Building Vocational Skills
With The Big Six

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Outline

1. Philosophy behind building skills with the Big 6.
2. How this pertains to students of all developmental levels.
3. Explaining what each movement means/importance behind them/what's being accomplished.
4. Examples of different ways to accomplish the movement (ie. Tongs, clothespins, educational "tools" to use).
5. How to chart the information gathered and how to interpret that data (maybe doing timings and chartings on each other doing the tasks and then interpreting it).
6. How to recognize when to change it-- because task is too difficult or "mastered" (and what mastery looks like).
7. Question/answer session
Introduction

There are many tools and skills that have specific uses for some learners and for some people. Academic skills and needs for development, for example, vary widely from individual to individual. The difference between a five-year old kindergarten student and a high school senior is enormous, and there are few academic skills or levels that they have in common. However there are skills that underlie all human performances, and these tools must be strong or the individual will not be able to perform satisfactorily. These skills, which this paper discusses, must be present or the individual will not be able to work or to learn.

Dr. Eric Haughton first called these critical underlying skills The Big Six. He called them BIG because these skills are essential for successful performance of almost any human skill. The six are; Reach, Touch, Point, Grasp, Release and Place.

Errorless Learning, Backward Chaining, and Program Placement

During the 1970’s I worked in several different programs, and while working in those programs I developed, with my partner Kevin Solsten, a series of discrete trials instructional programs that were quite successful for teaching Activities of Daily Living and Vocational skills. We used these programs to teach such skills as tool handling and silk-screening, and for a variety of assembly work. Despite what seemed to be excellent instruction, strong reinforcement, and excellent teaching skills we repeatedly encountered situations in which carefully taught chains of behavior did not remain intact after training. For example, in our vocational training classrooms, we taught such tasks as assembling a pen, hand stamping a greeting card, or putting together a series of cards for a mailing; these skills could be nicely taught, but they did not seem to maintain well.

We used errorless teaching (backward chaining) to teach these skills to our students. However, the best of our students performed these tasks only slightly above a prevocational level of productivity (25% of Industrial Standard Production), and none of our students maintained their skills for very long if we tried to remove 1:1 ratio teaching.

Since our students were learning job skills, we knew that they must become more independent and their performances must be much higher, or no one would hire them. We aimed to reach an extended employment level of performance: We knew that long term sheltered employment made an individual eligible for funding and thus could guarantee ongoing program placement for an adult. Our students were teenagers and the future, without good funding, looked quite bleak. When a student reached 25-50% of the industrial performance standards we faded our prompting and reinforcing. Our students then plummeted far below 25%, making them ineligible for continued community placement when they turned 21. None of our students could work for very long on any of these tasks, nor was their quality very high.

We visited a nearby rehabilitation center and looked at the way the professionals there analyzed vocational skills. WORK, Inc used a series of standardized discrimination and
assembly tests to place incoming clients into the proper vocational training level. We borrowed the design of their assessment center to prepare a curriculum that would help our students get and hold jobs, even if the jobs were in a sheltered work environment.

As we began to assemble our training and evaluation tools we timed our teachers (and administrators!) in the skills and component movements that we were going to teach our students. We had containers full of nuts and bolts, we had pegs and nails, and we had a variety of tools and assembly projects. We had an abundance of work for each student, though none of these materials were high-tech or expensive, and we had the performances of the teachers to use as a benchmark for our students. We set our goals a bit low, at the bottom of the teacher performance levels. Later we learned that this aim was far too low. We should have set our aims for the top of our teacher performances!

**The Big Six**

We were looking at mediocre performances of our students on Standard Celeration Charts and trying to decide what to do next. We kept seeing performances at about 30% of industrial standard simply fall apart shortly after that level was reached. We didn’t understand why, but it was clear something was missing.

When we looked at performance of our students we realized that they were extremely weak in the component skills that Eric called “the Big Six.” Simply picking up and dropping objects into a box was something that our teachers could do at well over 100 per minute. None of our students could do these tasks at over 20 per minute. At that time our students could not practice independently because they simply wandered off task or engaged in self-stimulatory behavior without a teacher to keep them focused by providing cues and reinforcement. They had neither the strength nor the endurance to work very long or very rapidly.

