

Cost Estimator/Quantity Surveyor Defined - A Key Word Analysis of Current Job Descriptions as the Basis for Exam and Competency Assessment Scoring Models

By Dr. Paul D. Giammalvo

INTRODUCTION

This is the second of a four part PILOT RESEARCH designed to perform a “Key Word” analysis from current job postings as the basis to define what the market (employers) are looking for in terms COMPETENCIES for the following job positions:

1. Planner/Schedulers- <http://pmworldjournal.net/wp-content/uploads/2016/06/pmwi47-Jun2016-Giammalvo-project-planner-scheduler-defined-featured-paper.pdf>
2. Cost Estimators/Cost Managers- this paper
3. Forensic Analysts/Claims Analysts- future papers
4. Project Control/Cost Engineers/Systems Engineers/Business Analysts- future papers

Furthermore, in addition to just being able IDENTIFY those competencies, the author is proposing a comprehensive approach to measure, assess and VALIDATE these competencies by adopting a two-step competency assessment model very much analogous to obtaining one’s first driver’s license.

Lastly, the author is proposing an academically sound approach for professional societies, guilds and related organizations to adopt which INTEGRATES the competencies expected in the marketplace with those developing and delivering training to current and future employees, be they universities, trade schools or individual training providers.

To briefly summarize/recap what was covered in the first part of this paper, to establish PERFORMANCE CRITERIA against which to assess COMPETENCY, cutting edge organizations such as the Green (Sustainable) Project Management Organization <http://www.greenprojectmanagement.org> and the Guild of Project Controls <http://www.planningplanet.com/guild>, have adopted the Iowa State University’s “A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives” <http://www.celt.iastate.edu/wp-content/uploads/2015/09/RevisedBloomsHandout-1.pdf> as the basis for their multi-level, competency based credentialing programs as well as the basis for those providing training in support for those credentials.

COMPETENCY ASSESSMENT APPROACH

This research was originally commissioned by the Guild of Project Controls as the basis upon which to define the “roles and responsibilities” for each of the Guild’s 4 track, 5 level certification process and then use this information to create both exams and peer reviewed competency assessments for each of each level and each track. The Guild has taken the approach that given there is no consistent method upon which to define the “roles and responsibilities” (also known as the “Exam Content Outline” (PMI <http://www.pmi.org/~media/PDF/Certifications/exam-outline/scheduling-professional-exam->

[outline.ashx](#)) or the “Global Alliance for Competency Assessment Framework” (GAPPS http://globalpmstandards.org/wp-content/uploads/2014/12/GAPPS_Project_Manager_v1.1150411_A4.pdf) that by “looking to the marketplace” and using current “help wanted” advertisements, would provide a “real time” analysis of what employers are expecting potential employees to be “competent” at doing.

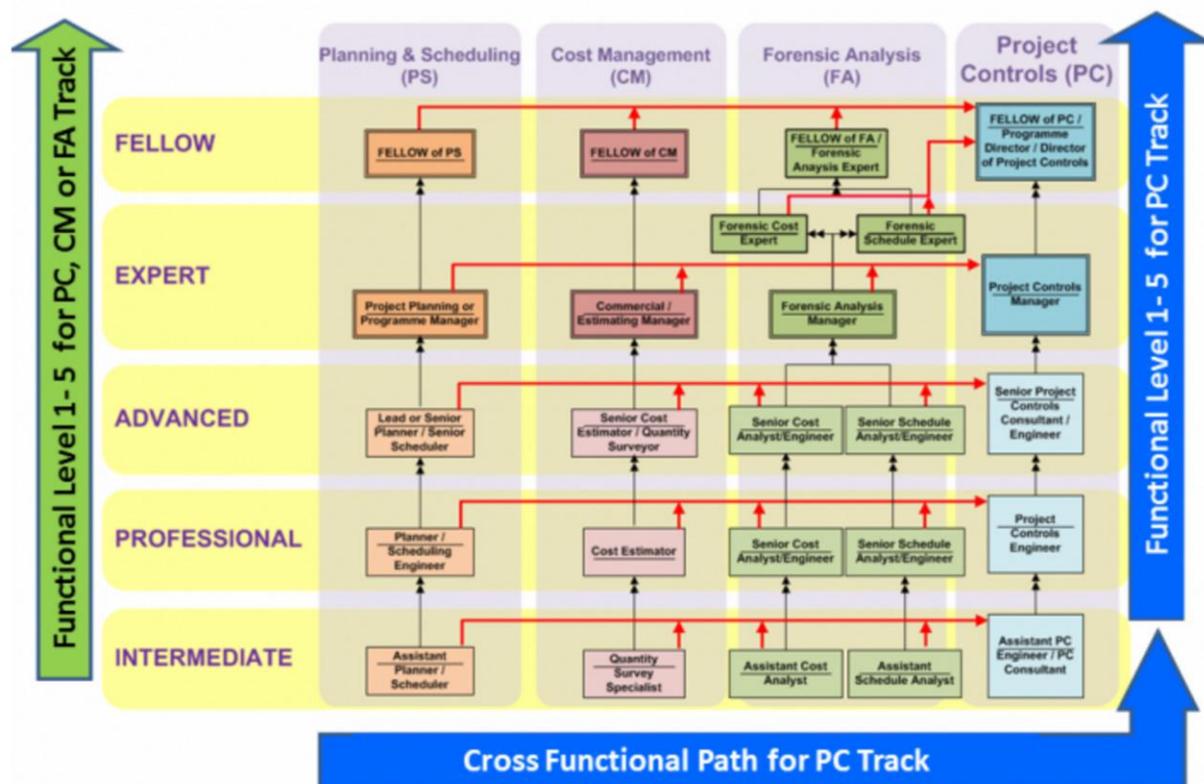


Figure 1- Guild of Project Controls Career Path (See Guild of Project Controls Career Path Progression <http://www.planningplanet.com/guild/gpccar/develop-project-controls-career-path-development-plan>)

