

In this complicated world that we live in, there is so many pressure for us to get started and specialize early. A lot of successful people like Tiger Woods choose one career path and started to focus on it in his earlier life. When you dig deeper, you get to understand that those who generalize and not specialists are those that are equipped to prosper in life.

It might take a little while for generalists to find their way in life; however, they are more creative and they can make associations between broad fields that specialists cannot make. Due to this, generalists are more innovative and they have more impact.

Using examples like medicine to academia and sport, these fields show how generalization is more powerful than specialized expertise. It also shows that experts mostly judge their own fields thoroughly than how open-minded, intellectually amateurs do.

Starting early and specializing is stylish, but it has uncertain merit.

Tiger Woods picked his first miniature golf club as early as the age of ten months old. When he was two years old, his golf drive was shown on national television. During that same year, he had his first tournament and he won the under ten category. Tiger woods now symbolizes a very common idea that the path to success in this life is to specialize, get started on something and train a lot.

This path toward specialization does not just happen in the world of sports. As a matter of fact, it also happens in the academic world, the difficult financial system as well as medicine. For instance, it is now rare for you to find oncologists concentrating on cancer alone. Instead, they specialize in cancer of a certain organ. The writer of this book and a surgeon Atul Gawande realized that when doctors make jokes about surgeons for the right ear, we should not make assumptions that such surgeons do not exist.

Is specializing the way forward? No, it is not. In this life, getting experience in just a particular field does not support performance. Two psychologists called Daniel Kahneman and Gary Klein did a study in 2009, they tried to find the association between experience and performance.

Klein indicated that experience is needed in some specific fields. For instance, firefighters are trained for years in order for them to be able to identify patterns in the behavior of flames which allows them to make 80% of their decisions in seconds.

However, Kahneman realized that in another field, the experience is not needed. Kahneman found out while he was studying the assessment of officer candidates in the Israeli Defence Forces that recruiters' predictions of a recruit's future performance, based on physical and mental abilities were no longer dependable than speculations. After several recruitment rounds, as the recruiters got more feedback, they didn't improve at making predictions. Hence, it was concluded by Kahneman that there was no connection between experience and performance.

Some fields of life are like golf or firefighting. Even though they are not simple, they have repeated patterns or rules that guide their decision making. However, there are other fields of life; for example, the army recruitment which is very unclear and requires one to be creative or flexible that generalization offers.

Let's look at how this works.

Experimentation is a trustworthy path to expertise as early specialization.

When Tiger Woods was 31 years old in 2006, he watched how Roger Federer won the US Open final for the third year in a row. Both Tiger and Federer were at the top of their field. Afterward, while they were sipping champagne together in the locker room; Federer experienced a connection with a person that understood his feeling of strength in which Federer has never felt this connection with someone else. Therefore, they became friends. However, the story Roger gave a biographer was very different from what Tiger had said.

Roger's mom who was a tennis coach said she resisted the temptation of coaching Roger if she ever felt like that. When Roger was a young boy; he tried playing squash, skiing, wrestling, skateboarding, basketball, tennis, and badminton. Later, he admitted that due to his different sports experiences, it helped him with his hand-eye coordination and athleticism.

Later on, Roger realized he liked sports that have balls. When he was a teenager he started trying tennis but he was not involved in it fully. When Roger's instructor realized his talent, he tried to put him amongst a team of older players but Roger did not want that. Roger Federer's success path to tennis shows us how generalization instead of specialization can frequently be the best approach to success.

There is a lot of evidence from various fields that support this. The music industry can also be used as an example where a lot of top musicians specialized when they were young. For example, the world-famous Yo-Yo Ma started his music career at a very young age. What a lot of people do not know is that Ma started playing violin and piano first and later moved to cello because he didn't like the violin and piano.

Yo-Yo Ma is not the only one in this. In a study that was conducted among students at a British boarding school by music psychologist named John Sloboda; it was revealed that students who went to structured music lessons in their early life were categorized by the school as "average," while no one was categorized as "exceptional." However, the students that were categorized as exceptional were the ones that have tried up to three instruments.

Experiment, if you do not know your path yet. You can use Vincent van Gogh as an inspiration. Vincent tried various things from working in bookstores to teaching to art and preaching before he finally realized his path as an artist and he changed painting forever.

Living in a complicated world has improved the average person's IQ and ability to think abstractly.

A professor of political studies from the hilly town of Dunedin in New Zealand named James Flynn changed the way we think about thinking in 1981.

Flynn came across results of IQ test scores of American troops that showed great improvement between the two World Wars. This same score that placed a soldier from the World War I in the 50th percentile would place the same soldier in the 22nd percentile of World War II troops. Flynn was fascinated and he asked researchers of other countries for data. The IQ tests he

received from the Netherlands showed similarly trend from generation to generation. He gathered more data from 14 other countries.

This is what is now known as the Flynn effect; his research showed an average of three-point increase in IQ level every decade in more than 30 countries. What led to this fast increase? This was explained by a Russian psychologist named Alexander Luria.

The Soviet Union was changing quickly in 1931. Remote villages that didn't change for centuries were changed to collective farms with industrialized development, planned production and division of labor.