**Self Stimulatory Movements**

When we looked at the performances of our students we immediately learned that there was a problem. Every movement element was weak, even movements that we termed “self-stimulatory” such as hand-waving or flapping. These movements can resemble a behavioral “white noise” as they are so high frequency within the student’s repertoire that they prevent other behavior from occurring.

We had reduced these behaviors through shaping and very careful backward chaining. However, no matter how carefully we programmed we found them showing up again and again in chains of behavior that we had built very carefully. At every pause there was the danger that a sudden flurry of hand-flapping would break out! We imagined ourselves creating useful gardens of behavior, with smooth utilitarian grass surrounded by useful vegetables, lovely flowers, and ultimately shrubs and trees. Instead after every small planting we would be faced with dandelions—these self-stimulatory movements that seemed lacking in purpose and didn’t fit with our plans for the garden.
Nothing we did seemed to help, and we kept finding ourselves faced with the reality that our students flapped thousands more times than they read, or wrote, or even did the vocational component movements that we had hoped to grow.

**So We Did Something Different.**

We began to look at these movements for their potential value as vocational building blocks rather than as “bad” movements. Even these “self-stim” movements were far below the frequencies that our teachers could attain. Quite often they were in the range from 50-100% of the lowest teacher performance. While these movements may have been somewhat deficient, they were the best practiced and most fluent of these individual’s performances.

As a result they were the most probable and developed movements in their repertoires. So that was why they kept appearing. It was natural and right for them to do so!

**The Big Six +**

Eric Haughton had told us to set high performance standards, and with those expectations we learned a new way to analyze a task. This way of looking at doing a task breaks a complex operation into the elements that compose it.

A task as simple as waxing a tabletop is composed of many components. Here is a typical task analysis. We would use an analysis like this as a step toward backward chaining a work task.

**Polish Table**

1. Reach to rag
2. Grasp rag firmly and continue to hold
3. Reach to tabletop
4. Move rag in circles with force sufficient to polish wax
5. Bend torso to stretch and cover entire surface
6. Look at table and wipe all of surface until the table is completely polished.
7. Stand up straight and move to another table.

Eric helped us understand that we needed to examine not just the presence of these movements but also the fluency of each component. While some skills can be built in chained practice, it is much more effective to build skills by increasing the frequency of the component movements until they are at fluent levels. When we began to approach our students this way we rapidly achieved performances within the 100-200% performance level. This level Eric first called “RAPS” (Retention, Application Performance Standard) then later called REAPS (Retention, Endurance, Application Performance Standard). Recently Giordana Malabello has added Adduction to the list and coined the term AREAS for Adduction, Retention, Endurance, Application Standards.
These acronyms all indicate the key feature of building up elements of movement prior to teaching complex chains of behavior. Fluent elements will enable a learner to retain (keep available for use for a long time), endure (work for extended periods of time), apply (use their skills at fluent levels in a variety of situations).

Building fluent components provides a foundation for all other learning. Without this platform, most individuals will never be able to achieve world-class performances.

As a result of our use of these standards our Amego students impressed WORK, Inc. executives since, despite their more severe disabilities, they consistently outperformed WORK Inc. clients. My work as a consultant at WORK and CP&S stemmed from the high productivity of our Amego students.

**The Trunk of the Tree**

The Big Six are critical fundamentals to any skill that uses our hands or arms. They are the “trunk” of the tree, critical to the support of all other behavior that the individual can do. If a learner cannot perform fluently on one or more of these elements than that individual must have a curriculum that will build these skills. Poor performance in any of the Big Six elements will inhibit all the skills that branch from that element.

Learners who are struggling in the classroom or in vocational training are frequently suffering from deficiencies in these movements. These deficiencies in turn create problems in learning to read, to write, to pay attention to a teacher. While our focus here is on vocational performances, these movements are just as fundamental to all other learning. You must see the tree—the high expectations that you provide—as you plan your vocational curriculum!

