, 40 business/general math HS teachers, 160 algebra-geometry teachers, and 80 trig-calculus-specialized math subject teachers
    - based on the “class in which they feel most accomplished as a teacher”

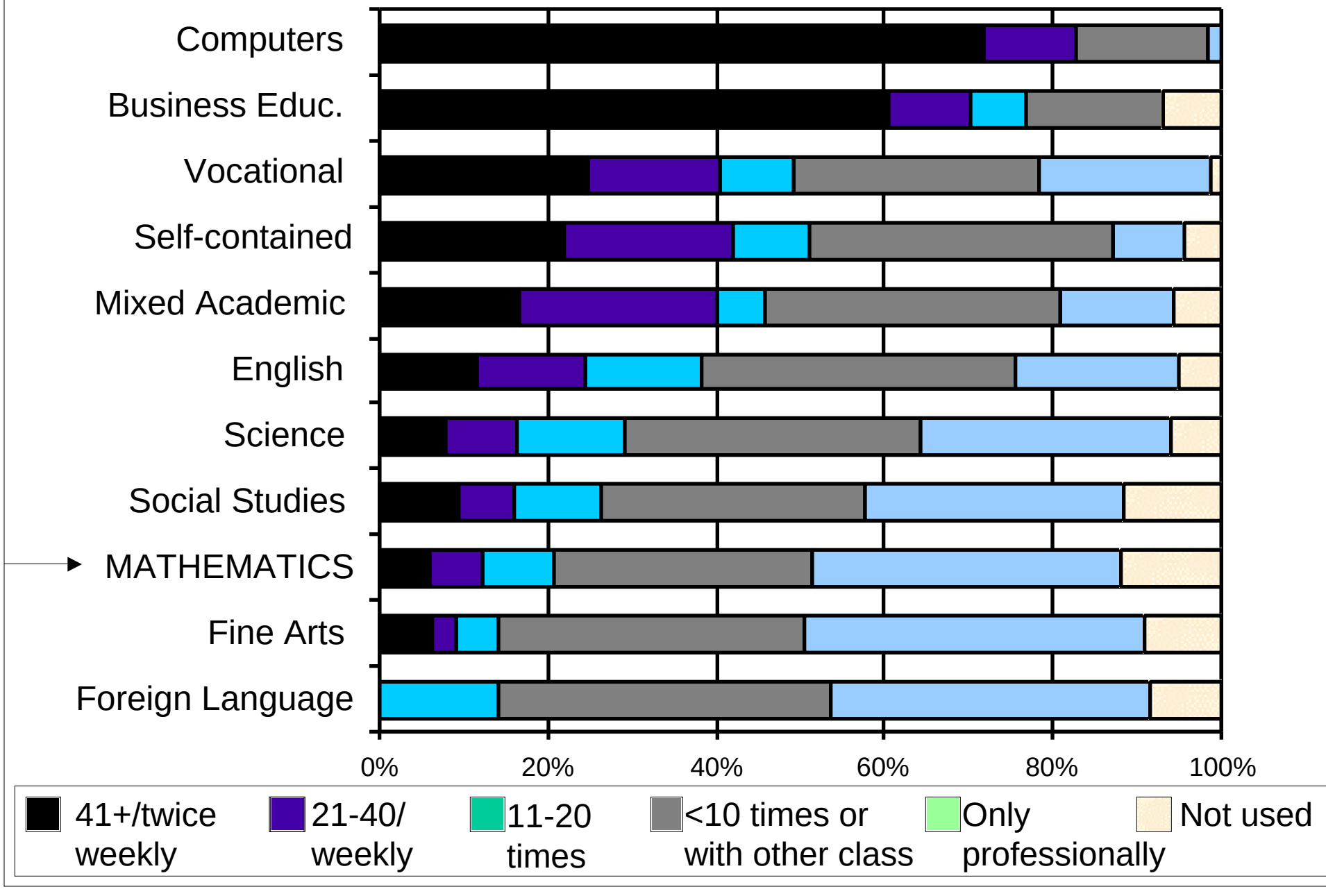
Computer Use by Math Subject Taught



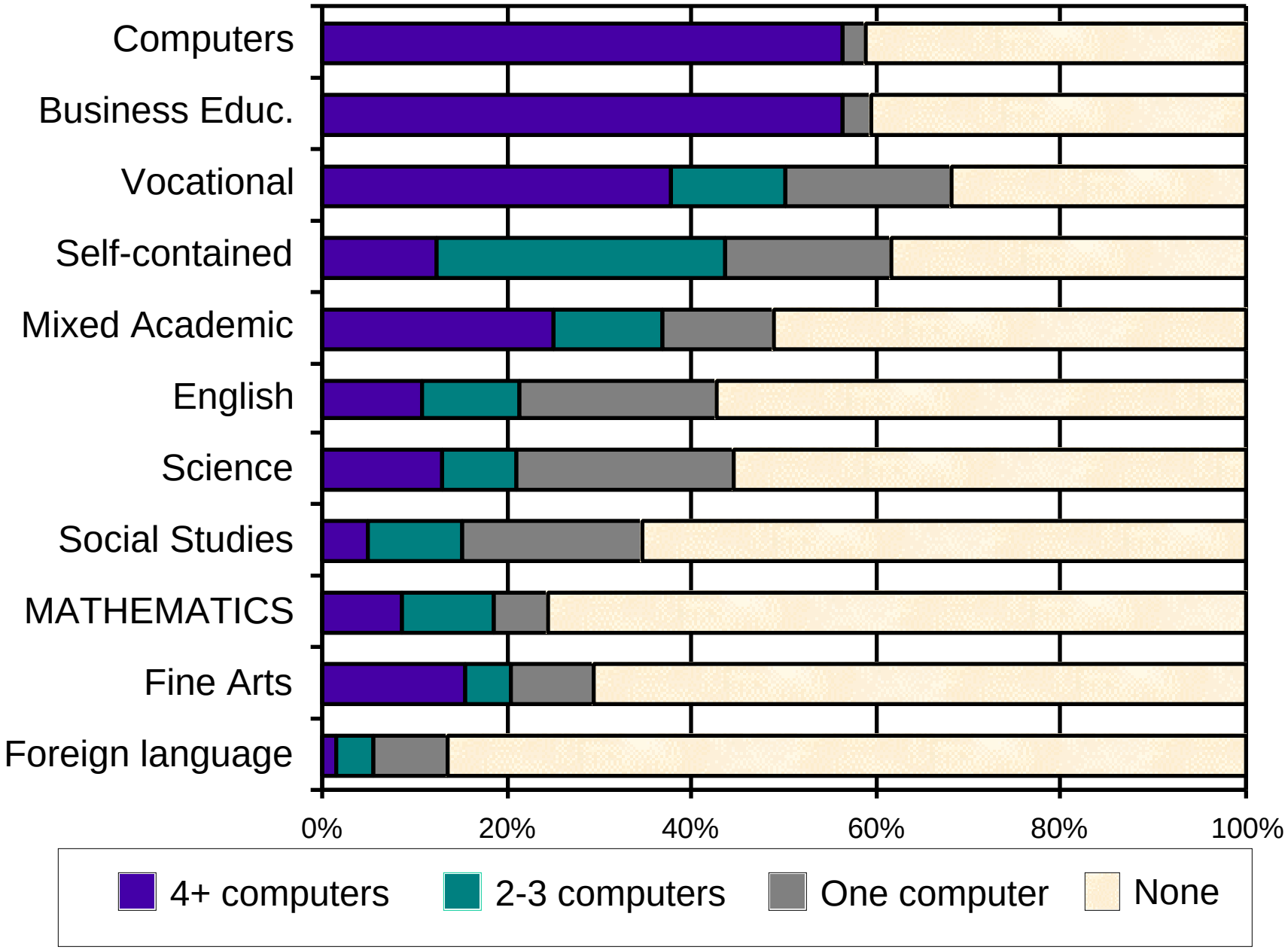
Most Often Used Software by Subject



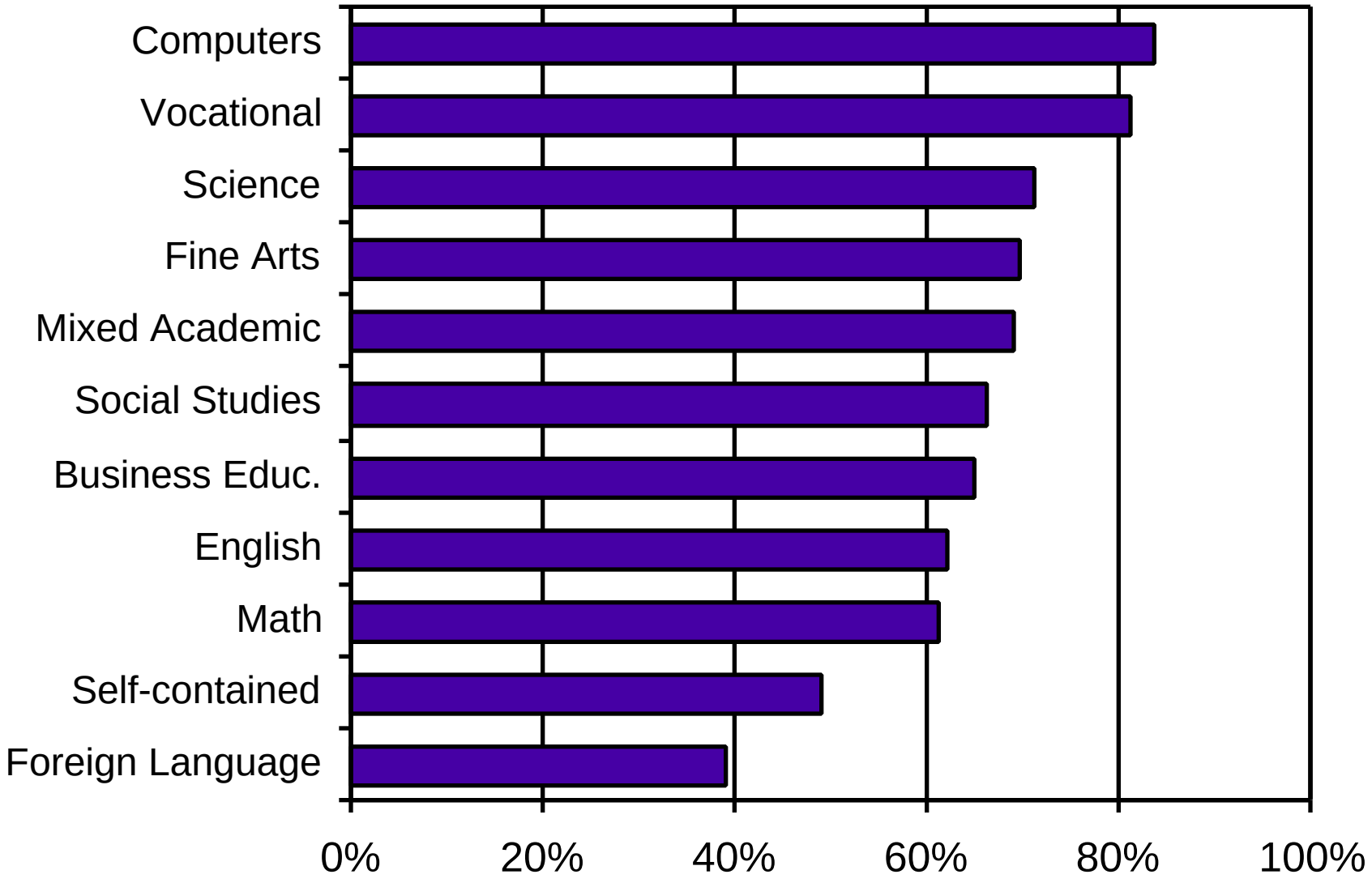
Math Teachers' Computer Use Compared to Others'



