Counselor Toolkit for ICT/DM Education Pathways

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Counselor Toolkit – December 2014
Why We Need More Students on ICT/DM Education Pathways

Economies, local and global, are increasingly driven by information and communication technologies (ICT). The ICT term is used to encompass all rapidly emerging, evolving, and converging computer, software, networking, telecommunications, Internet, programming, information systems and digital media technologies. ICT is also a comprehensive framework for organizing these inter-related, interdependent, and rapidly changing technologies, the many fields they support, and the ICT workforce they demand.

The ICT workforce spans across organizations of all sizes, in all industries. According to the Association for Computing Machinery (ACM), computing will represent half of all Science, Technology, Engineering and Math (STEM) jobs by 2020 and 62% of STEM job openings between now and then. In California, ICT employment represents about 1 in 20 jobs, paying about twice the median, demand is growing, and employers are reporting difficulty finding appropriately skilled ICT workforce. Economic Modeling Systems Inc. (EMSI) estimated the creation of 30,000 new ICT workforce jobs between 2011 and 2013 and more than 80,000 ICT workforce job openings due to replacements, for a total of more than 110,000 new and replacement jobs during that period. The gap between supply and demand is growing.

The impact reaches beyond California as America also struggles to produce enough technologists to close the gap between the supply of ICT professionals produced by the educational system and industry demands. From a global perspective, the U.S. continues to fall behind the rest of the developed world, as that gap continues to grow larger. The U.S. Department of Labor estimated that there were 1.4 million new jobs in ICT in 2014. If the decline in community college and undergraduate computing and information sciences enrollment continues, we will graduate only 29% of the qualified candidates needed to fill these jobs.

Adding to this crisis is the issue of equity. While computing-related jobs are the fastest growing segment in the US, the other big shift is demographic. The US will be majority-minority in the year 2040, with Blacks and Latino/as among the fastest growing populations in the country. Yet, despite the fact that they are a growing segment of the US workforce, Blacks and Latino/as are highly underrepresented in the growing ICT economy.

Given these realities, why aren’t more students exploring potential careers in technology?

First, student-to-counselor ratios continue to increase. Fewer counselors to guide public high school and community college students into and along ICT/DM education pathways coupled

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1 (See MPICT’s Phase 2 ICT Industry and Employment Outlook.)
with an increasing number of other career options, makes counseling a demanding role. It’s increasingly difficult to stay informed and remain current on how available pathways and programs match industry and market demand. This is especially true for ICT/DM. As a result, counselors AND students are less informed about these opportunities.

With fewer counselors, teachers often find themselves in the counselor role. At a minimum, teachers need to know where success in their classes and curricula can lead. They, too, must be aware of where their course sequences fit in education and career pathways to be able to advise their students on next steps, should they express interest in ICT/DM careers.

When counselors and teachers know more about ICT/DM education and career pathways and are aware of resources to which they can direct students to learn more about their personal possibilities, more high school and community college students are likely to include ICT as a potential career choice. The intent of this toolkit is to raise that awareness.
Toolkit Structure

This toolkit is presented in five parts. Part I, prepared by the California Community Colleges ICT/DM Sector Navigation Team, provides an overview of the ICT/DM job sector and the opportunities available for students on that pursue the related education pathways. Part II discusses strategies and examples of defining, documenting, and communicating ICT/DM education pathways information that community college educators can use to promote and support their specific programs. Part III describes how the online resources in Part IV apply to specific K-14 demographics. Part IV is a catalog of online tools and resources useful in attracting, informing and engaging the interest of middle school, high school and community college students in ICT education pathways. Part V offers resources and research that specifically addresses the interests and needs of computing career counselors.

One of the major access barriers to ICT pathways is awareness. Addressing misperceptions about the ICT/DM field and providing counselors with relevant information about how local programs lead to good jobs can heighten awareness. We hope that this toolkit can help you bring down some of those barriers, get more students on the way to good careers, and begin to meet the growing and unmet demand for digitally literate and skilled workers, in our region and the entire nation.
Part I: Background on the ICT/DM Sector

Information and Communication Technologies (ICT) is an umbrella term, widely used outside the U.S. and in the United Nations, to encompass all rapidly emerging, evolving and converging computer, software, networking, telecommunications, Internet, programming, information systems and digital media technologies. We add digital media to the acronym because it a growing sub-sector and one that is most attractive to young students.