**Building World Class Skills**

Consolidated Products and Services is a medical device manufacturer located in Randolph, Massachusetts. The company was initially sponsored by WORK, Inc., a rehabilitation center. The long term goal was that CP&S would bring in money that would support the efforts of the parent organization, thus keeping the fees for service that the Rehabilitation Center charged as low as possible. The strategy at WORK, Inc. was always to make the costs per client as inexpensive as possible so that the center could constantly be growing larger. Eventually the difference in their overall missions led to a separation of the two organizations. By 1995 CP&S employed seventy-five people in manufacturing operations. In the early 1980’s we were very happy when we manufactured a million ice packs in one year for the first time. It was a huge milestone when we got to 10,000 icepacks per day. In 1995 CP&S manufactured over 10 million icepacks each year.

CP&S began shipping internationally in 1988, making products for major medical labels throughout the world. The employees were paid full salaries and benefits. They had to
produce effectively to sustain those salaries and benefits. If you walk into the manufacturing environment you were immediately struck by the quality and productivity of the work that is being performed. Few visitors noticed that these highly skilled machine operators were in fact severely handicapped.

**World-class athletes** base their performance on world-class frequencies in Big Six movements. Each of these movement components must be at the absolute top of the possible spectrum of skill to enable a world-class athlete to compete successfully.

**World-class vocational performances** rest on the same movements that athletes depend upon. Professional staff setting the expectation level for a vocational training environment must aim high. The most important expectation is that each student can perform all of these elements at fluent levels.

_Practice strategies for the Big Six are the most effective technique to assure vocational skill in larger movements and complex discriminations._

**General Practice Strategies**

1. **Remember Elizabeth Haughton’s Happy Learner**: 80% of student effort should be independent practice! _At the same time that we were learning about the Big Six and component movements, Elizabeth showed us a simple “happy face” pie chart. Most of the face was practice. The proportions were something like this: 8% instruction, 10% measurement and 2% “testing” in the sense of standardized testing_. The lesson was clear to us. Hovering over our students—providing too rich a teaching environment—was holding them back. What we learned to do instead was to find materials and situations in which they could practice independently thousands of times per day. This practice became the foundation for the most powerful learning.

2. **Make measuring easy and part of the task**, for example use:
   - Pre-counted materials.
   - Grids to make counting simple and quick.
   - Counters that register each time the target movement is made.
   - A weighing scale to count parts.
   - A ruler to count paper (i.e. 1 inch = 200 sheets).

Student efforts to reset tasks: disassembly should be part of the training activity for the next group. (_Do not break hearts by having students put together, then take apart an assembly, but do not give the teachers all the work._)

3. **Have thousands of pieces of materials**! Never let scarcity or an overly complex task reduce the number of practice opportunities available to your learners.
4. **Plan a measurement and charting strategy from the beginning.** The chart will tell you if what you are doing is correct. Start at the beginning so that you don’t find yourself wasting important time going in the wrong direction.

5. **Use the “fluent chaining” approach to teach tasks.** Whether you use forward or backward chaining, build the skill at REAPS level so that the student is accustomed to performing at fluent levels. Add the other elements of the chain and constantly insist upon fluent performance before increasing complexity.

6. **Never say “this learner can’t.”** Let me repeat that one. NEVER SAY “THIS LEARNER CAN’T.” You must set high standards and give each learner the opportunity to develop as fully as possible.

7. **Flat lines are death.** “He not busy being born is busy dying.”

8. **Use the chart to steer you toward increasing skills.**

### Big Six Defined and Some Ideas for Practice

**Reach (Wave)**

Reach is the movement that we make when we simply extend our arm. A “reach cycle” is a reach and return. You can see some truly fluent reaches done by athletes, but only in warm-ups will you see them performed in isolation. Probably the best “reachers” are professional baseball, football and volleyball players, who build great strength and speed in their reach movements.

Aerobics shows frequently demonstrate Big Six movements in isolation, and reaches are among the most frequently demonstrated.

Reach is the basic positioning movement for your hands; if you cannot reach, you will be unable to do much else with your hands and arms. This is the very first of the Big Six movements. When you look at “The Karate Kid” you will see the emphasis on development of powerful reach component movements through car polishing. The ultimate usefulness of these thousands of practice movements is demonstrated by the immediate delivery of a karate block when needed.

Similarly the ultimate usefulness of vocational practice in Big Six movements is demonstrated by enduring mastery of vocational performance.