Number of Computers in Classroom by Subject

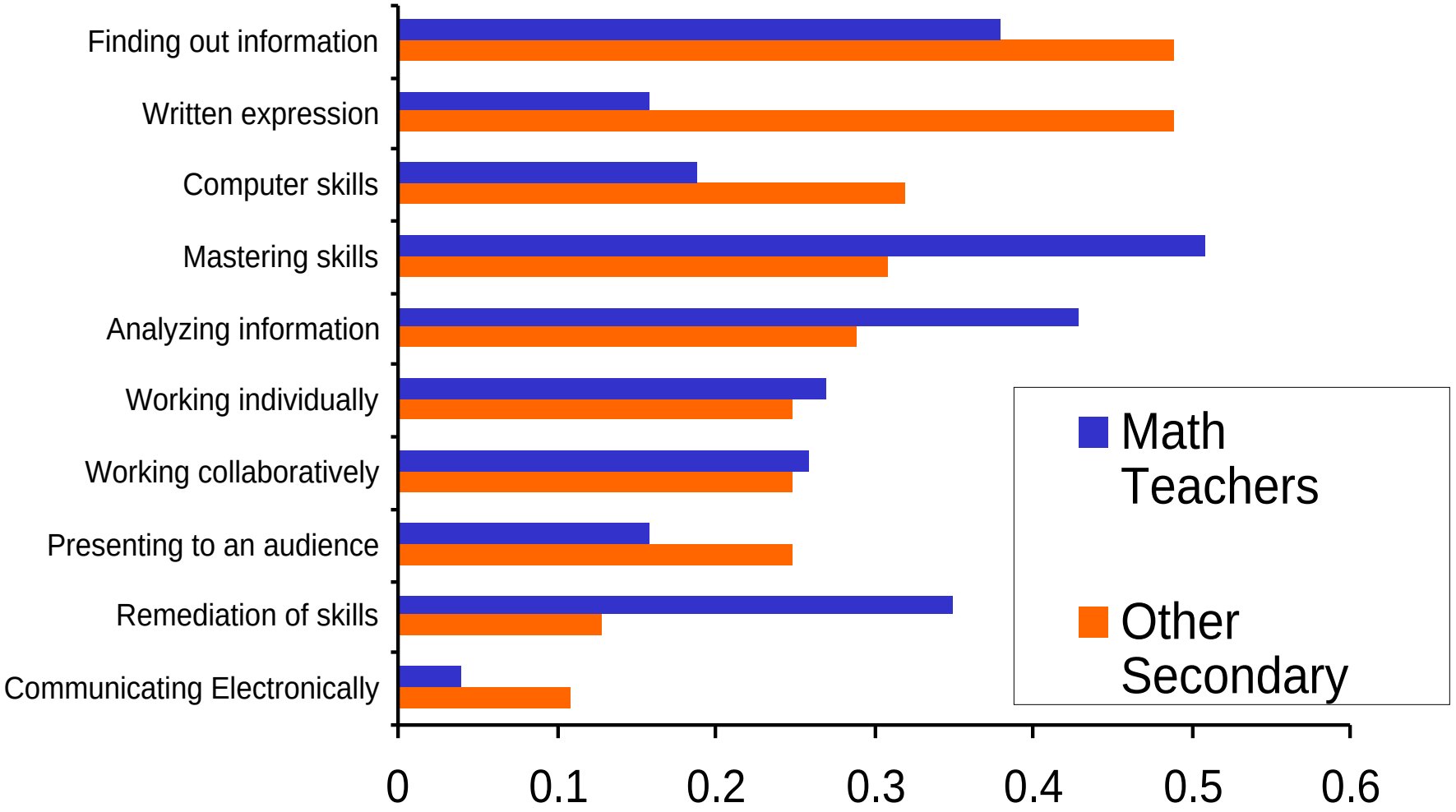


Teacher Provided With Desktop Computer For Use at School

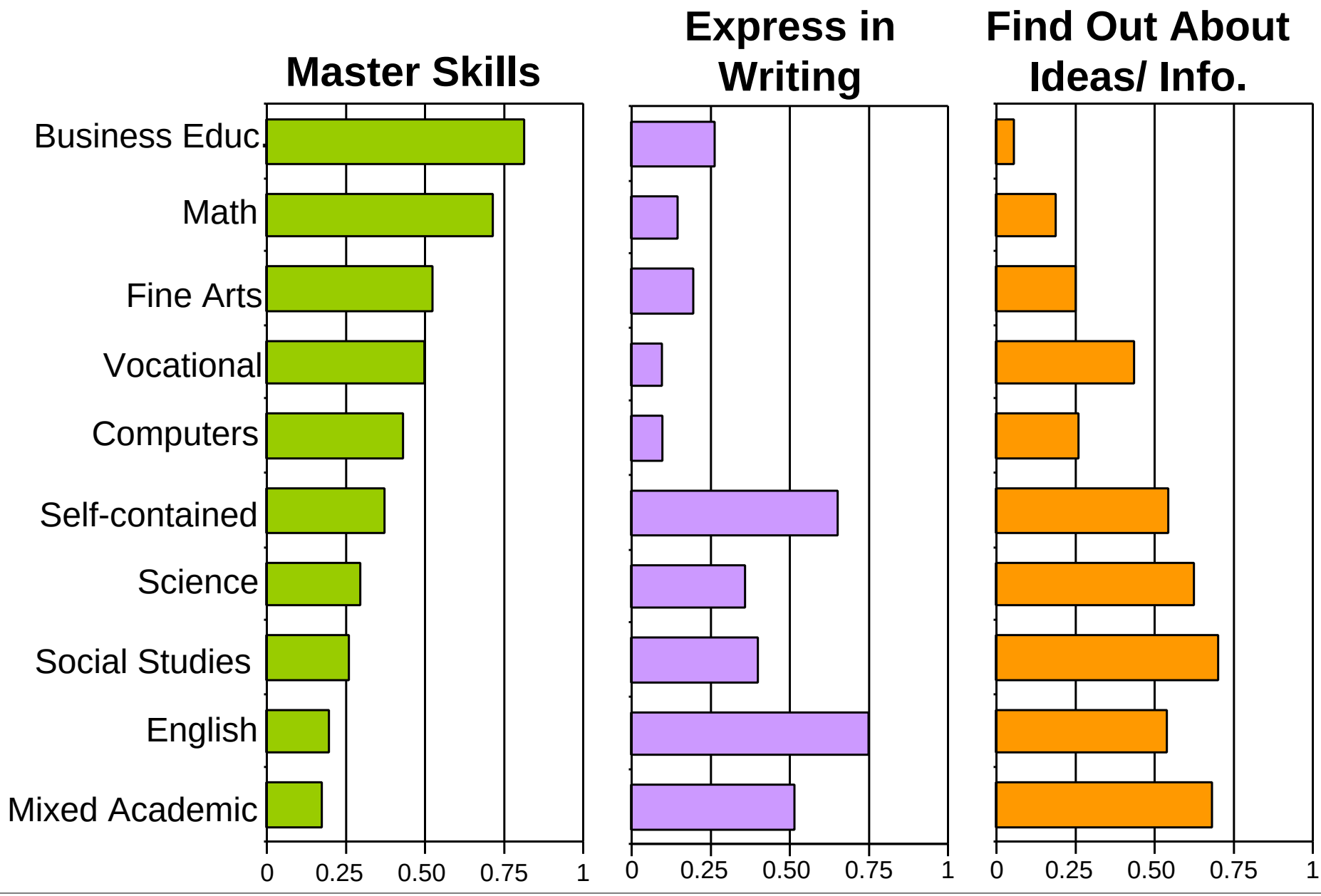


Math Teachers Have Different Objectives for Computer Use than Other Secondary Tchrs.

Teachers whose students used computers more than 10 times



Top Three Objectives for Student Computer Use



Why are Math Teachers Different?

Who They Are--Their Philosophies

The Requirements of their Subject

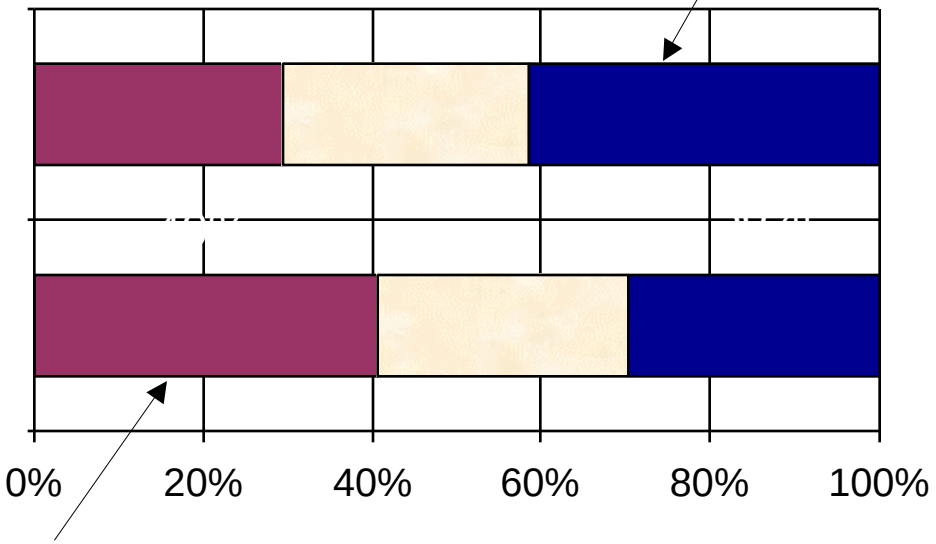
Their Working Environment

Teacher as a Facilitator Versus Structured Explanation

Math Teachers

Facilitator

