# Strictly Standardized Learning: A Comparison of Structured Texts with Conventional Paragraphs & Introduction of Standards with Respect to their Expected Effects on Society

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**Abstract**

Learning is a task that we optimally perform on the daily. Because learning is ought to take such a high percentage of our lives, the methodologies beneath should also be optimized. This study will question if there may be standards that could provide better learning experiences for everyone, and why. The effects of all sorts of standardizations will also be analysed, and implicitly, even the possibility of the emergence of a human language which is maybe almost as structured as a mid level programming language will be considered. The concept of learning for machines and humans will also be compared within the study

# Contents

# 1 Introduction

Attempts to standardize all sorts of content had been made countless times, and the outcomes had shown similarities. However, standardizations haven't been publicly formalized and aggregated to the extent that trees of standards could be built and numerous variations of standard branches/leaves could be used in many domains. Standards have been quite local and for explicit purposes. People accused standards of weakening the attention spans of the learners and more. This research will analyze learning as a whole and propose a slightly different way of managing standards. In Section 2 the changes in the notion of learning throughout the ages will be analyzed and compared. The comparisons will not only take place among humans, but also between humans and machines. Then the teacher's perspective will be taken into consideration, and it will be considered if intellectual diversity among learners implies there should be different teaching standards. Afterwards an example standard will be superficially built and analyzed. Finally the future and effects of standardization will be taken into consideration.

# 2 Learning

## 2.1 Learning Theory

### 2.1.1 Educational Philosophy

**Intro** This section is not central/crucial to the article, but its purpose is rather providing some background on how the 'methods of learning' that will be covered throughout the study have come to existence and for which reasons...

"Philosophy of education is connected with general philosophy partly by its purposes but more directly by its methods" (Moore, 2010)

Due to Plato and philosophers who didn't challenge his ways for quite a while (until almost recently), philosophers had been mainly focused on metaphysics and (mostly) therefore they couldn't solve their 'pseudo-problems' as said 'problems' were mostly being formed by conflicts over word meanings and / or misuse of words, the strongest parameter of the multivariate equation that depicts the implicit reason of both of which is probably **the imperfection of human languages**. If there were could be a perfect consensus on meanings and notations of all grammatical elements, all these pseudo-problems would cease to exist.

Assuming that the problem was with the definition of a 'problem', no legitimate 'method' to 'solve' these could be globally accepted as well. Scientist had effective methods to solve their problems, while these philosophers were yet have stabilized their problem statements enough to be able to systematically determine methods for solutions.

Had this problem of the philosophy also been spread to education, similar problems would arise. But while most 'philosophy' going on had been focused alternately on the solution and dissolution of such 'pseudo-problems', philosophy

of education had problems that set it apart. These problems it handled were closer to practice and had to be 'solved' and almost only solved.

To summarize, methods used within philosophy and educational philosophy are strongly connected, but methods used in educational philosophy could mostly be accepted as 'more valid', as they were more capable of yielding practical solutions.

## 2.2 People

**Intro** Now that we've superficially covered the root of methods within educational philosophy, the methods people have used to learn throughout history will be categorized and analyzed in this subsection.

There has been times when people had usually been learning by writing, in which they mostly focused on just repeating and memorizing previously done works and studies without altering them to a certain extent. And there had been times where other methods had been dominant. As everything else in this universe, the change in methods always had multiple reasons beneath.

### 2.2.1 How People Have Learned in The Past

**Motivation to Change** The way people used to study things have changed. Change usually comes from a desire of improvement and this desire stems from several motivations. One of these motivations, according to William Wotton who wrote about his reflections upon ancient and modern learning in the seventeenth century, was that

> "This great Difference arises from the Desire which every Man has, who believes that he can do greater Things than his Neighbors, of letting them see how much he does excel them"(Wotton, 1968)

As can be understood from the quote above, achieving more in comparison to another human had been a motivating factor to learn throughout history. The question to ask is how this motivations could end up leading people to learn differently, and to improve their methods.

The 'neighbor' in this context isn't just one who lives on a different space, but maybe on a different time as well. So one seeks to get better at almost every context conceivable, at all times.