*Ideas and Materials for Practice; both hands are important!*

- Lever with spring and mechanical counter
Rub a desktop or wall.
“Wax on, wax off” (as seen in *Karate Kid*)
Imitation of reach movements (at high performance speeds!)
Physical guidance (at high performance speeds!)
Bicycle pump
Karate “jab” movements
Boxing movements
Shaking maracas
Aerobics arm movement

**Touch (Tap)**

Touch is the end of a reach movement. It involves reaching to a point in space—and the point could be anywhere, since this is a big movement. Touch also involves an input, though we won’t worry about that too much right now. Touch is touching a wall, a table, a window—it is “completing” a reach by touching a specific place.

World Class athletes are also “Touch” champions, You “touch” a volleyball or a baseball into your glove. This skill underlies much of everyday behavior. A touch is a part of opening a door, eating a sandwich, writing a letter, and so on. Naturally it is more difficult to “touch” a moving object than a still one. Nevertheless the skills are very similar, and it is worth beginning with still objects, speeding up the hand movements until it is possible for the learner to touch moving objects, such as a balloon, a tethered ball, etc.

**Ideas and Materials for Practice; both hands are important!**

- Touch targets on a table or wall
- Touch buttons that will count and make a sound
- Imitate and touch teacher’s hand
- Touch balloons, then light balls or foam materials
- A sequence of numbers on a wall or desktop
- Certain colors or shapes
- Bang on a drum or other noisemaker
- Bells or other noise makers
- Tethered balls (like a punching bag!) or other springy target

**Point (Aim)**

Point is a more selective movement. It involves again using a sensory input to direct our finger(s) to a particular target. I might point at a letter or a number on a page, or point to a particular visual element of a picture or other visual display.

We point to a button or a key on a keyboard. Like the other Big Six elements, point is especially important to young children as they learn about the world. You will often see young children practicing their Big Six movements in isolation, and point is a particular favorite.
Fluent pointing is a key element in academic skills, as pointing helps new learners to select the proper part of a page or screen.

*Ideas and Materials for Practice; both hands are important!*

- Point repeatedly to one visual stimulus or object
- Tap a counter
- Hit a key on a keyboard
- Tap a light-switch or counter
- Point to a series of numbers (in order) or objects
- Use imitation to establish the chain, then build fluency
- Point to a particular object on a screen
- Point to a particular class (“point to all the boys”)

**Grasp (Squeeze)**

Grasp is the movement of clenching your hand. Grasp and Release can be described as a single element. When Eric Haughton first formulated the Big Six he decided that though they are two parts of the same movement they were so important that they must be described and practiced separately. Practicing grasp and release separately does not seem practical in most situations, though a spring could be used to bring the hand back to position and allow grasps or releases in isolation.

Grasp is at the base of all use of our hands. Fluent use of this element is especially critical for world class ball playing athletes in any sport that requires hand use. Athletes often develop this skill through squeezing a rubber ball or a hand spring. All of our human ability to manipulate items in the world rests upon our ability to use our hands to grasp. Surprisingly the autistic students we served at Amego were quite deficient in this area, a finding we never expected since they appeared to have the ability to grasp rapidly. Only when we began to examine these movements in isolation did we discover how deficient our students were in this skill.

*Ideas and Materials for Practice; both hands are important!*

- Squeeze a rubber ball
- Squeeze a hand spring
- Clench and release empty hand
- Squeeze counter lever or switch
- Squeeze trigger on Windex bottle
- Squeeze “the alien” toy with popout antenna and eyes

**Release**

Release is the other half of grasp. The movement is simply opening the hand so that whatever is held there can be dropped. Although different topographies, grasp and release are the same movement cycle. People with disabilities are often more fluent with one of
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these movements than the other. Quite often there is a long latency to one of these movements, as one set of muscles or the other is undeveloped. When planning to teach better use of the hand there are methods for providing resistance to hand movements in both directions, but most of the materials we can easily use strengthen grasp rather release.

Ideas and Materials for Practice; both hands are important!