"I try to provide opportunities and resources for my students to discover or construct concepts for themselves."



All Other Middle/H.S.

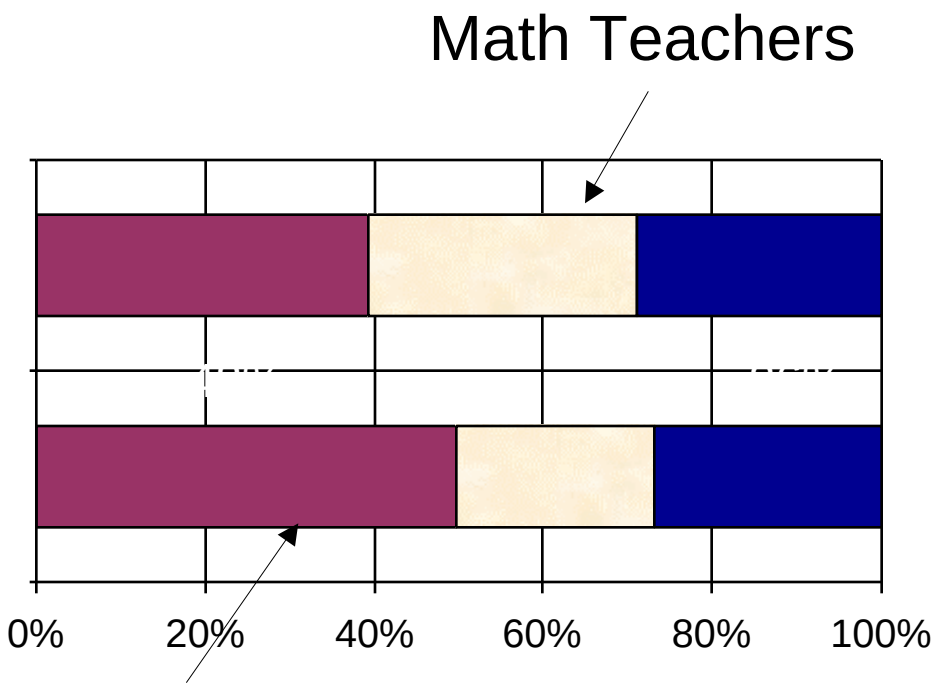
Explanation

"My students won't really learn the subject unless you go over the material in a structured way. It's my job to explain, to show students how to do the work and to assign specific practice."

Variety of Activities Versus Same for All

Variety

"It is a good idea to have all sorts of activities going on in the classroom. Some students might produce a scene from a play they read. Others might create a miniature version of the set It's hard to get the logistics right, but the successes are so much more important than the failures."