The ICT/DM Sub-Sectors

There are several core disciplines.

- Computer Science & Software Development
- Information Technology (IT, Networking)
- Digital Media

...and many hybrid occupations where these skills are combined with others; e.g.

- Business Information Systems
- Healthcare IT
- Social Media Marketing and Web Design
- Graphic Arts

Community college programs vary widely and lack standardization that would help businesses understand what skills are associated with our various programs, certificates and degrees. Consequently, at this time, the most solid evidence of student achievement for hiring is thru:

1. Transfer to 4 year degrees (Computer Science and Software Development)
2. Third party Certifications (IT)
3. Portfolios (Digital Media)
4. Entry Level occupations (CCC aligned curriculum)

Computer Science and Software Development:

While exceptions exist, careers in this high demand area are best accessed by a 4-year degree. In California, the Computer Science Transfer Model Curriculum (TMC) is the best option for our students.

Information Technology:

While many advanced IT jobs also call for a 4-year degree, there is no direct IT pathway thru the California State Universities (CSUs), University of Nevada, or University of Hawaii, for that purpose. In California, students can link their 2 years with the CCCs following the ICT Model Curriculum (see Appendix A) and transfer to a 4-year completion with several private 4 years, like National or DeVry.
However, this is a robust area as the CCCs have curriculum for both incumbent professionals and entry-level students. There is no better bargain for ICT certification preparation than the CCC’s. The Cisco Academy series and other third party certification preparation, like Project Manager Professional (PMP) are available at many CCCs and are in high demand.

Inexperienced students should be aware that experience is the key to advancement in this sector and be ready to take on an entry level job, such as a help desk role, and keep studying for higher certifications in Cyber security, networking and Project Management. Students who complete their Cisco Certified Network Professional (CCNP) certification have been known to begin jobs at over $70K per year.

Digital Media:

Many 4 year students return to community colleges to take these classes as they need the hands-on skill capabilities to do their jobs in today’s digital media world; however, without a 4 year degree the student would likely be relying on their artistic talent and self discipline to pursue a freelance career where some small business entrepreneurship training would be helpful. An exceptional student portfolio is the key to getting hired.

Entry Level Occupations

Recognizing the majority of today’s students are non-traditional and will leave and return to the CCCs as needed, more focus should be placed on entry level positions that enable a student to enter a field related to ICT/DM in 6-8 months as a starting point.

Entry-level jobs that utilize CCC existing curriculum are:

- Business Information Worker
- Computer Retail Sales Specialist (in development)
- Computer Support Help Desk (in development)
- Network Support Help Desk (in development)

The California Community College ICT/DM Sector Navigator Team is developing standardized skills requirements that business desire for these jobs that can be mapped to existing courses. Additionally, marketing support targeted at students and business is in development.
High-Demand Jobs in ICT/DM

KForce, a staffing and solutions firm specializing in IT, healthcare, finance and accounting, concurs with MPICT’s research that IT is hot! Following are examples from their list of hot tech jobs.

Desktop support/Help Desk Analyst
Why it’s hot: As companies begin to recover from the recession, computer upgrades and hardware refreshes are becoming critical. For almost any business investing in technology, desktop support staff, or help desk analysts, may be required to provide technical and customer service skills to assist in these projects. As employers search for these specialists, professionals in demand will likely include those who have supported a large number of end users during a project roll-out. These companies may also look for details on the types of operating systems the professional has experience with and additional hardware skills.
Experience: Hardware certifications such as CompTIA A+ preferred, experience with current technology and project rollouts.
Salary Range: $32,000 - $64,000

Java/.net Developer
Why it’s hot: As technology-driven organizations launch new projects, there is increased potential for new coding and development activities. For global organizations, Java developers will likely be in high demand. Additionally, organizations using Microsoft based applications will likely need .NET developers to step into consulting opportunities.
Experience: 5+ years experience coding methodologies and applications.
Salary Range: $65,000 - $114,000