**Learning as Nations** The past required learning to be more dependent on place, as no methods for mass long-range communication were present. This has limited the spread of learning and caused segregation of learners from different nations. Of course this wasn't the case for all types of learning. Learning by reading was still achievable via translations, but more common ways of learning, such as learning by experience really had suffered under these circumstances. One may even argue that the main cultural differences between different ethnicities or nationalities of today stem from the segregated learning processes from the past. A lesson is therefore to be taken from the past: **Learning**

**(standards) should not segregate people, for it may at least cause incompatibility of information, even if it doesn't start any new wars.**

**Ancient Learning Methodologies** There were equivalents of what we know as classrooms, in which people have learned together. These had different names in different nations, but were functionally similar. Memorization had played an important role, especially in theological aspects. Criticism was (in some teaching / learning institutions) allowed, learners were asked to interpret the subjects on their own, and question-answer sessions would also be occasionally held.(*Learning In Prehistoric Times: What Has Changed?*, 2017)
Even though the methods above seem like ancient variations of modern day learning methodologies, there had been some deviations from them.

### 2.2.2 How People Learn Today

With the latest developments in technology over the last few decades, the ways people have learned things have changed drastically. One of the most obvious reasons of this change is the fact that new technology that are at least implicitly helpful at learning have become available.

Today there are professors who have held the same class for years, that publish their notes anew whenever it needs an update. This system prove to be very useful and had been endorsed by most of the best universities of the world. In a way, **the idea of compacting the complete content of a subject and updating it when necessary could spark the fire for new, stricter more standardized learning materials**, the production of which would require the scientific method. One of the purposes of this very paper was to emphasize the possibility of just that.

There are numerous new learning methods that come up by the day. The ones that I expect to become more prevalent in short term, especially due to the coronavirus pandemic, are blended learning approaches. These approaches combine the traditional methods mentioned in Section 2.2.1 with online educational opportunities. Today, especially variations of flipped classrooms are being tested every day and teaching institutions are gathering comparison data about the learning experiences of their students like never before. The actual results won't come clear until the end of the pandemic, but most of the changes may remain kept.

### 2.2.3 Should Everyone Be Taught The Same Way?

Of course, if there are going to be standards on learning, it is important to consider if these standards should be the same for everyone, or if they need to be fitted / specifically designed for specific groups of people. To decide that, the theory of learning-styles is to be considered.

**The Theory of Learning-Styles** This theory proposes that different students have different preferred learning approaches / methodologies, and that the students could have better learning experiences if the teaching matches with their preferred way of learning. These different learning 'modes' can be dichotomizations such as reasoning versus insight or non-binary classifications such as visual vs auditory vs kinesthetic. (Riener & Willingham, 2010)

**The Variance of Disciplines** People from different disciplines are used to learning things in their own specific ways, and some conventional (e.g. mathematical) notations differ between different sciences. (e.g. mathematicians and physicists may use slightly different notations to show some equation or formula, while having valid, domain-specific reasons for doing so) As forcing them to use the same conventions from now on would've been almost impossible and in many ways harming, there should be a bunch of standard 'branches' that may be useful for each respective domain. **This means there should be a tree of standards**

**Should the teaching really be fitted to the learner?** Iff the presence of differing learning styles should imply better learning, then these styles become relevant while constructing standards. Nevertheless, the standards could still be clustered together to meet the needs of multiple learning approaches for several reasons. One of those reasons could be efficiency and time, and another reason could be to try to unify the terms and notations between different learners despite the negative effects this may have on the respective disciplines.

## 2.3 Machines

The emphasis of this article is on researching the possible pros and cons of having standardized learning for people, but as a lot of machine learning models have been inspired by our perception of the functionality of human brain, the logic behind machine learning is also relevant to the study.

### 2.3.1 Computational Learning Theory

The following quote explains the role of computational learning theory on this study quite well.

> "Programming computers to learn from experience should eventually eliminate the need for much of this detailed programming effort..."
> - *Arthur Samuel, 1959*

The quote above is actually not as common as the following interpretation of it, with which most readers are probably more familiar as it is recognized as one of the most common definitions of machine learning

> "Field of study that gives computers the ability to learn without being explicitly programmed."

As can be deduced from the first quote, it is preferable to use machine learning strategies for solving tasks with computers not only when it is impossible to program tasks explicitly, but also when it is possible, but requires too much effort. Humans can learn topics presented them in classrooms the way they always did, but to minimize the effort and stabilize the results, standards could be considered.

**Explicitly Programmable Tasks** These are the cases where it is conventionally not advised to use machine learning algorithms. It is important to realize that such a dichotomization of learning methods is usually not done when **people** are being assigned tasks.