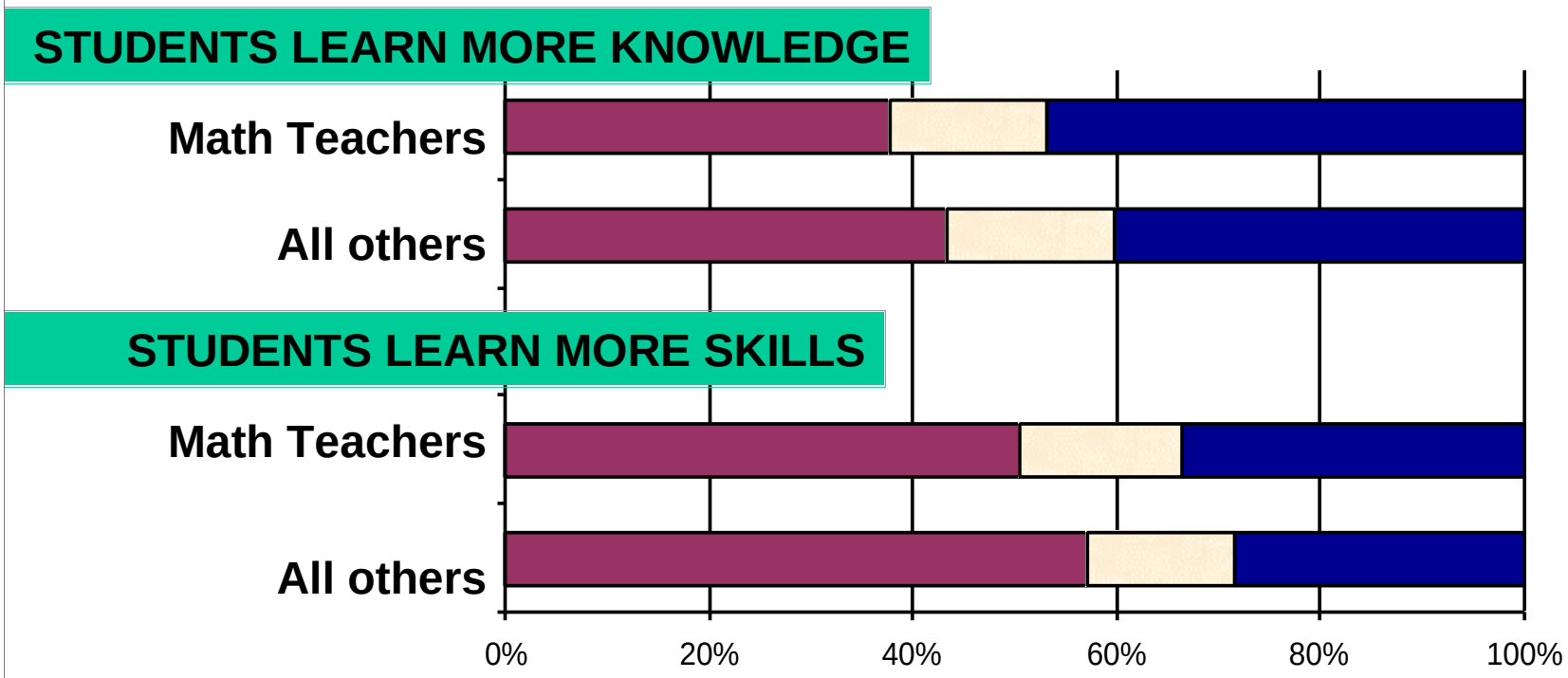
Explanation

"It's more practical to give the whole class the same assignment, on that has clear directions, and one that can be done in short intervals that match students' attention spans and the daily class schedule."

Two Teachers Compared

Mr. Jones:
Many questions came from students themselves. Though Mr. Jones could clarify questions and suggest sources of relevant information, he couldn't really answer most of the questions himself.

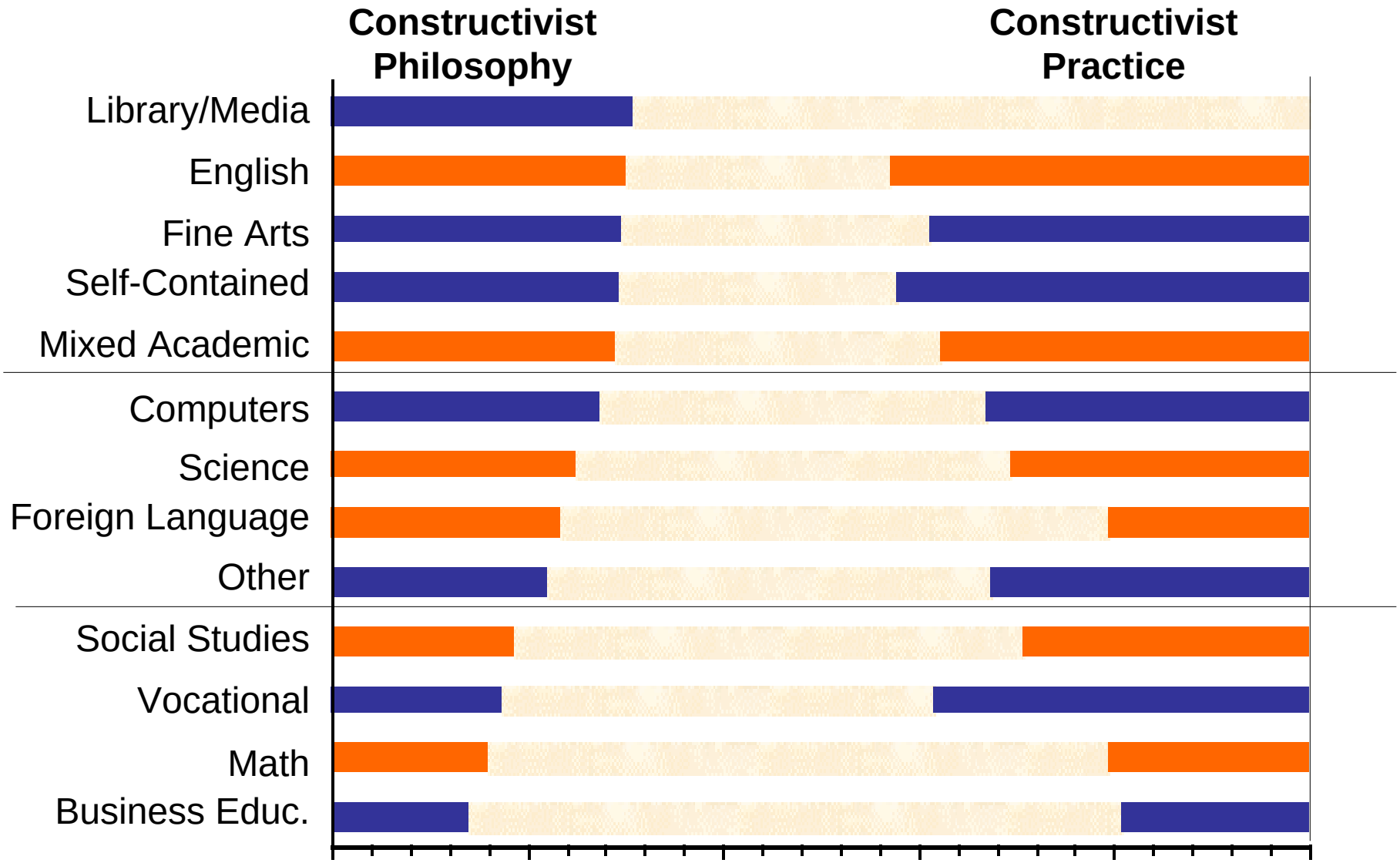
Ms. Hill:
Asked questions the students could answer quickly; based on reading they had done before. New material is taught using simple questions to keep students attentive.