Mobile Application Developer
Why it’s hot: It’s no secret that smartphones and tablet computers have gained popularity within the past few years. Many organizations on the cutting edge of technology want their products or service available online through a mobile application. Professionals with 1-2 years of experience in this field will likely be very market-able candidates. However, since this position has just emerged in the past few years, more employers are considering professionals with coding and other application development experience for these positions.
Experience: Coding or application development experience.
Salary Range: $110,000 - $200,000

Project Manager
Why it’s hot: As budgets decreased during the recession, so did the number of projects. As organizations reinstate funding for various projects, project managers are now back in demand. Depending on the size and scope of the project, large organizations and project management
offices will be looking for professionals with experience in discipline methodologies and structured projects.
Experience: Bachelor’s degree, PMP certification preferred
Salary Range: $80,000 - $100,000

Quality Assurance Testers
Why it’s hot: In the past, organizations outsourced quality assurance testers, likely due to cost-cutting measures. However, more organizations are now realizing that it’s important to have QA resources onshore. These professionals may be expected to have strong scripting skills with experience in writing and executing test scripts and potentially automated testing tools, as well as up-to-date knowledge on current technologies being used within that particular organization.
Experience: 1+ year experience testing, Certifications on automated tools such as Quick Test Pro (QTP).
Salary Range: $50,000 - $65,000

Data Warehouse Developers
Why it’s hot: Staffing specialists have recently seen a growing need from public firms and healthcare organizations to hire professionals who have the ability to gather and report data for business intelligence. From extracting data to compiling a report of the findings, organizations may look for candidates with experience in SQL development or database administration. Those professional applying for positions in this area should list their specific experience with Microsoft’s Sequel Server data warehousing applications (SSRS/SSAS/SSIS).
Experience: 2+ years experience with reporting/data warehousing, SQL development.
Salary Range: $85,000 - $100,000

SharePoint Application Developer
Why it’s hot: Gone are the days of paper files and Rolodex’s. SharePoint now offers a way for businesses to manage and organize content and documents, and professionals who can deliver this service, are typically placed in a position in less than a week. Hiring managers will likely look for professionals who have worked in a large environment and have experience with custom development or developing projects from scratch.
Experience: 5+ years working as a developer, C#/.NET development experience.
Salary Range: $95,000 - $115,000
Part II: Strategies and Implementations

MPICT is based at City College of San Francisco and is advised by a Regional Leadership Council that represents seven community college districts in California, Nevada and Hawaii. Since 2012 (through 2015), a sub-award project\(^2\) has enabled collaborations with City College of San Francisco, San Francisco Unified School District, San Francisco Office of Workforce Development, and local community-based organizations that increase the number of students on ICT education and career pathways. These relationships have been (and continue to be) a valuable source of input to the strategies and implementations described below. We asked our partners “what works?” How did the students that found ICT education pathways get there?

Specialized Counselor

As mentioned earlier, over-burdened counselors find it challenging to know enough about ICT careers and the education those careers require to recognize student interest, advise them on the possibilities, and recommend a course of action. A community college counselor specializing in ICT/DM education pathways and maintaining current knowledge about workplace learning and career opportunities is prepared and therefore more successful in attracting and advising students with a desire to pursue ICT/DM career development. A specializing counselor stays current by working closely with high school academy coordinators, community college ICT/DM deans and department heads, state and federal funded bridge/pathway programs, local workforce development, local CBO programs and ICT/DM industry advisories.

Equally important as providing informed guidance, an ICT/DM specialized counselor is a leader that plans and implements and/or supports the remaining strategies.

Implementation: CCSF Biotechnology Program Counselor

CCSF’s Biotechnology Program has a dedicated Biotechnology Program Counselor that places a focus on guiding students into and through the Bridge to Biotech program. The Bridge to Biotech provides a rigorous and engaging introduction to biotechnology. Bridge students learn essential laboratory skills while at the same time strengthening the math and language skills that they will need for success in the biotechnology certificate program.

Math and English remediation is often the barrier for many students, in particular the underrepresented, to ICT education pathways. Counselors specializing in an industry sector are not only best prepared to assess readiness and guide students on courses and programs, they are also aware of additional, and relevant, support that can increase success. CCSF’s

\(^{2}\) San Francisco ICT Pathways Project funded by Broadening Advanced Technological Education Connections (BATEC) an NSF National Center of Excellence for Computing and Information Technologies
Biotechnology Program Counselor has been a positive influence in attracting and retaining students in CCSF’s biotech programs.