- Squeeze hand in and have student push out
- Squeeze/release nerf ball or other rubber ball
- Open empty hand in response to cue
- With hand on flat surface, raise fingers up

Place (Get)

This element is a “carry” element. Grasp an item and move it to a particular point. Putting a fork on a plate, or a plate on a table are everyday examples of these elements. In a certain way place is a composite of other Big Six elements.

Place didn’t last into the later formulations. However doing most vocational work depends upon ‘placing’ items during the work cycle. In the videotape you will see many different “place” examples.

Strictly speaking “place” is a composite behavior, not an element. However it is the easiest of the “Big Six” to practice. Your materials should be self-counting if possible and provide for hundreds of practice opportunities. Since it is a composite behavior made up of several different elements it has the advantage of providing more rest for each muscle group.

Ideas and Materials for Practice; both hands are important (AND in place, two hands working together are important)

- Marbles from a bowl into a container
- Tennis balls into a barrel
- Nuts or bolts into a coffee can
- Deal playing cards
- Move boxes from one stack to another
- Stack objects
- Empty a container piece by piece
Jim Pollard on the Big Six, Slightly Abridged, 1998

...here's how I conceptualize it with seeds planted by Brother Eric, shaping courtesy lots of folks with retardation, perceptual problems, autism and Huntington's Disease, kids and adults, as we worked together on teaching, recapturing or holding onto self-care skills:

BIG SIX:
Reach............
Touch............
Point.............
Grasp.............
Place ...........
Release........

Although different topographies, grasp and release are the same movement cycle when practiced apart from the chain. Except in rare cases and that's another albeit esoteric story. So BIG SIX in my mind is (my own) BIG FIVE, that is minus Release. So:

BIG FIVE
Reach.............
Point.............
Touch.............
Grasp.............
Place.............

In self-care chain skills force is a very important dimension of movement, often the essential one for critical effect, exempli gratia, ..."using toilet paper." So I take THE BIG FIVE and add more force, so...

Reach when repeated, with more force, becomes PUSH/PULL
Point stays the same or is simply renamed AIM
Touch, with more force, becomes TAP
Grasp, with more force, becomes SQUEEZE
Place, with more force, becomes RUB

It's true these names were conceived, revised, reconceptualized, tweaked, etc.perpetually by Eric. I had maybe 5 or 6 phone conversations with Eric and they were all regarding this element topic. ...The only thing that's quintessential is the conceptualization of chain (remember I'm talking self-care here) skills as elements. Eric once rhetorically asked me, "Before the discovery of elements, what did we have?" With devilish relish of the thought, he exclaimed, "Alchemy!!" He looked like a damn wizard with his goatee! For what it's worth...

Pollard
**Composite Practices**

The videotape demonstrates that composite movements can lead to higher skill. The key is to assure that your students are in the practice range (50% of REAPS and UP!) before allowing them to engage in composite practice. The outstanding performances that you see on this tape are the result of thousands of hours of intense and supported practice, daily, constant measurement, and positive reinforcement. Make certain that you provide those supports to your learners when you provide practice on composite skills.

CHECK THE BIG SIX and make sure that your students possess them at high levels!

**Another List of Elements**

Wave  Aim  Tap  Squeeze  Get  Pump  Rub  Shake  Twist

Kevin Solsten, my partner in Amego and Tools for Change efforts came up with Twist from our experiences in looking at critical elements for vocational skill performance. This list of nine components was one of Eric’s later lists. I guess you could call this the “big six plus three” or the Big Five plus Four. The name “The Big Six” somehow has seemed right and was planted very deeply in our memories thanks to Eric’s passion about it.

**About Richard McManus**

Richard G. McManus is Director of The Fluency Factory, a Precision Teaching Learning Center located South of Boston in Hingham Massachusetts. You can learn more about the Factory from [www.fluencyfactory.com](http://www.fluencyfactory.com/) He has recently also begun operating a school for middle and high school students with special needs called The Beal Street Academy. You can see that website at [www.bealstreetacademy.com](http://www.bealstreetacademy.com/)

Mr. McManus continues to assist educational and vocational training organizations to raise and reach the highest possible learning outcomes for their clients.

Richard earned his BA degree in Philosophy from Kenyon College and advanced training in Applied Behavior Analysis from Northeastern University. He is a pioneering expert in Precision Teaching for vocational performance excellence.