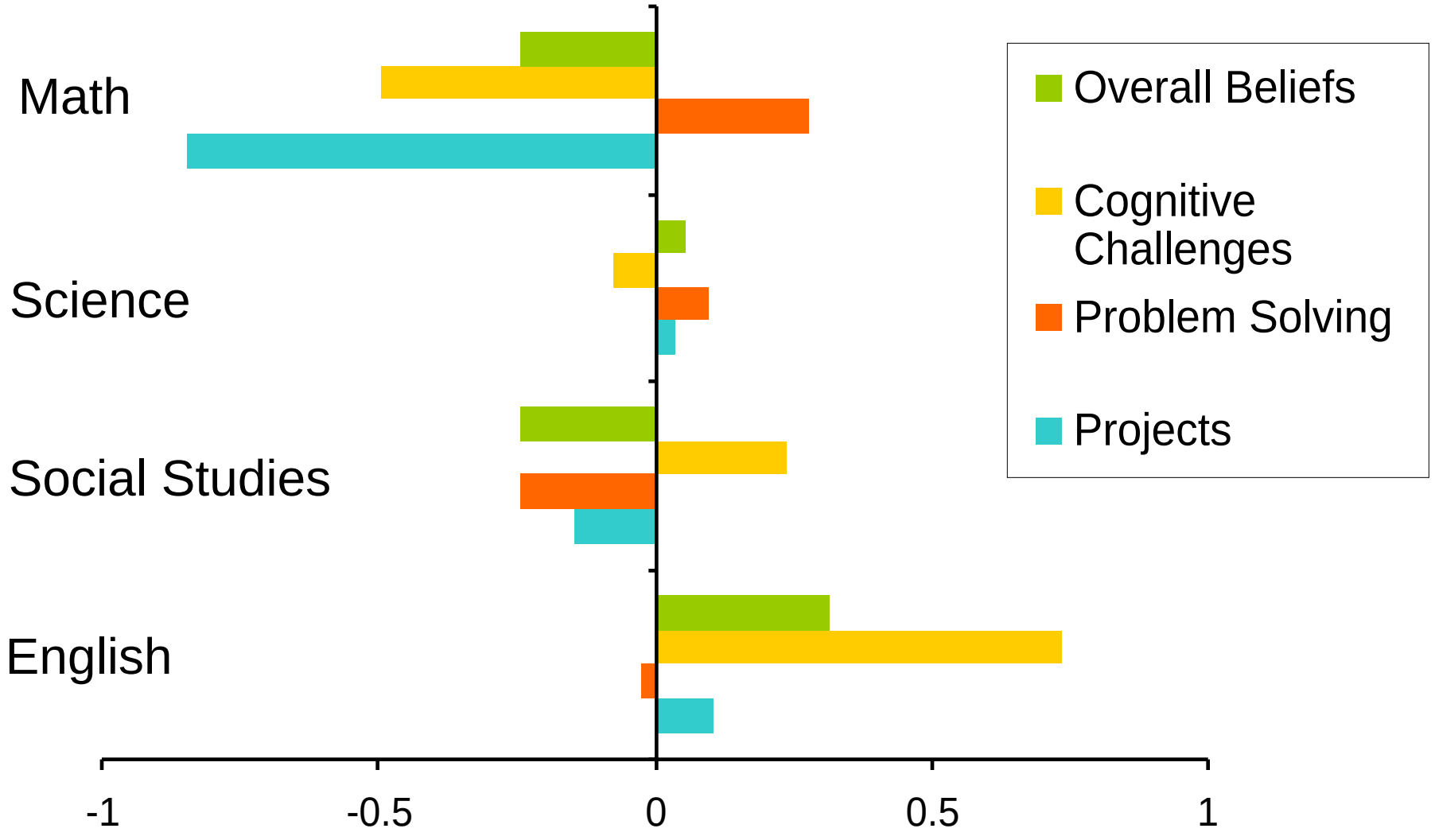
Constructivist Practice Index

Deep Thinking	Project-Based	Student-Designed
• Hold a debate and argue for a particular point of view which may not be their own. • Represent the same idea in more than one way (in math by a table and a graph; in English, by a poem and an essay). • Work on problems for which there is no obvious method of solution. • Seriously assess their own work. • Make conjectures about what they will learn or discover in a new unit.	• Make a product that will be used by someone else. • Do hands on/laboratory activities. • Work on projects that take a week or more. • Demonstrate their work to an audience including people other than from the school or their family.	• Relate what they are working on to their own experience. • Suggest or help plan classroom activities. • Decide on their own procedures for solving a complex problem and then discuss among themselves their different procedures and results.