**Promotion of K12-CC Linkages**

Promoting linkages between high school ICT/DM academies to

- community college dual enrollment,
- CBO ICT/DM certificate programs,
- community college ICT/DM department certificate, and/or
- workforce development programs and/or internships

raises student awareness and curiosity about career possibilities. This involves maintaining a current inventory of high school and community college enrollment opportunities and how they can sequences to support the student’s progression on the pathway. This information is organized by specific ICT pathways, produced as collateral aimed at the student, and disseminated to all counselors and STEM/ICT teachers (high school and community college).

**Implementation: San Francisco ICT Education Pathways Environmental Scan**

*Pathways to ICT Education and Careers in San Francisco* is an inventory of SFUSD, CCSF, CBO and broader community resources, programs and information relevant to ICT education, training, workforce development and employment. Researched, consolidated and analyzed by the SF ICT Pathways Project Team over the summer of 2012, the report provides detail about the ICT education and training options students and job seekers have available to them in San Francisco. The scan also identified opportunities to improve SF ICT pathways and get more students to the end state of promising careers in ICT.

The report presented data about the number and demographics of students enrolled in ICT courses at SFUSD and CCSF; ICT-related courses offered at 17 SFUSD high schools and the five ICT departments at CCSF; ICT-related certificates, programs and credentials at CCSF; and ICT training and bridge programs offered by SF CBOs.

**Implementation: San Francisco ICT Education Pathways Collateral**

The SF ICT Pathways Project team created brochures and flyers for high school and community college students, teachers and counselors using information in the *Pathways to ICT Education and Careers in San Francisco*. A three-fold brochure was produced for each of SFUSD’s 17 high schools with ICT academies or ICT-related courses, describing their specific programs, CBO programs for high schools students, and the local contacts. An ICT@CCSF brochure was also produced, the first time any information about CCSF’s ICT departments was presented in one document. Students, teachers and counselors now have an overview of the 220 classes, 32
Implementation: Defining Course Sequences to Jobs

The MPICT team worked with SFUSD and CCSF staff members to define course sequences leading to ICT industry certifications, which are often the only qualification necessary for some entry-level positions. Making students aware of how certificates can be earned on the way to higher credentials and degrees can improve retention. Students can begin related work while completing a degree. When counselors and advisors can link a sequence of courses with jobs, they are able to give students a vision of the pathway with real opportunity along the way.

Certificate sequences are usually defined and available on ICT department web pages. But graphically presenting them in a manner that shows progression, provides an idea of time frame, and related the end result to an actual job is easier for a counselor to communicate and a student to remember.

Again, here are examples from the SF ICT Pathways Project:

**CNIT CISCO Routing & Switching Certificate**

Potential Jobs:
Network and Computer Systems Administrator
Computer Network Support Specialist

**Potential Salary: $94,140**
Video Production and Editing Certificate

Potential Jobs:
Camera Operator, Associate Producer, Assistant Video Editor
Potential Salary: $79,740

Web Foundation Certificate

Potential Jobs:
Enter level web developer
Potential Salary: $47,750
ICT/DM-Focused Career Events

ICT/DM is seldom represented at high school and community college career fairs and awareness events and when it is, it gets lost among the many choices presented as having equal opportunity. ICT/DM-focused career panels and program awareness events get more student attention, especially when they feature near-peer ICT/DM professionals and the availability of counselors, teachers and program recruiters to engage students inspired to take further steps. Because the topic is narrowed, such events also allow the participation of a broader, diverse audience such as high school and community college students or community college students, veterans and job seekers.

Implementation: BAVC Career Panels at CCSF

The Bay Area Video Coalition, a SF community based organization that provides training in video production, interactive design, audio engineering, computer science, independent film and advertising, partners with CCSF to offer students access to career panels of ICT professionals to learn more about the journey to jobs they’ve heard about or want to pursue. Most of the panel members are young, “near peers”, which makes these events interactive and successful, in that many participants want to learn more about BAVC programs and how they leverage study in CCSF ICT programs.
Part III: Advising Specific Student Demographics

Some tools and resources in Parts III and IV are more effective or targeted for specific types of students. Here are some considerations for four major groups.