Taking this approach, the KEY WORDS from the JOB ADVERTISEMENTS determine the TASKS or ELEMENTS which are required to “prove” one is competent, while the Knowledge Dimensions and Blooms Cognitive Process Dimensions determine the LEVEL of the job and the Knowledge dimensions define what TYPE of knowledge is required.

The Iowa State University’s “A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives” model was chosen as the basis underlying the credentialing process for both exams and peer reviewed competency, as it measures and validates not only the 4 different TYPES of KNOWLEDGE:

1. Factual
2. Conceptual
3. Procedural

4. Metacognitive or Critical Thinking

But it also measures and validates HOW that knowledge can or should be USED by assessing against Benjamin Blooms 6 Levels of COGNITIVE PROCESSES:

1. Know
2. Understand
3. Apply
4. Analyze
5. Evaluate
6. Create

Using the matrix approach as the basis for performance criteria enables any organization adopting this concept to be able to match it to any level of competency, from entry level (“Apprentice”) to “Journeyman” or “Professional” Practitioner and upwards to Master Practitioner.

More importantly, adopting the Iowa State University model as the basis for the PERFORMANCE CRITERIA enables the INTEGRATION between the needs of Employers who are hiring practitioners who hold these credentials and those individuals and organizations who develop and deliver training to prepare practitioners to qualify for these jobs via the certification process. This is an important topic of debate today about making education RELEVANT to what those employers need and want. For more on this topic, go HERE http://horizon.unc.edu/projects/issues/papers/School_to_Work.html or HERE <http://www.philstar.com/business/2015/06/17/1466631/matching-education-jobs>