The question to ask is if explicitness may be worth the effort when it ends up yielding better results. For computers the answer is usually no, because it takes a couple clicks or so to train a model a billion times if sufficient processing power is present. But for people that is not the case, as the functionality of a human brain is still too complex for modern science to be able to fully understand. So, the focus of a modern standard with humanity's current knowledge of the functionality of a human brain won't be like 'training a human brain just as if it was a 'machine learning model'. **However, a standards tree created with psychology and statistics and additional intuitive information can be used to overcome the uncertainty here in the long term. The defects in the said tree branches can also be partially removed by eliminations, additions and mutations that can be made over time.**

## 2.4 Differences and Similarities Between Artificial and Biological Neural Networks

*The artificial neural network phenomenon is not an exact copy of its biological 'equivalent'.*
The technical differences may also cause different learning methods to be optimal.
On top of the realizations made on the above two sections, knowledge of the differences between artificial and biological neural networks could play a role on **determining learning standards**. However as mentioned in Section 2.3, bringing this knowledge to life in form of really reasonable teaching-learning standards is really hard to realize.

> "Neuroscientists and machine-learning researchers face common conceptual challenges in understanding computations in multi-layered networks. Consequently, there is an opportunity for synergy between the disciplines, to redeploy DNN analysis methods to understand biological networks and visa-versa." (Barrett, Morcos, & Macke, 2019)

The quote above may imply that there is hope for extending learning experiences from neural networks to biological networks and vice versa, but the challenges mentioned are still on the discovery (not even solution) phase, and if

humanity ever overcomes them, it will be revolutionary not only for the learning standards but pretty much everywhere where information exists, and the quote above isn't even about creating an interface to actually transmit useful information between two systems, but just the analysis of them.

About how the two systems learn: While artificial neural networks require data that comes in quite definite structures, "Biological Neural Networks are able to tolerate ambiguity, to learn on the basis of very impoverished and disorganized data [for example, to learn a grammar from random samples of poorly structured, unsystematic, natural language]" (Eluyode & Akomolafe, 2013)

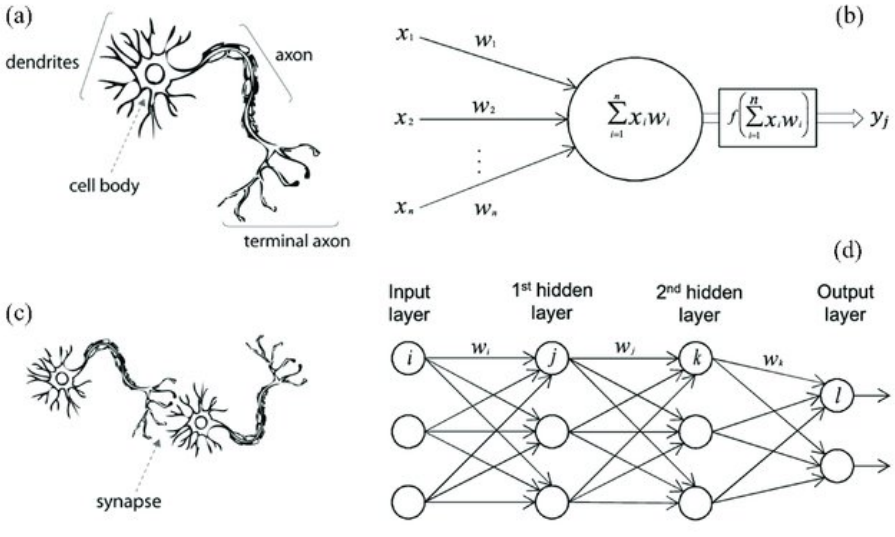


Figure 1: A biological neuron in comparison to an artificial neural network: (a) human neuron; (b) artificial neuron; (c) biological synapse; and (d) ANN synapses
(Meng, Hu, & Ancey, 2020)

### 2.4.1 Own Will and The Notion of a Higher Dimension

Is it possible to tell the actions a person is about to take in the next thirty seconds with technology from 30 years later and access to its entire brain?

**Yes** Then no human action ever was taken with an own will, as such a phenomenon doesn't exist. In fact, one could claim that then the whole concept of life is meaningless. In this case all actions are **perceivably predictable** (i.e. the fact that these actions can be predicted is known)

**No** Then one could claim that there exists a higher dimension D, in which the own wills of the people relocate. The higher dimension may be accessible

to another being that is somehow stronger, but is impossible for humans to perceive. Therefore the notion of **destiny** may still be present, but **perceivable predictability** may not.

There are many attempts at reading hidden intentions from human brains, none of which could perfectly explain the process of someone making an actual decision, but they may make some progress in the future, which would be really exciting.