High School Students

High school students are often the most uncertain about what career to pursue; therefore the place to start is an assessment of personal interests. Sites that include personal assessments and other resources that help choose a matching ICT career are

- American Job Center’s and O*NET’s *My Next Move*
- *Career Café*
- *Career One Stop*

Once a student narrows their choices down to a few options, the remaining sections of these three sites as well as the others resources listed can be navigated to locate the student’s next area of exploration (jobs, salaries, testimonials, education pathways).

Community College Students

Although some community college students are not firmly decided about their career and may benefit from assessing their interests, most are looking for information that will help them refine career objectives and align their studies to pursue good jobs. They may also be interested in an education pathway that combines opportunities to begin their career while preparing for transfer to a 4-year university. For these reasons, virtually all of the tools included here are of value in assisting their areas of inquiry.

Underrepresented Students

Several of the sources included here can assist in advising women and students of color. The National Center for Women in Technology (*NCWIT*) offer its Talking Points that provide conversation scripts aimed at young women and parents, with several in Spanish. *Mi Proximo Paso* is the Spanish version of the *My Next Move* profiler site. Finally, resources at the National Alliance of Partners in Equity (*NAPE*) STEM counseling sites focus on strategies for underrepresented students in general. All images on the student site and in the materials are of young women and students of color. In general, we found that most of the media presented diverse student and workforce images.

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Veterans

The Career Café site includes a section dedicated to advising veterans on assessing opportunities based upon military experience and planning the education needed to pursue them. Although not listed here as an ICT advisement site, the American Council on Education (ACE) Military Guide presents credit recommendations for formal courses and occupations offered by all branches of the military.
Part IV: Online Advisement Tools

The resources described in this section include:

- personal interest assessments that help students link their passions to potential careers,
- descriptions of ICT jobs across a wide variety of categories, including salary data,
- videos of ICT workers talking about what they do and why they enjoy what they do,
- information about ICT certificate and degree programs at colleges in their geographical areas, and
- tips on how to be successful in pursuing ICT careers during and after they’ve completed education programs.

Many of these resources present information about multiple careers. To assist with navigation, there are links to pages on the sites where the reader can find information about ICT.

Unless otherwise noted, the resources presented here are available for no cost.
The goal of the Association for Computing Machinery (ACM) Careers Website is to provide additional details that will help students prepare for a career in ICT. In particular, the site can help them decide how to develop the skills needed to be successful in a computing career with a focus taking the first steps toward an undergraduate degree in a computing-related discipline.

In addition to the wealth of information outlines below, the welcome page contains a link to a careers brochure designed to introduce high school students to the various disciplines that are part of computing, and to give a sense of the many opportunities available in this ever-expanding field. A Spanish version is also available.

The ACM Careers Website includes the following resources:

- Top 10 Reasons to Major in Computing
- Faces of Computing
- Computing Degrees & Careers Awareness Brochures and Posters
- Computing Disciplines & Majors
- What Computing Professionals Do
- Skills You'll Learn if You Study Computing
- Preparing for a Computing Major
- Frequently Asked Questions About Computing Careers
- Cool Computing News
- Other Important Sites for Students, Parents, and Educators
American Job Center for Youth

The American Job Center is portal to information and programs from the Department of Education, Department of Labor, Department of Veteran Affairs, the Small Business Association, the General Services Agency and the White House, who have all pledged their commitment to making this the site for information on strengthening the American workforce.

The site points to resources for job seekers, businesses, veterans, youth. The Youth section of the web site provides links to a college navigator, career exploration, information about the Job Corps, and Federal student aid. There’s also help for finding summer jobs.