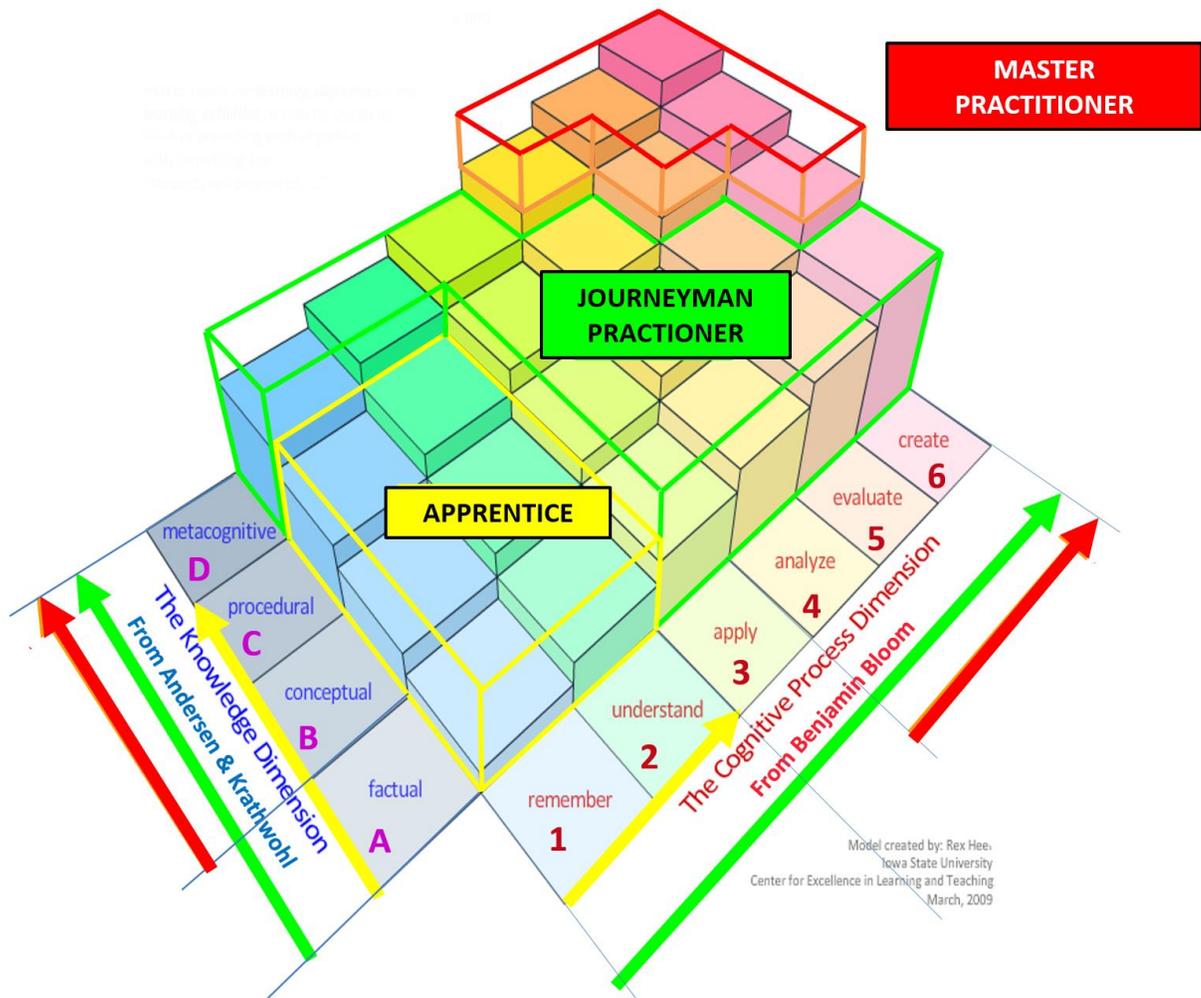


Figure 2 Levels are determined by TYPES of KNOWLEDGE and HOW THAT KNOWLEDGE IS USED (Blooms) Source Heer, Rex (2009) Iowa State University Center of Excellence in Teaching <http://www.celt.iastate.edu/teaching/effective-teaching-practices/revised-blooms-taxonomy>

THE GPC MODEL-

The Guild of Project Controls Compendium and Reference (GPCCAR), much like PMI’s “PMBOK Guide”, AACE’s “Total Cost Management Framework”, Green (Sustainable) Project Management’s “PRISM Methodology” and the “PRINCE2 Methodology”, is also built around the PROCESS GROUPINGS, however because the GPC takes an INTEGRATIVE approach, combining the roles and responsibilities of not only Planners and Schedulers but also Cost Estimators and Quantity Surveyors, Forensic/Claims Analysts, Project Control professionals, Cost Engineers, Business Analysts and Systems Engineers, the Guild has broken the process groupings down one level deeper into MODULES and those modules have been further broken down into SUB-MODULES. Looking at this as a Work Breakdown Structure (WBS) the Guild has taken the processes down to Level 4.

And these MODULES apply not only to Planners & Schedulers but also to Cost Estimators/Quantity Surveyors, Forensic Analysts/Claims Analysts and Project Control practitioners, the GPC approach is a more realistic model of how project controls works in most organizations, whether owner or contractor and whether organized functionally as stand-alone departments or integrated as a PMO or Project Support Services (PSA)..

Explained another way, while the PROCESS GROUPINGS apply to all of the above job descriptions the focus (weighting) changes based not only on the TRACK (PS, CM, FA or PC) but also depending on the LEVEL of the credentialing process.