> "Just as physicists can explain complex systems with a small set of elegant equations (e.g. Maxwell's), it might be possible for the multidisciplinary study of the brain to produce a list of well-defined universal principles that can explain the majority of its operation." (Bar, 2009)

One of the most common hard-to-reverse flaws of scientific work done to predict human decisions from the study of their brains is that the hypothesis are mostly not proven by induction with complete coverage. As biology is not man-made like computer science, one can't assume that some root elements (e.g. transistors) are going to function correctly with a certain probability (and it can be handled when it is not the case), therefore one can also not reach implications that explain complex entities 'perfectly'. The equivalent of 'transistor' in biology (not biological transistors, they are defined differently) could maybe be a cell, or even smaller, the 'smallest particle possible'. But cell isn't as simple as a bit, as it isn't just going to yield 1's and 0's and this 'smallest particle possible' couldn't and potentially can't be found.

**Smallest Particle Possible** An atom can be divided, and an electron can be divided into sections.The 'smallest particle possible' had not been perfectly discovered by humans, and in fact, anything one can think of can also be thought of in sections, and therefore the smallest element is, in a way, unreachable. (dividing a positive number by a natural number greater than one will keep yielding smaller results, never reaching the smallest) By some people, preons, the point and basic subatomic particles from which all quarks and leptons are formed, could be considered as this 'smallest particle possible'. But no sufficient experimental evidence could yet be provided. (Raitio, 2018)

So the derivation from the two paragraphs above is that biological neural networks couldn't make use of the technologies of artificial neural networks in their actual forms, **because they couldn't use 'induction' well enough.**

# 3 Teaching

Another reason beneath the absence of strictly standardized learning materials is the unwillingness of the academicians to implement them. It takes time to work thoroughly on a teaching material before putting it into use, and the proposal of strict standards are also most likely to cause them more strain. So

it is also important to **Determine the work load behind the production of a teaching material using a standard branch** to be able to manage efficiency, and motivate the teachers. It is important the note that the 'standards' attempted so far have not really been too harsh for the teachers. E.g. the common core standard for mathematics teaching in the USA.

**Common Core Mathematics Standards** Schools in the United States of America have been standardizing their curriculum to make them substantially more coherent. Standards used in numerous American states have been aggregated together with the addition of some international models and research, so that American students from all states could have the same, optimized learning materials available for them. The standards have the goal of providing the students with a formal mathematical understanding, due to which some students find it harder to learn, while some other students have been learning more rationally (with less analogies and a stricter implementation of the scientific method).(?, ?) The common core standards have been mentioned here, for they are an example which is stricter than the usual, yet still common for a lot of countries in the world and for where they are heading.

# 4 Who do we call clever?

Usually people who can learn fast and without repetition are recognized as clever within the society but what actually matters is how one is **capable** of learning, and how one **connects** different elements together, or finds patterns.

It is also really important to question if a standardized learning material should be focused on people who've been thereby declared 'clever' or vice versa, or should there be a segregation/branching for that purpose as well. However this question may remain unanswered for now.

# 5 An Example Teaching Standard: SLT000.001

This standard will just be an example, and it therefore won't be supported by sufficient evidence or detail for deployment. The definitions of terms below have also not been strictly determined, and they are incomplete.

## 5.1 Naming and Definition of Terms

In this section the naming of the root/canonical/basic/atomic elements within the standard will be explained.

**SLTxxx(.xxx)** "SLT" stands for "Standards for Learning and Teaching"

1. "xxx" is a placeholder for the serial number of the standard. The first x also determines the serial number for the numbering system, so the numbering system "xxx(.xxx)" may be changed with every incrementation of the first x.

2. ".(xxx)" is a non-mandatory placeholder for standard snapshots, meaning they are yet to be deployed and they may be faulty.
3. Other notions/terms used in the standard can be prefixed with "STL:" to avoid confusion with other terms (E.g. If a standard is used within a logic textbook and the author wanted to reference the standardization, the author should ensure that the readers understand that the 'implication' mentioned is an implication in the context of SLT's)

**Learner** Individual who is learning or who is being taught anything

**Teacher** Individual, whose purpose is helping the learner with learning.

**Item** Item is not an atomic explanation element. It is just a part of the explanation that somehow could be segregated. Maybe it happens before or after another item, or maybe it belongs to some other item.

**Implication** An implication means that an item 'has caused' another item. The causality between items can be one way or two ways, but such attributes should somehow be clearly depicted (e.g. drawing a one way / two way arrow between items)

**Event** An event is an item which represents an action.

**Chain** Items with certain connection to one another (could be a causal, hierarchical or any other sort of connection) could form a chain. In a chain the end nodes (the first and last item on the chain) can only have one connection and the remaining nodes can have two connections each.