<table>
<thead>
<tr>
<th>Career Exploration</th>
<th>Summer Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page is the My Next Move site that asks the question, “what do you want to do for a living?” The inquirer can search by type of career or industry, and if they’re not sure, can search based on the type of work they enjoy doing. See the link below for type of careers and industries related to ICT.</td>
<td>This is the BETA version of the Summer Jobs+ bank. Use the search features to find opportunities in careers in information technology.</td>
</tr>
</tbody>
</table>

ICT related links:

- Professional, Science and Technical Careers
- O*NET OnLine
- Career One Stop

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California Career Café

California Career Café is the premier site for advisement for California community college students. Funded by the California Community College Chancellor’s Office, the site provides an array of rich resources and media that invites a student on a pathway that begins with assessment of interests and progresses all the way to job search. The site also includes resources for aspiring entrepreneurs, veterans, and career changers.

Each of the pages below includes videos, links to valuable external files and student activities. Click on the image to navigate to the site.

- Identify your strengths and talents
- Match your personality to careers
- Use your learning style
- Be a great student
- Make math matter
- Set goals

Explore information about the 15 career pathways, one of which is Information & Communication Technology
| EXPERIENCE         | Connect with a professional association  
|                   | Conduct an informational interview  
|                   | Land an internship  
|                   | Volunteer  
|                   | Try an apprenticeship  
|                   | Find a mentor  
| tips              | Use campus services  
|                   | Bounce back – being resilient  
|                   | Manage your time  
|                   | Be money wise  
|                   | Need a second chance?  
|                   | Learn to apologize  
| PREPARE           | Build soft skills  
|                   | Earn an “A” for attitude  
|                   | Practice teamwork  
|                   | Improve communication  
|                   | Solve problems  
|                   | Go global  
|                   | Project professionalism  
| JOBS              | Visit the campus career center  
|                   | Conduct a job search  
|                   | Write a resume  
|                   | Network like a pro  
|                   | Call on social media  
|                   | Practice interviewing  
|                   | Master video interviews  
|                   | Interview with a ring – phone interviews  
|                   | Tune into corporate culture  
|                   | “82B Great”  
| APPLY             | Figure out your EQ  
|                   | Act on your big idea  
|                   | Learn from entrepreneurs  
|                   | Get social  

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- Evaluate your benefits and skills
- Plan your next move
- Discover new job opportunities

**people skills**

- Learn about skills your success depends upon
- Capitalize on skills and experiences
- Polish up people skills

ICT-related professional organizations
CareerOneStop

Sponsored by the US Department of Labor, CareerOneStop is a source for employment information and inspiration, providing tools for students, job seekers, businesses, and career professionals.

CareerOneStop is a very comprehensive set of sites. Counselors can start with America’s Career InfoNet (the Explore Careers section of CareerOneStop), which helps individuals explore career opportunities to make informed employment and education choices. The website features user-friendly occupation and industry information, salary data, career videos, education resources, self-assessment tools, career exploration assistance, and other resources that support talent development in today’s fast-paced global marketplace. Click on the images below to navigate to the site.

- Learn about assessments
- Research occupations and industries
- Update skills
- Search for jobs
- Advance of change your career

- Learn about wages and salaries where you live
- Typical benefits
- How to pay for education and training
- Set goals, develop a plan, and get prepared
- Find short-term training, certifications, apprenticeships, community colleges and programs, and other training providers
- Ways to continue developing existing skills

- Preparing for and conducting a job search

- Networking, interviewing and negotiating a salary
- Resume and cover letter advice
- Preparing for a successful interview

- Find workforce services in your area
The IT Career Paths provides education and career information for aspiring IT professionals. With the resources on this site, counselors and student can learn what kinds of technology careers are in demand, what those careers are like, and how to contact employers who are looking for individuals with those skills. ICT Career Paths gathers its information and statistics from all over the web, including sites such as the Bureau of Labor Statistics, Indeed.com and CIOInsight.com.

The IT & Computer Science Schools page allows search of schools that offer IT programs and degrees by state and keeps statistics on the top IT and computer sciences schools in the country.

The Certifications page provides overviews of IT certifications in demand. The Careers page profiles in-demand IT careers such as Cloud Architect, Computer Forensics, Computer Networks Systems, Cybersecurity, Help Desk Technician and Mobile Communications Technology, just the name a few.