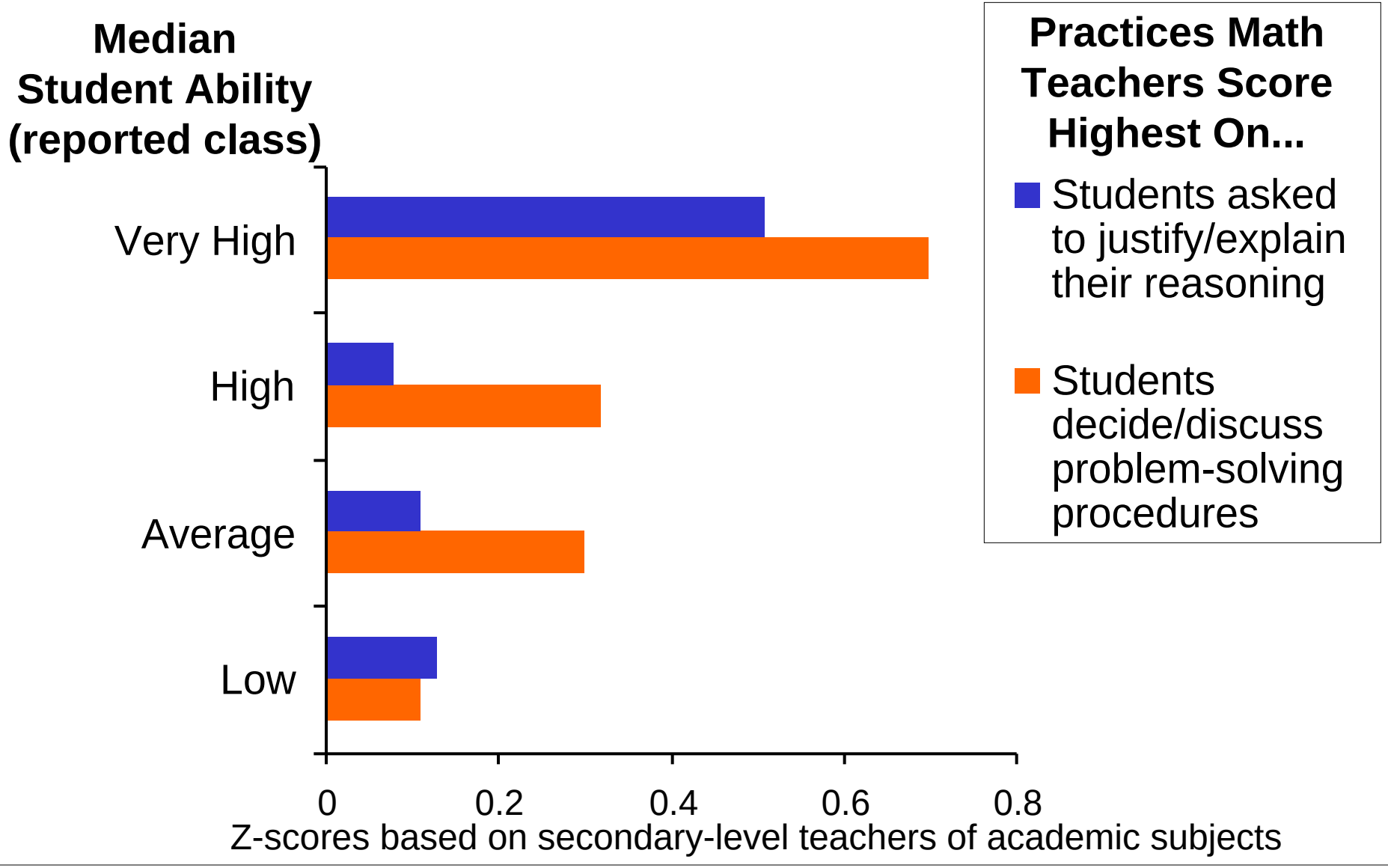
Constructivism by Subject Taught



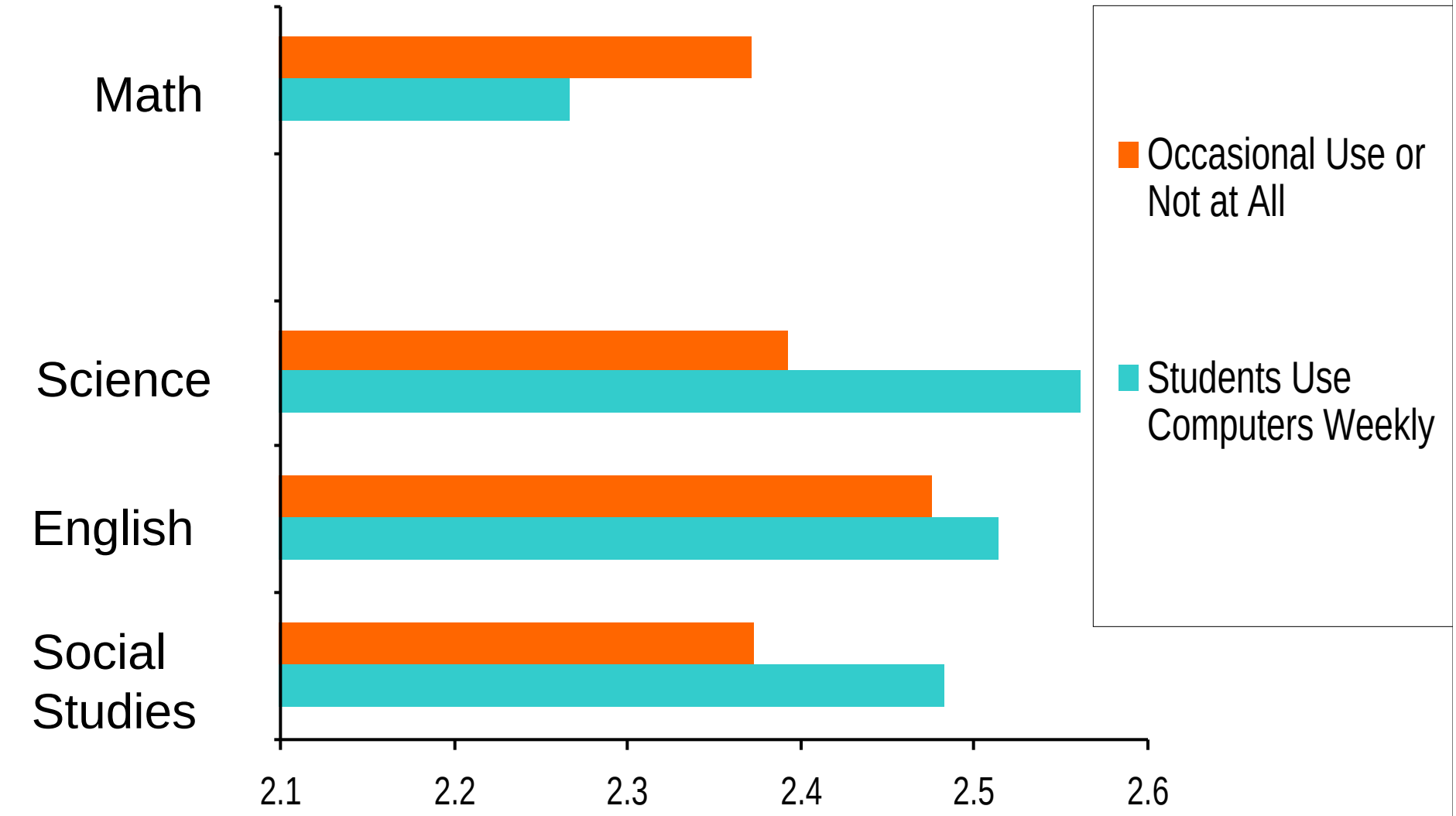
Different Patterns of Constructivist Responses by Subject Taught



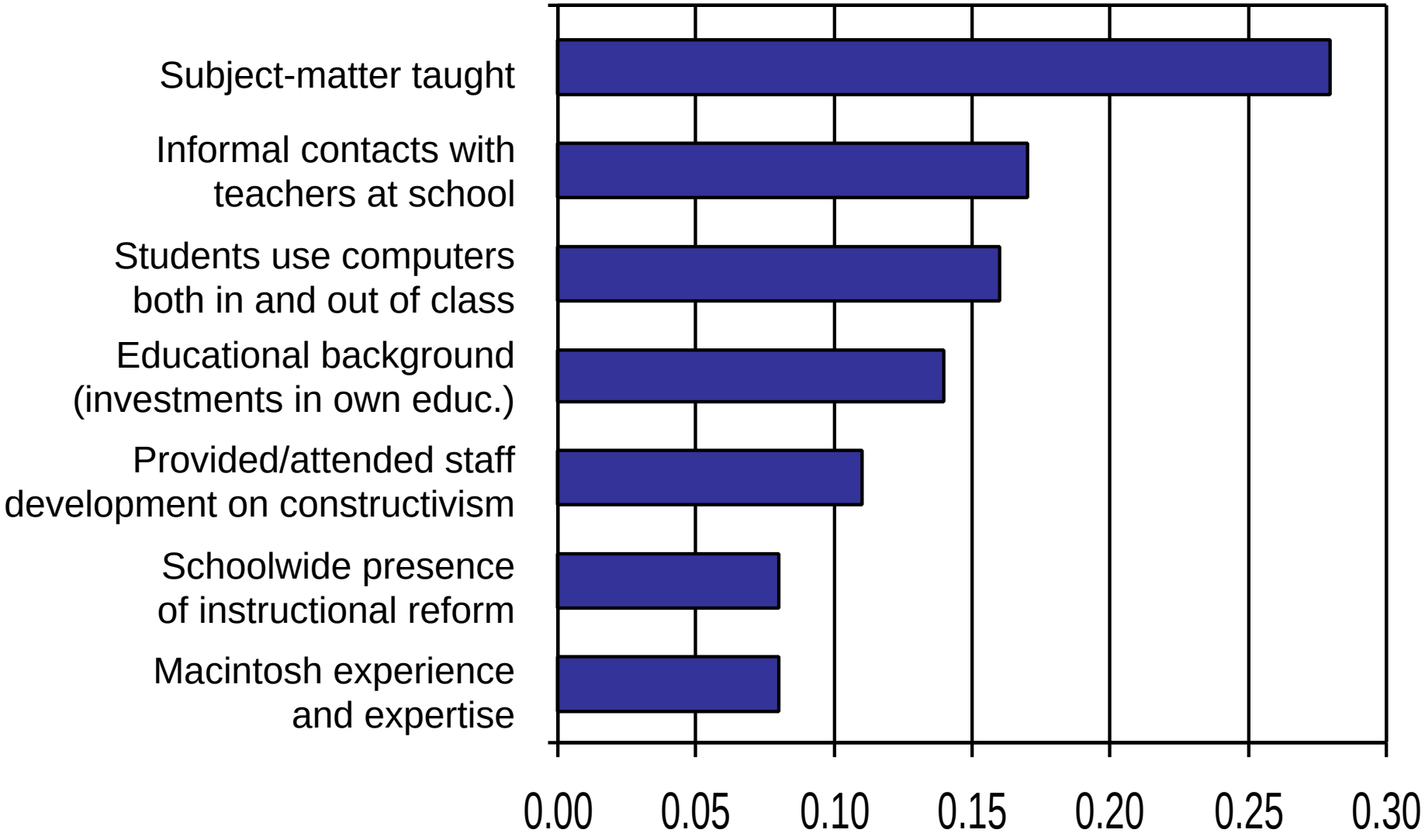
For Their Most Constructivist Items, Math Teachers Favor Very High Ability Students