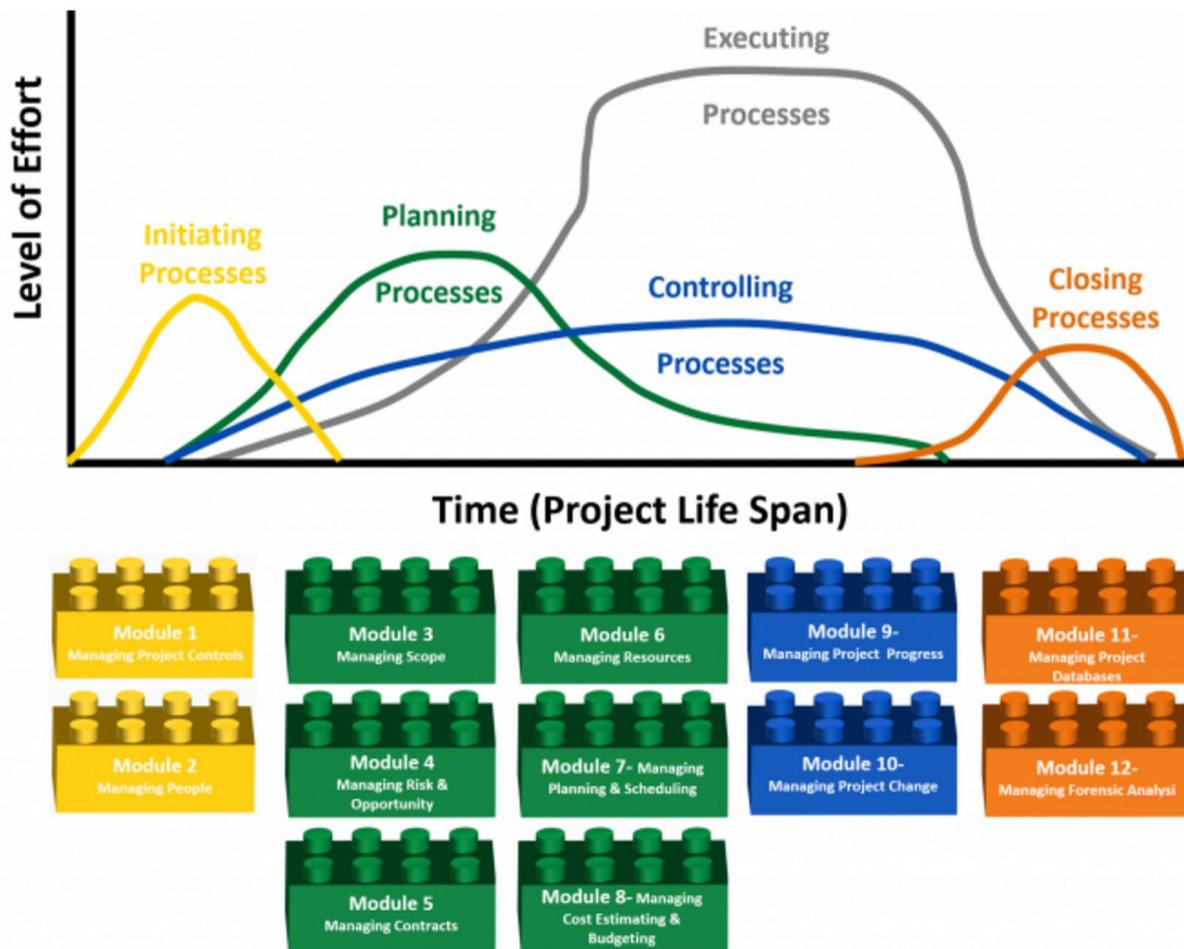


Figure 3- Guild of Project Controls Compendium and Reference Modules Mapped against the Process Groupings (See Figure 10 <http://www.planningplanet.com/guild/gpccar/introduction-to-managing-project-controls>)

METHODOLOGY-

Trying to define what a Cost Estimator/Quantity Surveyor does is akin to asking the 7 blind men of Hindustan to describe an elephant- if you ask 50 people you will get 50 different answers, depending on whether they are owners or contractors, not to mention which industry sector or area of the world they are coming from.

To try to eliminate the effects of individual, sector or regional bias, the research approach was to apply James Surowiecki's the "Wisdom of Crowds" philosophy and look at what the job advertisements are seeking or requiring, conduct a "key word" search on those job advertisements, validate those key words against an independent source, and then map those key words to accepted and recognized standards to see if the content contained in the job advertisements is consistent with and support the standards or if there is a disconnect between what the job advertisements are asking for and what the standards are measuring.

Explained another way, following Covey's advice to "begin with the end in mind" the author used job advertisement's as the starting point and working backwards, used what the marketplace is looking for as the basis to benchmark and validate the "roles descriptors", around which the certification program structure and weighting factors were built.

This pilot research was done by:

Randomly selecting a total of 30 job advertisements for the position of "Cost Estimator" or "Quantity Surveyor" as they appeared rank ordered by the Google search engine;

5 job advertisements from each of the following countries were randomly chosen by selecting the top 5 which showed up on a Google search for "Cost Estimator" or "Quantity Surveyor" "Job Openings" and [Country]:

- Australia (5)
- Canada (5)
- Middle East (5)
- United Kingdom (5)
- United States (5)
- Singapore/Malaysia (5)

These countries were chosen as being a globally dispersed sample of countries doing large, complex and challenging projects AND who most likely are seeking globally qualified professional level talent to staff those projects.

The next step was to try to find a PROFESSIONAL ORGANIZATION which published a set of "Roles and Responsibilities" to use as a benchmark as was done with the Planner/Scheduler assessment. (Which used PMI's Exam Content Outline for the PSP) Unfortunately, research indicated that while no global professional organization (i.e. AACE, ASPE, RICS) other than the New Zealand Institute of Quantity Surveyors <http://www.nziqs.co.nz/What-is-a-QS> published a listing of "roles and responsibilities" there were several other resources to use as a baseline to select the key words:

- US Bureau of Labor Statistics Occupation Outlook Handbook <http://www.bls.gov/ooh/business-and-financial/cost-estimators.htm>
- Truity- Job Duties of a Cost Estimator- <http://www.truity.com/career-profile/cost-estimator>
- Job Planner- Cost Estimator, Job Description- <http://job-descriptions.careerplanner.com/Cost-Estimators.cfm>
- Study.com Project Estimator- Job Description, Duties and Requirements- [http://study.com/articles/Project Estimator Job Description Duties and Requirements.html](http://study.com/articles/Project_Estimator_Job_Description_Duties_and_Requirements.html)
- Prospects “Job Profiles- Quantity Surveyors” <https://www.prospects.ac.uk/job-profiles/quantity-surveyor>
- Careers in Construction “Roles of the Quantity Surveyor” <http://www.careersinconstruction.com/article/the-role-of-a-quantity-surveyor/>

Keeping in mind that while there were over-laps, no single reference identified all the requirements which employers were asking for via their job postings, however, these resources were used INITIALLY to identify 125 “key words” to use for the data search of the “help wanted” advertisements as the basis to develop a WEIGHTING for each of these attributes based on what the marketplace valued or placed more importance on. The hypothesis being that the more frequently any specific key word appeared in the job postings, the more value or importance it was to those who were hiring “Cost Estimators” or “Quantity Surveyors”.

Thus the 30 results from Google searches for “Cost Estimator” or “Quantity Surveyor” and “Job Openings” were copied and pasted into a single word document, then based on the references above, 125 key words were selected appropriate to the position of “Cost Estimator” or “Quantity Surveyor” and using the “Find” feature in MS Word, the frequency- number of times each word appeared in the job advertisements- appeared was recorded in an Excel Pivot Table spreadsheet.

As a “quality control” step, a cross check was run to ensure that the job advertisements did NOT contain any key words that the combined sources from above may have MISSED and that proved to be correct. There were no key words in the job advertisements which did NOT appear in at least one or more of the baseline references, even though no one single original baseline reference contained all of the key words.

Having validated and cross validated the data to ensure all the key words and only the key words were identified and counted, the results were then MAPPED against three documents from the Guild of Project Controls:

1. Guild of Project Controls Compendium and Reference-
As the Guild of Project Controls built the compendium and reference guide on the 5 project process groupings (Initiate, Plan, Execute, Control and Close) this analysis provided an indication of how important the different PROCESSES and SUB-PROCESSES were to Cost Estimators/Quantity Surveyors vs Planner/Schedulers, with the comparisons to Forensic Analysts and Project Control/Cost Engineers/Business Analysts/Systems Analysts to be added in the coming months.