The Salary page presents a different look at pay information, providing information about averages and trends, top paying firms, job growth rate, and states where the IT job growth is fastest. The Job Board page allows visitors to locate IT jobs in their area searching by city, state or zip code.
The National Alliance For Partnerships (NAPE) Counselor Toolkit is designed to effectively reach and encourage all students to consider a future career in STEM. It provides an overview of STEM careers, introduces positive language for talking with students, and connects the messaging with tools, activities, and resources. The Toolkit includes the following:

- 1 Exploring STEM Careers Booklet
- 4 lesson plans and related documents
  - STEM careers scavenger hunt (lesson plan, matrix, resources, worksheet)
  - STEM careers are essential to our health happiness & safety (lesson plan, worksheet 1, worksheet 2)
  - Engineering our world (lesson plan)
  - Work values (lesson plan and worksheet)
- 100 Kudos Cards to encourage girls in STEM
- 1 desktop Kudos Cards holder

High-quality print version of the Counselor Toolkit can be ordered from NAPE at this site.
The NAPE STEM Careers: Just for Students page at its website is an excellent tool for counselors to walk through with their students think about pursuing an ICT education pathway. It begins by explaining what STEM careers are and why they’re important. Students can then navigate links that allow them to explore topics such as:

- Is STEM the right career for me?
- Why are STEM careers in demand?
- What is driving STEM career growth?

The site then allows students to go deeper with a look at over 100 different STEM careers with videos of STEM professionals talking about what they do and how they prepared for their work. There are links to the U.S. Bureau of Labor Statistics Occupational Outlook and NACE’s Job Salary Calculator that illustrates the opportunities and potential pay. The National Association of Colleges and Employer’s (NACE) Job Salary Calculator also considers location and level of education when it computes the salary given data the student enters.
The National Center for Women in Information Technology has an excellent Resources page at its site that includes guides for conversations about ICT education and careers. Talking Points, at its Resources site are great scripts for advocating for diversity beyond more women. NCWIT Talking Points are easy-to-use conversation cards designed to help promote women (and any population) in IT. The double-sided cards help people talks about the issues with solid research, simple text, and appealing photos for easy reference. Here are the links:

**Why Should Young Women Consider a Career in Information Technology?**

**Comparing U.S. K-12 Students’ Math and Science Performance Internationally: What are the facts, what do they mean for educational reform, and how do I talk effectively about the issues?**

**Communicating for Change: Persuade Colleagues to Get on Board**

**Institutional Barriers & Their Effects: How can I talk to colleagues about these issues?**

**Moving Beyond Computer Literacy: Why Schools Should Teach Computer Science.**
O*NET OnLine

The O*NET Online is a resource provided by the Department of Labor’s Employment and Training Administration with detailed descriptions of the world of work for use by job seekers, workforce development and HR professionals, students, and researchers. Central to the site is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. Information from this database forms the heart of O*NET OnLine’s interactive applications for exploring and searching occupations.

The site’s Career Exploration Tools, a set of valuable assessment instruments for workers and students looking to find or change careers, starts with a link to My Next Move. This tool allows students and career seekers to find answers to the question “What do you want to do for a living?” If students have ideas about what they’d like to do, they can search for careers by keywords or industry. If they’re now quite sure, students can answer questions about what they like to do, and the site will suggest possible careers. Mi Proximo Paso is the Spanish version of the site. My Next Move can also translate military experience to job opportunities.

O*NET OnLine has a very extensive occupation search tool that allows the visitor to focus searched on

- Career keywords
- Career cluster
- Industry
- Jobs with a bright outlook
- Job family
- Occupation categories based on levels of education, experience, and required training
- STEM discipline

The O*NET Resource Center can be used by organizations and individuals to download the O*NET database, the career exploration tools described above, job analysis questionnaires, employer guides, and technical reports. The resource site includes descriptions for O*NET tools and a Developers Corner for developing products, software, or system applications containing O*NET information.
Part V: Other Research and Resources

Counselors for Computing (C4C)

**Counselors for Computing (C4C),** offered by the National Center for Women in Technology, provides school counselors with up-to-date information and resources they can use to guide students toward education and careers in computing. Counselors for Computing (C4C), a project of the NCWIT K-12 Alliance made possible by the Merck Company Foundation, empowers school counselors to increase student interest in and preparedness for computing and technology jobs. C4C brings school counselors the information and resources they need to advise students about careers in computing and technology and paths to these careers. C4C is a four-year campaign.