**Tree** If a group of somehow-connected-items cannot be depicted with just a chain (e.g. if an element has two sub-elements) than they could be depicted as a tree just like the trees in computer science, the formal definition of which could be found under countless computer science / data structures literature such as (Atallah & Blanton, 2009)

## 5.2 Additional Rules

**Sharing a Source of Information** For the cases, in which the teacher is not capable of keeping all the material up to date themselves, the teacher should not provide the learner with direct content. Instead, the learner should be taught how to find the most up to date information themselves. E.g. the 'correct' conventions of using a framework may change over time, and the teacher may find it hard to update their 'curriculum'. In such cases the teacher should ensure that the learner is capable of finding the correct source to learn from.

**Fast Query Techniques** Programming languages such as python are becoming more and more important for one-time-run tasks, because the time and effort spent while thinking and programming is more precious than the time the computer spends to compute. In a similar manner, the learner could learn to be capable of finding the correct results just by a simple query in their favourite search engine. As time passes and as the learner learns about how to put better keywords in their query the conventional way (by testing and gaining experience). Over time, the learner may even be expected to not need any more teaching for most of their remaining learning. An example query technique could be to search for the international scholarship opportunities of the Max Planck Institute with the following link:
`https://batikanor.com/d/max%20planck%20institute%20scholarships%20international`
This link searches the web using DuckDuckGo (A search engine which as default option yields the same result for every locale) and yields the first result. It should be noted that this query could have been made with less words while yielding the same result, which would've made the searching process quite more efficient. And another important notice is the fact that if a newer and better webpage to answer this query ever comes to existence, it may be yielded as the new result. Meaning that **a learning source which uses the hereby explained fast query technique may have its content changed / updated at any time** and the formulation of the query should therefore always ensure that the yielded result doesn't deviate too far away from the context.

**Last Resort: Abstraction** All explanations should be as formal as possible (using the scientific method if possible), because abstractions and too intense usage of daily language may cause many problems such as incoherentness, which had been one of the main motivations behind the development of the common core standards for mathematics.

## 5.3 Expected Effects

If the aforementioned standard were ever to be deployed, its effects could've probably been positive in the long run. The teachers would start to not 'teach' conventionally, but instead, guide. And the students could become more independent, learning when they actually think that they need to learn, and as fast as possible. There could also be negative effects, such as learners becoming more unwilling to partake in teaching sessions (a.k.a. lessons) because the content had been too 'overly' formalized and analogies had been almost 'banned', they would become way less social and the contributions that the teacher may want to make during the teaching sessions may have almost ended. Of course, all these claims are to be supported with experimental and further psychological evidences, which won't be included in this paper as they were all assumptions.

# 6 Comparing Structured Texts or Standardized Material with Conventional Paragraphs

Structured texts are easier to learn from. Learners have taken notes from the original material that they were meant to learn from throughout the ages, and similarities in note-taking had also been often observed. Learners started to condensify and formalize texts, use symbols etc. And the more experienced they are, more formal their notes have become. This fact, in a way, shows a desire to change in the direction proposed with this paper. This comparison is being made on the daily by countless students, and they are choosing standardized materials more and more, especially as they grow older. Modern note taking apps have also been enabling new ways of doing this.

# 7 Future Vision: A Tree of Standards

Humanity will probably not be able to find a standard to transmit any sort of information with, which could be globally optimal. Therefore, countless standards could be built and somehow related to one another. E.g. the standard proposed on Section 5 could have different variations of it which propose some changes for it to be used more optimally in countless domains.

Standards could come and go. They could be improved or replaced. But they should be proposed and they should be tested, so that progress can be made.

# 8 Effects of Standardization on Society

As people have tried to standardize content, the most common critiques have been about standards demotivating the students and making the process of learning harder for people who 'don't have the types of brains that do well with the scientific notations and formal language'. But the standardization proposed on this paper leaves place for branching, an example usage of which could be to differentiate curriculum for ADHD students. The existence of and causes beneath ADHD are often questioned, but no argument shall deem the proposal of standards wrong, for the standards may be useful for both scenarios.

# 9 Conclusion

Standards should be tested. Information in all different types and forms should be standardized with countless rules and for countless domains. Many standards proposed may prove to be harder to learn from, but improvement is bound to take place due to which the mankind will have better standards with better outputs.

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