2. Blooms Cognitive Dimension-
 This analysis enables those adopting this approach to measure and assess multiple LEVELS of competency, based on the 6 Blooms levels. It also enables those professional societies who are establishing multi-level, competency based credentialing programs to design them using a “market driven” approach.
3. Anderson & Krathwohl’s Knowledge Dimension-
 Lastly this analysis enables those developing training to be able to differentiate and thus develop the focus of their training around the 4 unique TYPES of KNOWLEDGE, which none of the more popular exam based credentials has yet to do.

FINDINGS 1- Job Descriptions vs GPC’s GPCCAR.

As readers can see from Figure 1 above, the GPC Career Path not only integrates 4 different job titles or job functions but unlike the most popular exam based credentialing programs (i.e. PMI, AACE, PRINCE2, ITIL etc) the GPC model offers 5 levels, roughly corresponding to a normal career path progression from being a fresh graduate getting the first job to becoming a senior practitioner. (For more on these levels and the requirements for each track and level, go [HERE](http://www.planningplanet.com/guild/certification) <http://www.planningplanet.com/guild/certification>) This mapping is for the “CM” track. Professional level, which includes “cost estimators” and “quantity surveyors” with between 5-10 years of experience.

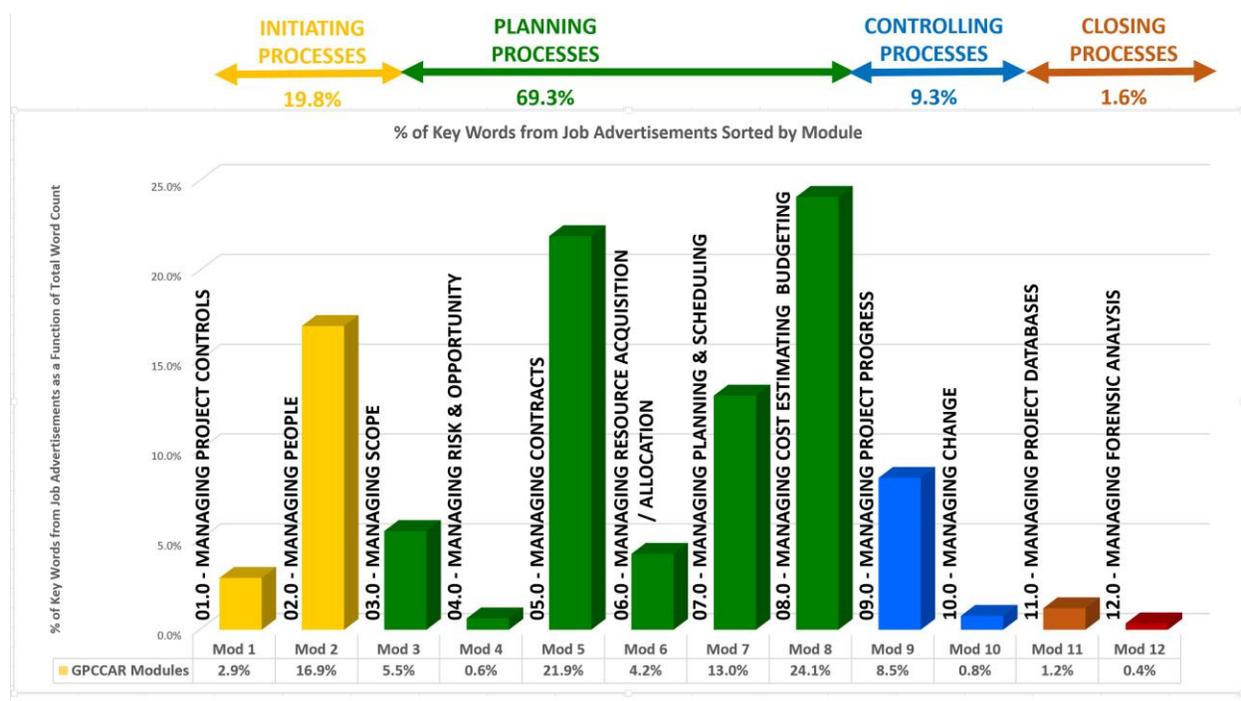


Figure 4- GPC Modules Showing Total Percentages for Each Process Grouping Based on Key Words from Job Postings (Adapted by Author from Guild of Project Controls Modules- <http://www.planningplanet.com/guild/gpccar/introduction-to-managing-project-controls>)

As can be seen from Figure 4, because the Guild has gone to a greater level of detail in measuring and validating, when they “roll up” the modules to the Process Grouping level, here are the totals:

- Initiating Processes = 19.8%
- Planning Processes = 69.3%
- Controlling Processes = 09.3%
- Closing Processes = 01.6%

(NOTE: As this is project CONTROLS, there are no EXECUTING processes as it is the project manager/project team who are responsible to EXECUTE THE PLAN created by Project Controls for and on their behalf and use. This includes cost budgeting and cost control)

But what is most important is these weightings are based not on an arbitrary allocation using qualitative assessments, but are qualitative, based on the frequency of key words contained in the job postings found on the internet. What makes this “market driven” approach highly desirable is that as the job descriptions change due to technological advances or any other changes in the marketplace, it is a relatively quick and easy way to modify the exam and competency scoring models to match changing markets. It also offers a sound and rational approach for any sector to CUSTOMIZE the scoring and assessment model to match their unique requirements as the basis for IN HOUSE or specialized credentialing programs.