Luria used this change to conduct research. In one of his research, he asked the villagers to arrange wools into groups. In modern villages, the villagers would be happy to group similar wools together; for instance, those that have different shades of blue. However, people in the premodern villages refused to do it. According to those participants, every piece of wool was different and the task was impossible to do.

Questions that involved conceptual thinking got a similar reply. A picture was shown to one of the villagers named Rakmat, the picture had three adults and one child; he was asked which person did not belong to the group. However, Rakmat was unable to identify the child as different because he did not think about the question abstractly. Rather, he said the boy has to be with the adults so the boy can help the adults with their work.

The findings of Luria were clear. The more you have been exposed to modernization the better your ability to make associations between objects or abstract concepts. In this day, our mind regularly concentrates on abstract concepts. For instance, when we look at the download progress on our computers; we immediately understand. Our minds understand things better now and we are able to connect ideas together than before.

And yet, we keep narrowing our conceptual focus.

If you want it to stick, you show learn slowly and hard; not fast and easy.

Your best teachers in school might be the ones who taught you the least. A study conducted on teaching at the US Air Force Academy monitored the progress of thousands of students working with hundreds of different professors, starting with Calculus I classes. It was revealed that professors who their students got higher grades in the exam were highly rated in the student evaluations. However, the professors who their students got lower grades in the exam were poorly rated in the student evaluation.

However, there was a difference when the economists that conducted the study looked at the result. The professors who were highly rated has a negative impact on their students. On the other hand, professors who received bad feedback were the ones that later inspired better student performance.

Instead of teaching to test, these professors were actually helping to get a better understanding of basic math concepts. This made their classes complex and annoying which made the students give them poor rates during student evaluations. However, this was beneficial to the students. Professors that were using difficult methods were giving better approaches to learn.

There are specific approaches we can all use to embrace necessary difficulties. One of the approaches is called spacing which means creating time between learning something and practicing it. A study was done in 1987 in the Journal of Experimental Psychology. In this study, Spanish students were divided into two groups; one group was tested on the words they learned that same day and the other group were tested weeks later.

After eight years; with no further study, the two groups were tested again. The results showed that the latter group was able to remember 200% more words.

Short-term spacing is also effective. In a study that was conducted in 1972 by researchers at Iowa State University; these researchers read different words to people. The first group of participants was asked to repeat the words immediately. The other group was asked to recite the words 15 seconds after they have been distracted with basic maths.

The first group of participants performed better than the group that was distracted. Later in the day, the participants were asked to write down the words they could remember. The group that had previously performed worse were the best this time. At the first instance, the process of

working very hard to remember a piece of information has helped them move it from short-term to long-term memory. Therefore, do not become too happy with fast progress when you learn. Embrace hard and slow learning because it will be beneficial for you in the long run.

A narrow focus is not helpful, and the solution to this is to think outside the box.

In some situations, dealing with specialists is appropriate. For instance, if you want to get an operation, you would prefer a doctor that specializes in the operation you are about to do and you would want a doctor that has done such operation severally. Nevertheless, as we gain from various reflection and thinking, this narrow focus is not helpful.

For instance, a cardiologist often uses stents which is a metal tube that holds opened blood vessels when treating chest pain; meaning they do it reflexively even in circumstances where the operation might be unsafe and inappropriate. This explains the study that was conducted by Dr. Anupam Jena of Harvard Medical School in 2015. Dr. Anuoam study revealed that patients experiencing cardiac arrest or heart failure were at lower risk of dying if they were admitted to hospital where top cardiologists were away.

Other fields also show how looking at a problem from an outside view can be beneficial instead of looking at it with an inside view by your own specific specialty.

A study that was conducted by Professor Dan Lovallo of the University of Sydney; he asked private equity investors to give a full assessment of businesses they were willing to invest in as well as their expected return on investment. Also, these investors were told to write notes about other projects that have similarities, like another tech start-up or a project on infrastructure.

The study revealed that the investors' estimates of return for the businesses there were willing to invest in were about 50% higher than those of alternative projects they had written down but not looked at in detail. The investors were stunned to discover the differences and immediately reduced their expected profit from their actual potential investments.

Furthermore, psychological research has constantly shown that the more information we consider about something, the more our judgments become extreme. In an example, a student ranked university higher when the student was told that only specific science departments instead of all science departments were ranked in the national top ten.

It is clear that some bad calls can be made if we fail to see things from a broad perspective.

A breadth of experience and interest leads to innovation.

Various comic books can inform us about success. When Dartmouth business professor Alva Taylor and Henrik Greve from the Norwegian School of Management wanted to examine the effect of individual breadth on creative impact, they used comics.

Tracking the careers of comic creators and the success of several comic books from 1971 till date; they have made some guesses about what would improve the worth of a comic book. They predicted that the more a creator makes a comic, the better the comics would be. They further stated that the more resources a publisher have, the greater the quality and the more successful the product will be.

However, all these predictions were wrong. Experience or financial assets does not lead to success. What led to success was the breadth of a comic creator's experience across comic genres. Out of 22 genres, the more a creator has done from comedy to crime, to fantasy to non-fiction, the more successful they were. However, this connection between breadth and success isn't just the situation in creative or artistic worlds.