C4C resources include:

- **C4C Webinar** Video of a counselor workshop on key tips for advising
- **C4C Slide Presentation** A PowerPoint presentation that can be modified and used for professional development on ICT counseling
- **C4C Information Sheet** Information about the C4C campaign
- **Counselor Talking Points** Key points to convey to students and parents about computing education and careers
- **EdJobsMap: Computer Science Education and Computing Jobs** Web page for finding national and local data on technical jobs and student preparedness for those jobs

The C4C site provides information on the following pathways:

- **University Pathway** Getting students on track to a four-year computing degree
- **Community College Pathway** Helping students learn about two-year degrees and certificates in IT and computing
- **Intersecting Pathways Poster (24"x36")** Showing students that no matter where they start, multiple pathways lead to quality jobs
• **Military Pathway**: Connecting students with their interests with next steps toward technical careers

**Jobs for the Future**

![Jobs for the Future Logo](image)

JFF works with its partners to design and drive the adoption of education and career pathways leading from college readiness to career advancement for those struggling to succeed in today’s economy. This Counseling for Careers page provides information about how JFF can be engaged by community colleges to

Streamline the counseling process  
Empower students to become informed consumers  
Strengthen relationships between colleges and community partners  
Inform planning and revision of college pathways

Counseling to Careers features two training sessions, spaced over four months that build capacity for districts, community-based organizations, schools, and community colleges to identify best bets. The intervening period gives participants time to put the Counseling to Careers process to action by conducting research and working with partners, supported by ongoing technical assistance from Jobs for the Future.
Appendix A: ICT Model Curriculum

Model Curriculum Worksheet – December 2014 DRAFT

CCC Major or Area of Emphasis: Information Technology (IT)____
CSU Major or Majors: Information and Communication Technologies, Information Systems, Information Technology____
Total units____22____ (all units are semester units)
Degree Type (indicate one): AA-T_____ OR AS-T_____ OR MC ___

Required Core Courses: ______13_____ units

<table>
<thead>
<tr>
<th>Title (units)</th>
<th>C-ID Designation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information &amp; Communication Technology Essentials (4)</td>
<td>ITIS 110</td>
<td>Essential Preparation</td>
</tr>
<tr>
<td>Business Information Systems, Computer Information Systems (3)</td>
<td>ITIS 120</td>
<td>Essential Preparation</td>
</tr>
<tr>
<td>Introduction to Programming Concepts and Methodologies (3)</td>
<td>ITIS 130 or COMP 112</td>
<td>Essential Preparation</td>
</tr>
<tr>
<td>Computer Network Fundamentals (3)</td>
<td>ITIS 150</td>
<td>Essential Preparation</td>
</tr>
</tbody>
</table>

Select ____6____ units or ____2____ courses from the following:

<table>
<thead>
<tr>
<th>Title (units)</th>
<th>C-ID Designation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Systems Analysis and Design (3)</td>
<td>ITIS 140</td>
<td>Important Preparation</td>
</tr>
<tr>
<td>Systems and Network Administration (3)</td>
<td>ITIS 155</td>
<td>Important Preparation</td>
</tr>
<tr>
<td>Introduction to Information Systems Security (3)</td>
<td>ITIS 160</td>
<td>Important Preparation</td>
</tr>
<tr>
<td>Introduction to Database Management Systems (3)</td>
<td>ITIS 180</td>
<td>Important Preparation</td>
</tr>
<tr>
<td>Business Communication (3)</td>
<td>BUS 115</td>
<td>Important Preparation</td>
</tr>
</tbody>
</table>

Select ____3-4____ units or ____1____ course from the following:

Title (units) | C-ID Designation | Rationale |
---------------|------------------|-----------|
<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>GE Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Statistics (3)</td>
<td>MATH 110</td>
<td>B4</td>
</tr>
<tr>
<td>Finite Mathematics (3)</td>
<td>MATH 130</td>
<td>B4</td>
</tr>
<tr>
<td>Business Calculus (3)</td>
<td>MATH 140</td>
<td>B4</td>
</tr>
<tr>
<td>Single Variable Calculus I Early Transcendentals (4)</td>
<td>MATH 210</td>
<td>B4</td>
</tr>
</tbody>
</table>