To summarize here are the difference between the GPC Planner/Scheduler weighting for each module as published last month and the comparable weighting for the GPC Cost Estimator/Quantity Surveyor:

	Initiation		Planning						Controlling		Closing	
	Mod 1	Mod 2	Mod 3	Mod 4	Mod 5	Mod 6	Mod 7	Mod 8	Mod 9	Mod 10	Mod 11	Mod 12
Planner/Scheduler	8.4%	19.1%	1.8%	1.5%	3.8%	3.5%	30.6%	4.4%	23.6%	1.1%	1.3%	0.9%
Cost Estimator/Quantity Surveyor	2.9%	16.9%	5.5%	0.6%	21.9%	4.2%	13.0%	24.1%	8.5%	0.8%	1.2%	0.4%
Forensic/Claims Analyst	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Project Controller	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 1- Comparison between GPS PS Track Scoring/Assessment Weighting vs the CM Track Scoring/Assessment Weighting (by Author)

In the coming months, this table will be filled in with the remaining job titles.

As this is PRELIMINARY RESEARCH, further studies need to be conducted to validate whether in fact these weightings are appropriate and relevant, but given this has not yet been done previously, this makes for a QUANTITATIVE rather than QUALITATIVE STARTING POINT.

FINDINGS 2- Job Descriptions vs Blooms Cognitive Levels-

To develop this comparison, a “verb analysis” was done against the key words in the job descriptions to determine which level of Blooms the employers were seeking. For an example of this “Verb Analysis” see Table 2 in the Iowa State model- <http://www.celt.iastate.edu/wp-content/uploads/2015/09/RevisedBloomsHandout-1.pdf>

As an example, if the job description stated “ANALYZE the incoming bids of vendors and subcontractors” that would be “tagged” as “B4” - meaning it is Blooms Level 4 requirement.

As a starting point, the GPC took the approach that the “Journeyman” (or in the case of the Guild, the “Professional” level) would be the baseline competency against with the other levels, both higher and lower, would be benchmarked. When the job postings were randomly chosen, they were for people with a MINIMUM of 5 years’ experience. This establishes the MINIMUM ACCEPTABLE standards against which one can claim to be “COMPETENT” as a professional level practitioner. This is analogous to obtaining one’s first driver’s license. You are competent to drive the family sedan alone and with no supervision but you are not yet qualified to drive tractor trailers or school busses or heavy equipment.

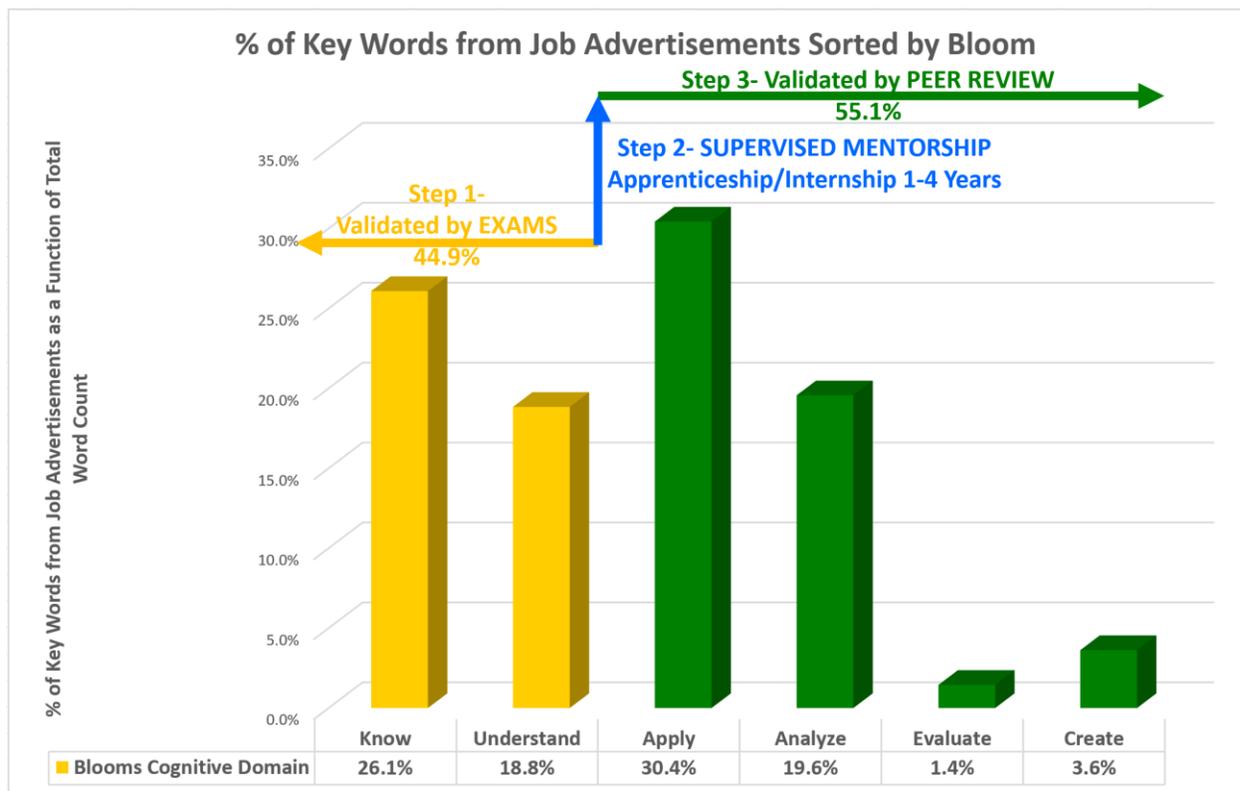


Table 2- % of Key Words from Job Advertisements Sorted and Filtered by Blooms (by Author)

