



## The Real Projects for Real Clients Course (RPRCC) Initiative Recruiting Young Women Into and Retaining Them in Computing-Related Majors: An Initiative Based Upon 35 Years of Psychology Research

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Gender equity in computing has long been a national goal advanced by those concerned with fairness and by those who know that the female point of view improves the design and development of software systems. Unfortunately, though, the percentage of young women entering computing-related majors keeps falling, and the female dropout rate is higher than the very high male dropout rate.

The intellectual underpinning of the RPRCC Initiative is a 35-year psychological **Study of Mathematically Precocious Youth (SMPY)** that followed 3000+ MPYs from middle school into middle age. SMPY's mandate was to determine how to best educate MPYs in order to maximize their success in STEM careers. Along the way SMPY discovered that:

- absent mitigating constraints, MPY females choose STEM fields involving organic things, i.e., fields involving people, helping people, etc. This explains the current gender equity in medicine, the near gender equity in biology and many of its variants, and the majority-female participation in the social sciences.
- female MPYs have considerably higher verbal skills than MPY males, accounting for their preference for inter-personal interaction, rather than solo work, and for the current gender balance in law.
- absent mitigating constraints, MPY males choose STEM fields involving inorganic things, i.e., fields involving machines, abstractions etc., accounting for the gender imbalance in computing, engineering, and physics.

<b>High School-Level RPRCC (for Recruitment)</b>	<b>Pre-Choice-of-Major, First-year/Sophomore Undergraduate RPRCC (for Recruitment)</b>	<b>Post-Choice-of-Major, Junior/Senior Undergraduate RPRCCs (for Retention)</b>
<p><u>Pre-programming topics taught and skills developed:</u></p> <ul style="list-style-type: none"> <li>* requirements acquisition</li> <li>* GUI development</li> <li>* users' manual construction</li> <li>* all of above iteratively improved thru frequent interaction with critical stakeholders, e.g., client, customer, users, etc.</li> <li>* simple risk management, project scheduling and management</li> <li>* software is coded, tested</li> </ul>	<p><u>Same topics covered, and skills developed as in High-School-Level RPRCCs</u></p> <hr/> <p style="text-align: center;"><b>Notes</b></p> <p>In introductory programming courses, young women often lose their self efficacy because young men already have programming experience, but female students perform better at pre-programming activities than young men (listening to clients/users, etc.), so women do not lose their sense of self worth.</p>	<p><u>Full life-cycle software development activities taught and skills developed</u></p> <ul style="list-style-type: none"> <li>* Types of RPRCCs             <ul style="list-style-type: none"> <li>▫ Web Programming RPRCCs</li> <li>▫ DBMS RPRCCs</li> <li>▫ Training Games RPRCCs</li> <li>▫ Software Engineering RPRCCs</li> <li>▫ Capstone RPRCCs</li> </ul> </li> <li>* Possible clients             <ul style="list-style-type: none"> <li>▫ socially-relevant agencies</li> <li>▫ college faculty and staff</li> <li>▫ local companies</li> <li>▫ local government</li> </ul> </li> </ul>

and deployed in a later course		agencies
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So, one might ask, what is the point of an initiative to recruit young women into and to retain them in computing-related undergraduate majors? The answer is that only about 30% of the typical software development project (person-hours, etc.) involves solo inorganic work, i.e., writing code. The majority of the remaining 70% has a highly organic, teamwork- and interpersonal interaction-based nature, especially if the software's client/ customer is a socially relevant agency, e.g., an adoption agency, a child-care agency, a poverty agency, etc. The RPRCC initiative is, therefore, based upon courses in which students work in teams --initially on the 70% -- to produce real, useful, software for real clients. The table below shows the three aspects of the initiative.