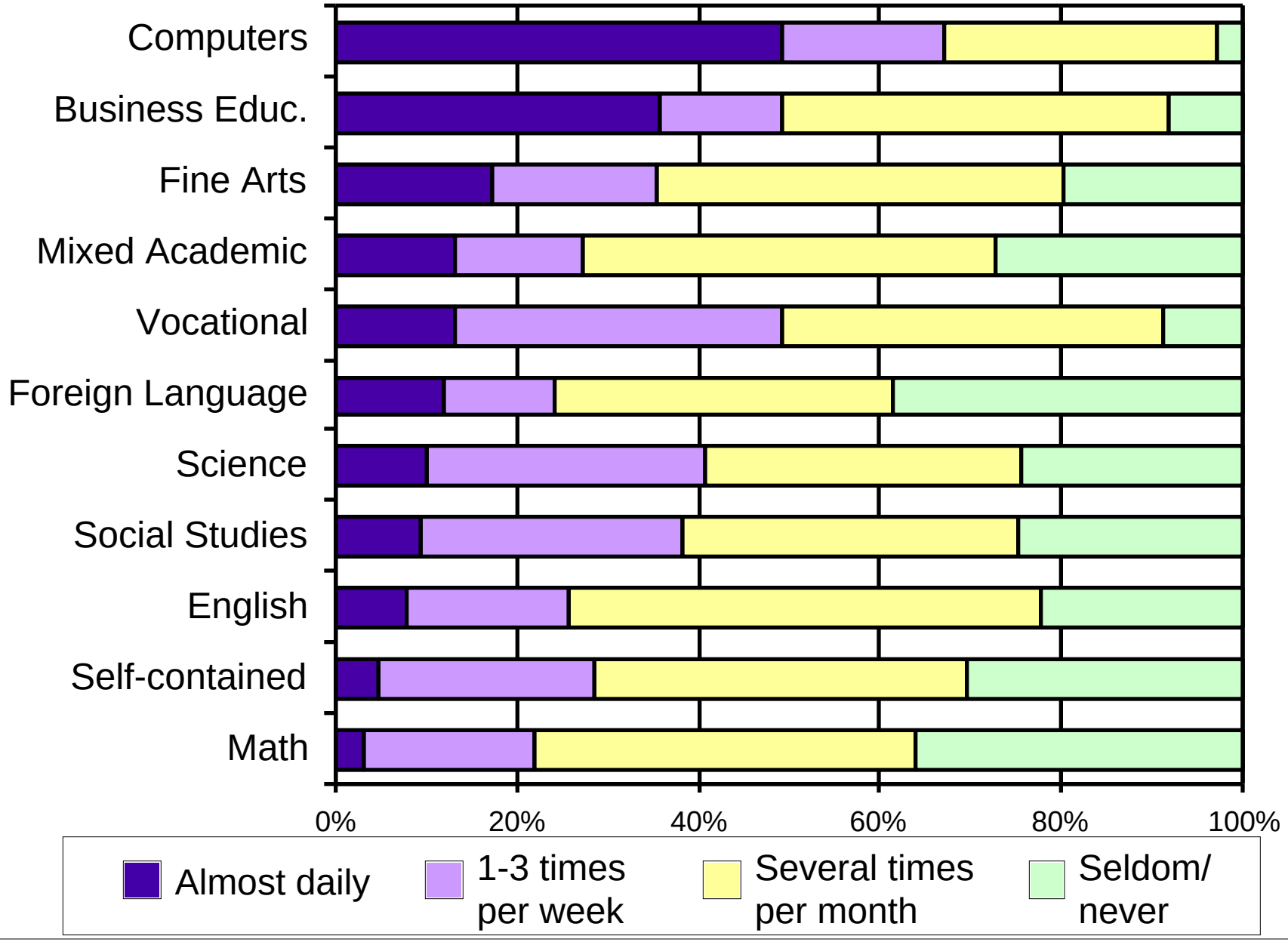
Recent Changes Towards Constructivist Practice by Computer Use by Subject Taught



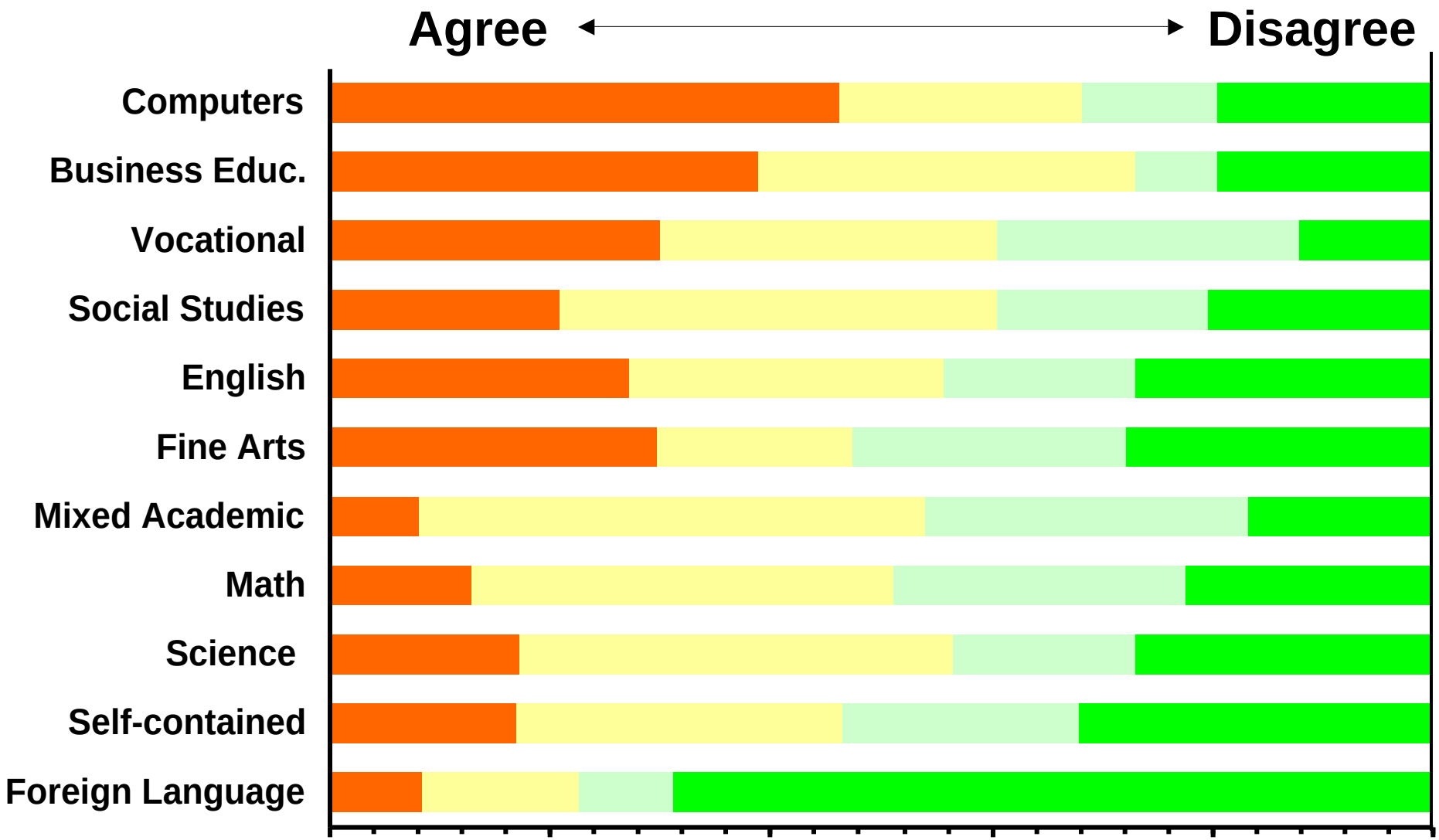
Strongest Individual Predictors of Constructivist PRACTICE (All Secondary)