Continuing the driver’s license analogy, this same “Three Step” process follows exactly the same type of weighting which have long been tested and proven not only in issuing drivers licenses but in so many other applications- Step 1 being one takes a written exam to validate a fundamental knowledge and understanding, which, upon successful completion, you are issued a “Learners Permit” or “Provisional Driver’s License” which validates you have demonstrated sufficient knowledge and understanding of the “rules of the road” and having done so, you are entitled to Step 2- drive on the road, but under the supervision of a licensed driver. After an appropriate amount of time has elapsed during which the “apprentice” is expected to gain more experience and confidence, the individual moves to Step 3- a practicum where the “apprentice” is required to demonstrate that they actually can apply their

knowledge and understanding and can do it to the satisfaction of a trained professional, which in the case of your driver's license is the DMV officer. You cannot do the practicum unless you first pass the exam, but just because you pass the exam alone does not validate that you are a competent driver until BOTH criteria have been met.

What does this table tell us? It says that based on what the market is saying, coming from current job advertisements, Employers are seeking COMPETENT COST ESTIMATOR/QUANTITY SURVEYOR with a minimum of 5 years' experience and that the definition of "COMPETENT" is comprised of:

1. What they KNOW-	26.1%
2. What they UNDERSTAND-	18.8%
3. What they can APPLY-	30.4%
4. What they can ANALYZE-	19.6%
5. What they can EVALUATE-	01.4%
6. What they can CREATE-	03.6%
TOTAL	100%

Given that exams CANNOT validate whether someone actually can or does in fact APPLY the Knowledge and Understanding they have, means that the market is telling us when we assess a practitioner with a minimum of 5 years' experience for COMPETENCY as a Cost Estimator/Quantity Surveyor, that we should give a weighting of ~45% to the EXAM (Step 1) portion and ~55% to the Step 2-PRACTICUM or PEER REVIEW of their work.

FINDINGS 3- Job Descriptions vs Knowledge Domains-

The last comparison being presented in this paper shows the TYPES of knowledge that the job market is telling us Employers need or want in competent practitioners. To determine this, the key words found in the job descriptions have been categorized as to the TYPE of knowledge they require:

1. Factual- Formulas, Definitions etc.
2. Conceptual- Codes of Ethics, History and Philosophy, i.e. Earned Value Management, Risk Management etc
3. Procedural- Risk management processes, Change or Configuration Management procedures etc this is the "ITTO" that you see in so many PMP Exam Prep courses.
4. Metacognitive or Critical Thinking- Innovation, Out of the Box Thinking, Continuous Process Improvement etc

The hypothesis being that the more experienced one becomes and the more one advances in one's career, the less emphasis will be on validating the factual or conceptual types of knowledge and the more the emphasis will be on measuring and validating the procedural and critical thinking skills, particularly with regard to continuously improving existing processes or creating new, more efficient ones..

While the findings from Table 3 are unlikely to hold much interest to the employer, for those responsible

to develop and deliver training, or for those professional organizations attempting to evaluate their certification program or the training being developed and/or delivered by their training providers, this is essential information, as it shows what types of knowledge employers are looking for when they hire people, understanding it is up to those developing and delivering training to be able to develop these competencies.

Explained another way, what Table 3 is showing us is that to meet the requirements that the market needs or wants, for a “professional” or “journeyman” level cost estimator/quantity surveyor, with a minimum of 5 years’ experience, requires certification training courses or advanced/continuing degree education programs which focus on developing or enhancing:

1. Procedural Knowledge- 58.7%
 2. Factual Knowledge- 23.2%
 3. Metacognitive Knowledge- 09.3%
 4. Conceptual Knowledge- 08.9%
- Total 100%