An inventor named Andy Ouderkirk at the multinational company 3M was awarded as the innovator of the year in 2013. He has also been named on 170 patents which are representations for creative success. He was captivated and he began to research on what initiates successful and inventive team. He realized that inventors who were more likely to succeed in 3M and win the company's Carlton Award for innovation were not specialists. They were polymaths, people with one area depth and great expertise in other fields.

These polymaths have the tendency to have many patents in their field; however, it also continually took expertise assembled in one area and applied it to another. A study of respected

scientists led by Robert Root Bernstein, a Professor of Psychology at Michigan State University, confirmed Ouderkirk's findings. Comparing Nobel prize-winning scientists to other scientists, the statistics showed that Nobel laureates are 22 times more likely to be an amateur actor, magician, dancer or performer.

Therefore, for any employers looking for new talents; here is an appeal. Do not look for people who only fit your defined requirements. Make room for people that do not fit into any of the categories. Their breadth of experience might be irreplaceable.

The experts and pundits that society listens to are terrible at making predictions.

During the Cold War of 20 years, the world respected forecasting expert named Philip Tetlock gathered and examined predictions from 284 experts. From his assessments, he came to the conclusion that experts are worse at making predictions about things.

Also, Tetlock found out that experts who have many years of experience, academic degrees and even experts who have the ability to get access to classified information are also terrible at making decisions. When experts predicted that an event was impossible, such an event happened in 15% of the cases. Events that were predicted to happen failed to happen 25% of the time.

This is a concern for people that listens to cable news; Tetlock found out that there is an inverse relationship between fame and accuracy. Tetlock deduced that the more an expert appears in the news, the more likely they were to be wrong and Tetlock put it as "roughly as accurate as a dart-throwing chimpanzee."

One of the issues that many of the experts faced is that their focus was too narrow. Having spent their whole career studying one issue; they have a tendency to have explicit ideas on how things worked says the US Soviet relations. Therefore, what makes a good forecaster predicts future events? Researchers like Jonathan Baron a psychologist said being actively

open-minded and the ability to question your own knowledge. Many of us cannot do this, and we can not set aside our own belief to pick evidence that supports our existing beliefs.

Think about the study that was conducted by Professor Dan Kahn of Yale. Pro and anti-Brexit voters were asked to interpret statistics on the effectiveness of skin cream. The task was completed successfully by most of the participants. However when the same statistics were presented to them as the association between crime and immigration; most of the participants misinterpreted the statistics due to their personal political beliefs. In the US, this same study got similar results on the subject of gun control.

How can we fight our ability to maintain our existing beliefs even though there is evidence? It was proposed by Kahn that if we want to stay open-minded, a person's personality is vital and we have to consider the world around us. Rather than scientific knowledge, how much you know; focus on scientific curiosity, the ability to learn more, ability to find new evidence and the willingness to be open-minded.

Now, let's look at how we can grip this kind of curiosity.

To become a generalist, you have to change your attitude toward learning and success.

Let's see if you can get the answer to this question right. "Disease X has a prevalence of one in 1,000 people. The test for the disease has a false positive rate of five percent. What is the chance that someone receiving a positive test result has the disease?"

If you get 2% or 1.96, your answer was right. Therefore, you did better than 75% of physicians and students at Harvard and Boston University who got the answer wrong. Most of them got 95% as their answer.

The question is easy if you can think about it. In a sample of 10,000 people, ten will have the disease and get a true positive. 5%, or 500 people, will get a false positive. Therefore, from the 510 people with a positive result; only 10, or 1.96% are ill. Unfortunately, a lot of students were

not taught how to think openly about such a question. According to Arturo Casadevall, a star in the field of microbiology and immunology needs to change.

Casadevall from the School of Public Health at Johns Hopkins Bloomberg is formulating programs that address the interdisciplinary understanding of topics such as philosophy, ethics, statistics, and logic. One of the courses is “How do we Know What is True,” which looks at various types of evidence in different academic disciplines. The course “Anatomy of Scientific Error” helps students to look for signs of misconduct or poor methodology in scientific research.

Casadevall believed that, with a more severe understanding of reasoning and multidisciplinary thinking, students will be more ready to make an actual impact on our economy and society.

Actually, not everyone has a senior academic position like Casadevall. How can we broaden our range? One thing is to accept failure. A creativity researcher called Dean Keith Simonton has indicated the more a creator produces, the more failures they produce. However, it is also very likely for them to produce huge success. For instance, Thomas Edison had over 1,000 patents of which many of it were failures. However, his successes, for instance, the light bulb were ground-breaking.

Walking in a disorderly path of experimentation may not always bring immediate results. However, it may be the best approach to greatness in the end.

Range: Why Generalists Triumph in a Specialized World by David Epstein Book Review

Accepting range, experimentation, and breadth of experience is frequently a better way to success than specialization. Range needs you to be patient, open-minded and scientific curious. If we can nurture and demonstrate these, the chances that we will create important innovations and contribute significantly to our economy and society will increase.

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