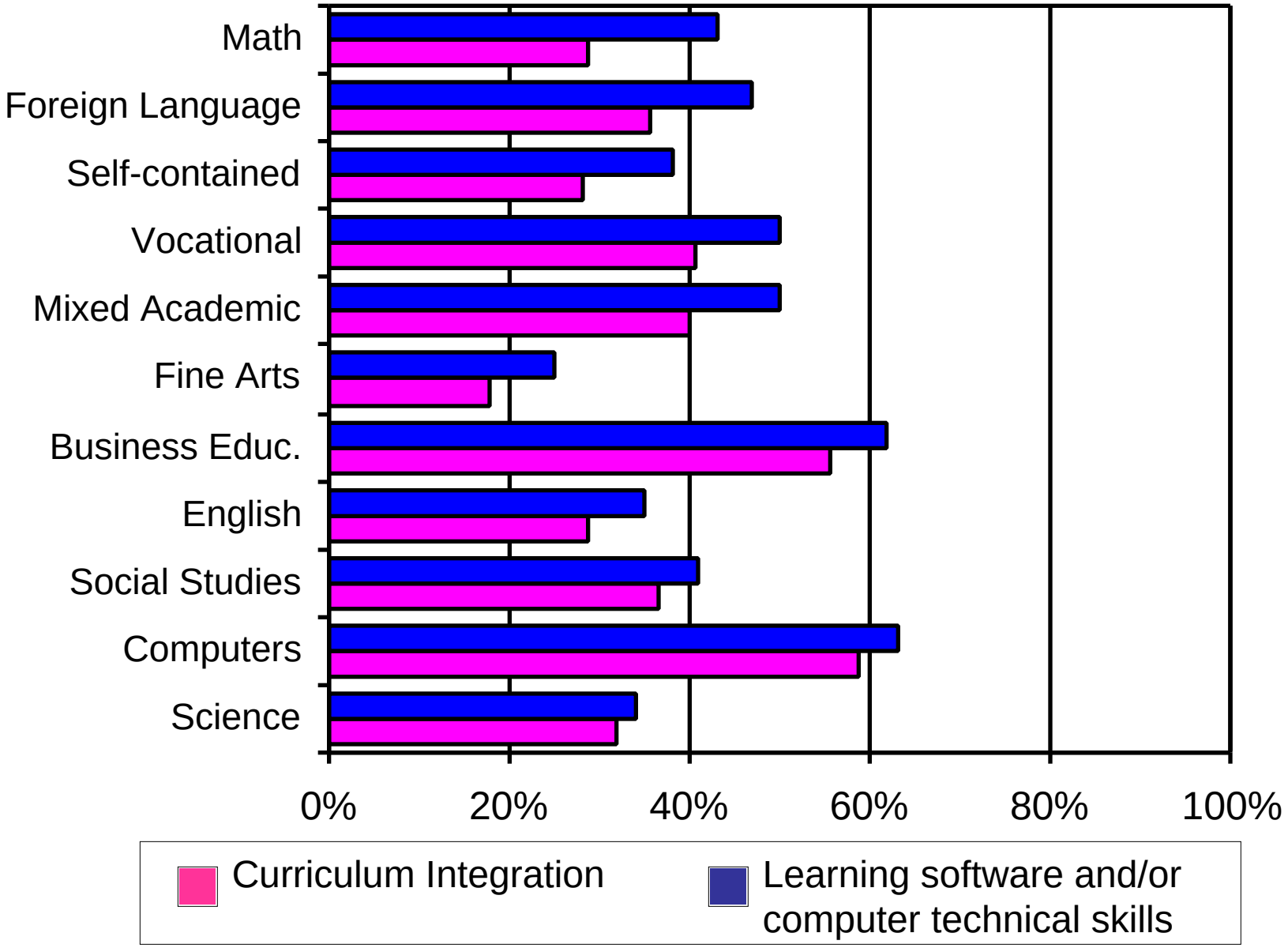
How Frequently Do Teachers Talk With Other Teachers About Computers, Software, or the Internet?



“The People Who Give Me the Best Teaching Ideas Know a Lot About Computers.”



Percents of Teachers who Report that Computer Skills or Curriculum Integration was a Central Focus of Staff Development



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- ***Internet Use by Teachers (available now)***
- ***Computer Presence in American Schools***
- ***Computer and Software Use by Teachers***
- ***School Decision-Making on Technology***
- ***Staff Development & School Support for Teachers' Computer Use***
- ***Pedagogical Beliefs and Practices Among American Teachers***
- ***School Technology Investment Alternatives***
- ***Teacher Pedagogy and their Use of Computers***
- ***School Context and Personal Factors in Teachers' Use of Computers***
- ***Computer Use in Reform and High-End Technology Settings***
- ***Dynamic Relationships Between Pedagogy and Computer Use***
- ***A Summary of Teaching, Learning, & Computing-1998***

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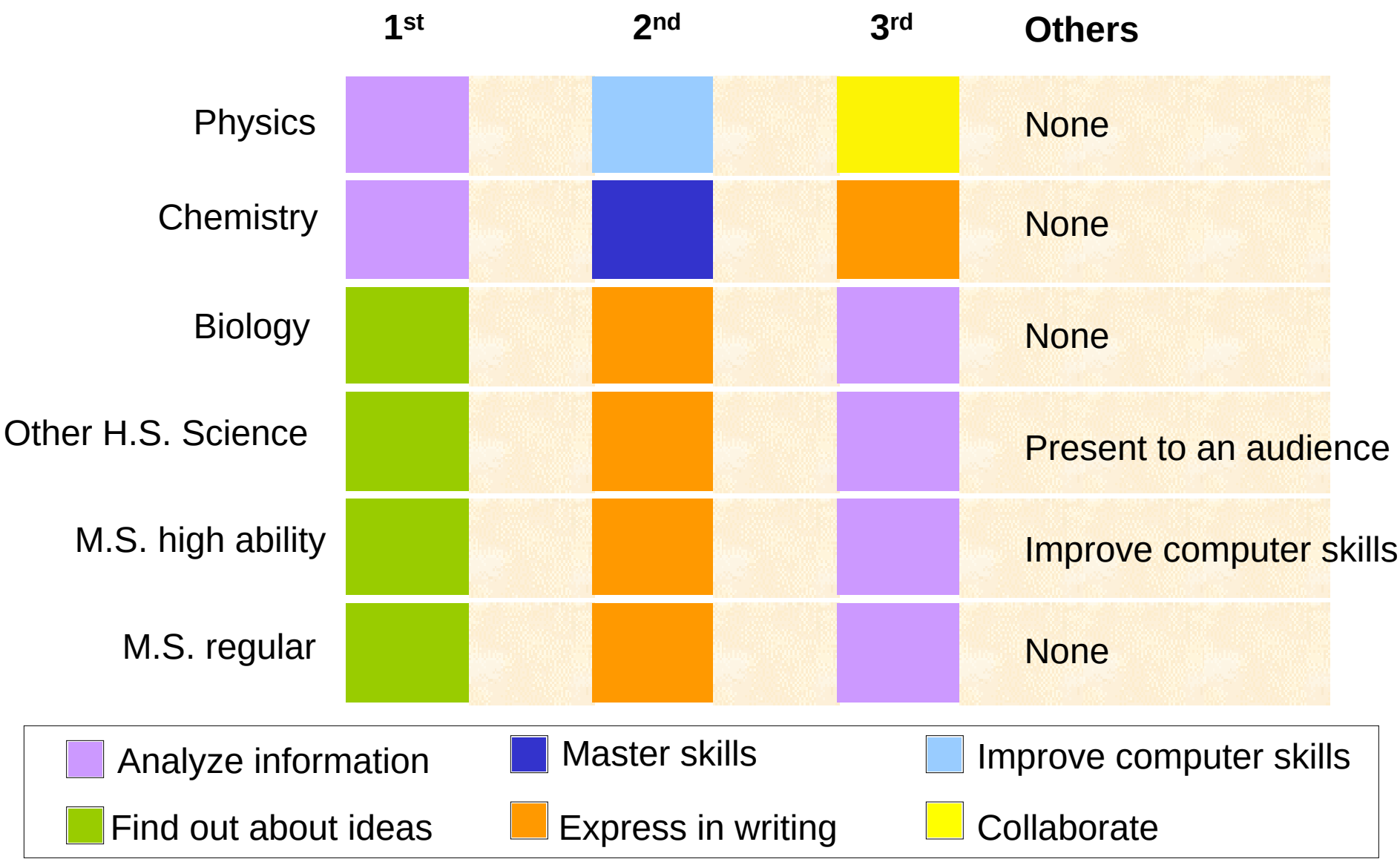
- New findings presented weekly
- Discussion group
- Reports and newsletters: view or download
- Archive of previous newsletters and findings

Most Common Objectives of Computer Use, by Subject



Average Constructivist Pedagogy Index For Frequent Users of Different Types of Software - Middle Grade Science Teachers