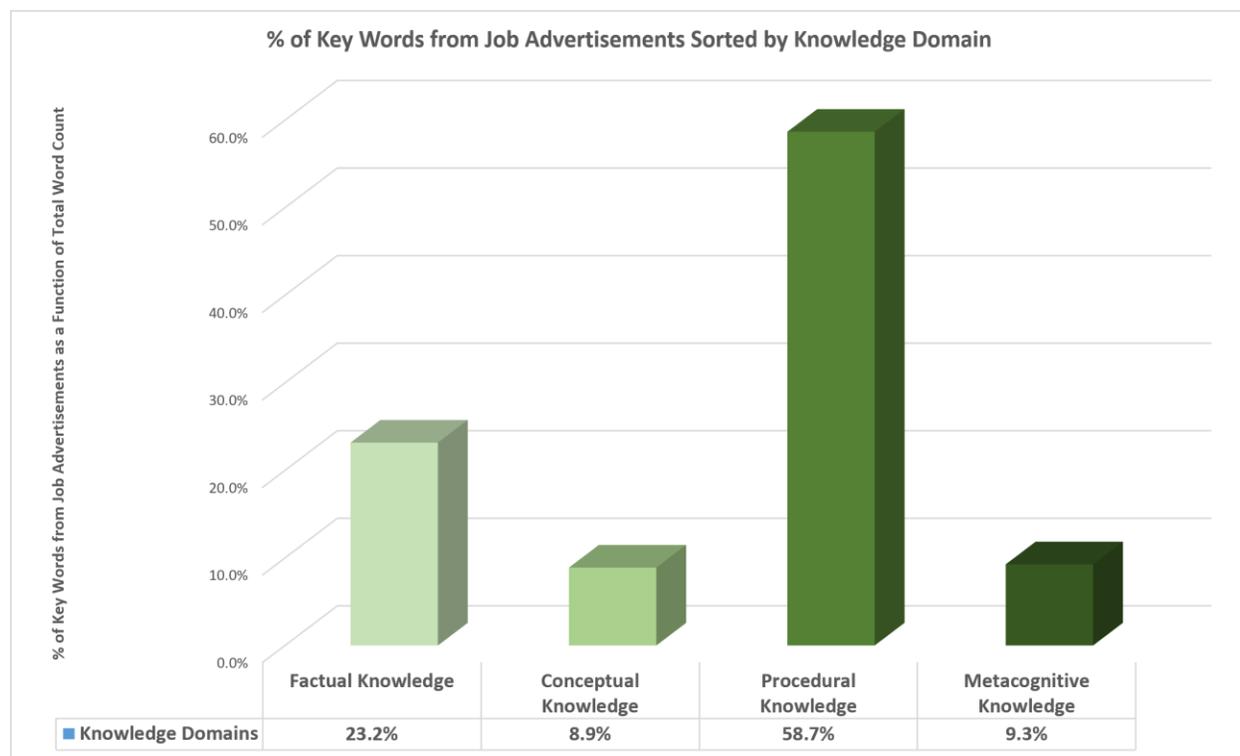


Table 3- % of Key Words from Job Advertisements Sorted and Filtered by Knowledge Domains (by Author)

This graph is self-explanatory demonstrating to those developing or delivering training what knowledge domains they need to be focusing on developing. As this is for a “professional” or “journeyman” level practitioner, the focus is or should be on developing procedural and factual knowledge and less on

conceptual or critical thinking. As one moves up the career path towards more senior positions, the focus will change more towards the metacognitive knowledge.

CONCLUSIONS-

It is abundantly clear that EMPLOYERS are NOT HAPPY with the competencies demonstrated by graduates from most Universities, as these graduates do not have skill sets that employers need and want. There is a lot of pressure on Universities in particular but also all training providers to develop and deliver those competencies which are in demand by employers

This presents an ideal opportunity for professional organizations, who are uniquely positioned to be able to IDENTIFY those competencies their member employers need and want, and through their professional certification programs, develop the programs necessary to take the individual members and provide them with a structured career path development program built around what employers need and want, not just initially but for their entire career.

Implicit in this is the understanding that the needs and wants by employers need to be flexible and are likely to change and that the only way to keep abreast of changing requirements is to continuously analyze the collective wisdom found in “help wanted” advertisements. Assuming those placing the advertisements are being realistic in knowing what they need/want, no place else can you get “real time” market information and analyze it using any one of a number of “big data” analytics.

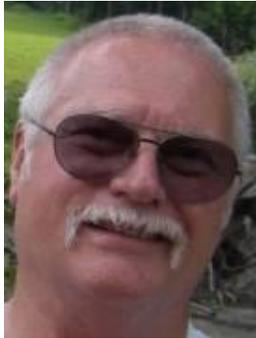
FOLLOW ON RESEARCH-

While the author has validated that the approach taken by the Guild of Project Controls is sound and does represent a “best tested and proven practice”, with a sample size of only 30 job postings, the Guild is going to further VALIDATE these initial findings by creating a follow on survey of the membership or other interested professionals.

At the same time, keeping in mind that the Guild is one of the very few global professional organizations who recognize those with advanced degrees as an integral part of the credentialing process, <http://www.planningplanet.com/guild/certification> the Guild would like to encourage practitioners who are looking for Masters or PhD thesis or dissertation topics to consider expanding this pilot study by adding more job postings, and a more robust demographic analysis to see if there are any significant differences between industrial sectors or between different parts of the world which were not evident looking at a relatively small sample size.

Another avenue for those interested in “analytics”, a very interesting masters or PhD thesis would be to develop an app which monitors global help wanted postings based on a list of key words and is able to create a “heat map” of those terms. This will help identify trends in the marketplace as well as help identify what competencies are in demand.

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He has spent 18 of the last 35 years working on large, highly technical international projects, including such prestigious projects as the Alyeska Pipeline and the Distant Early Warning Site (DEW Line) upgrades in Alaska. Most recently, he worked as a Senior Project Cost and Scheduling Consultant for Caltex Minas Field in Sumatra and Project Manager for the Taman Rasuna Apartment Complex for Bakrie Brothers in Jakarta. His current client list includes AT&T, Ericsson, Nokia, Lucent, General Motors, Siemens, Chevron, Conoco-Philips, BP, Dames and Moore, SNC Lavalin, Freeport McMoran, Petronas, Pertamina, UN Projects Office, World Bank Institute and many other multi-national companies and NGO organizations.

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