The Fallacious Pyramid

Introduction

The famous 'learning pyramid' is widely observed, and frequently quoted as fact in the media and psychology textbooks, exerting strong influence on much of the theory and suggestion on implementing certain teaching methods. Indeed, a quick google search will throw up a vast range of images depicting this model. However, little attention has been paid to the origins of the model, and the evidence, or lack thereof, supporting it.

In this article, this model will be discussed, in an attempt to come to some conclusions on its validity, with regards to its origins, if there is any research evidence to support the existence of this model, and finally we seek to relate this model to other research and theories within the field of educational psychology.

Background

There are a number of different styles of the learning pyramid, with some consistent features as can be seen below. It essentially proposes that there are some forms of learning which are more effective than others, in that they will lead to a greater amount of information being recalled at a later date. It also proposes that a percentage can be observed relating to these learning experiences, with regards to how much of the information we have been exposed to will be remembered. There is some variation among models, but generally they propose that learning experiences will produce greater remembering in the following ascending order:
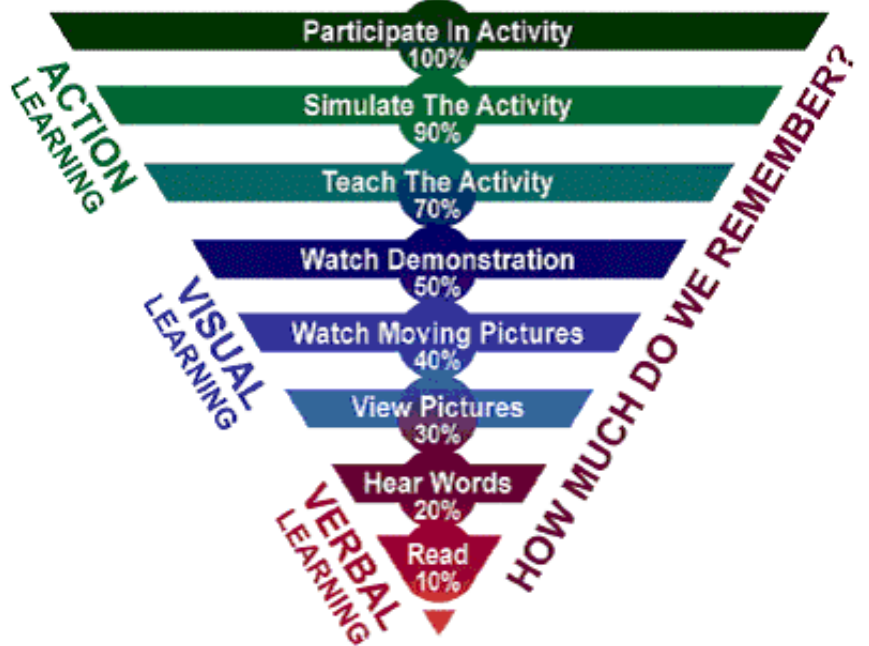
- Listening (e.g. to a lecture)
- Reading (e.g. from a textbook)
- Visual (e.g. seeing a concept in action)
- Audiovisual (e.g. seeing a concept in action and hearing it being explained)
- Discussing (e.g. talking about a concept with others)
- Experience (e.g. relating a learning concept to personal experience)
- Teaching (e.g. a teaching a concept to others)

As can be seen from the examples here, the exact definitions, order of learning techniques and percentages of information retained can vary between models. Overall though, it is clear that there is at least some consensus between these models.

10%
of what
we read

20% of
what we hear

30% of what we see

50% of what we hear and see

70% of what we discuss with others

80% of what we experience personally

90% of what we teach to others

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HOW DO WE LEARN?

Participate In Activity
100%

Simulate The Activity
90%

Teach The Activity
70%

Watch Demonstration
50%

Watch Moving Pictures
40%

View Pictures
30%

Hear Words
20%

Read
10%

ACTION LEARNING

VISUAL LEARNING

VERBAL LEARNING

HOW MUCH DO WE REMEMBER?

The Cone of Learning

I see and I forget.
I hear and I remember.
I do and I understand.
— _Confucius_

After 2 weeks, we tend to remember ...

Reading

Hearing Words

Seeing

Watching a Movie
Looking at an Exhibit
Watching a Demonstration
Seeing It Done on Location

Participating in a Discussion
Giving a Talk

Doing a Dramatic Presentation
Simulating the Real Experience
Doing the Real Thing

- 10% of what we READ
- 20% of what we HEAR
- 30% of what we SEE
- 50% of what we SEE & HEAR
- 70% of what we SAY
- 90% of what we SAY & DO

Passive

Active

Source: Edgar Dale (1969)

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It may seem surprising to learn then, that this model has a particularly suspect basis, being inaccurately attributed to work which never suggested that the model be used as it is, and that no substantial work has been published to support the existence of percentages of remembering being associated with different learning techniques.

Dale's Cone of Experience

The current model is often misattributed to the work of Edgar Dale, and it can clearly be seen that Dale's 'Cone of Experience' has inspired many of the current popular models. Despite this, there are several key differences to the model itself, and the applicability of Dale's work in an education setting, which have developed over the years so that what is now often referred to as the 'Cone of Learning' is in fact far removed from the work which Dale originally carried out.

Dale first proposed the theory behind the cone of experience in the first edition his book 'Audio-Visual Methods in Teaching' (1946), suggesting that this could be a rough guide to teaching techniques which would provide the strongest experiential involvement, and could lead to the greatest retention level, particularly with regards to audio-visual techniques of teaching. In a subsequent edition of his book in 1969, he proposed the following graphic model:
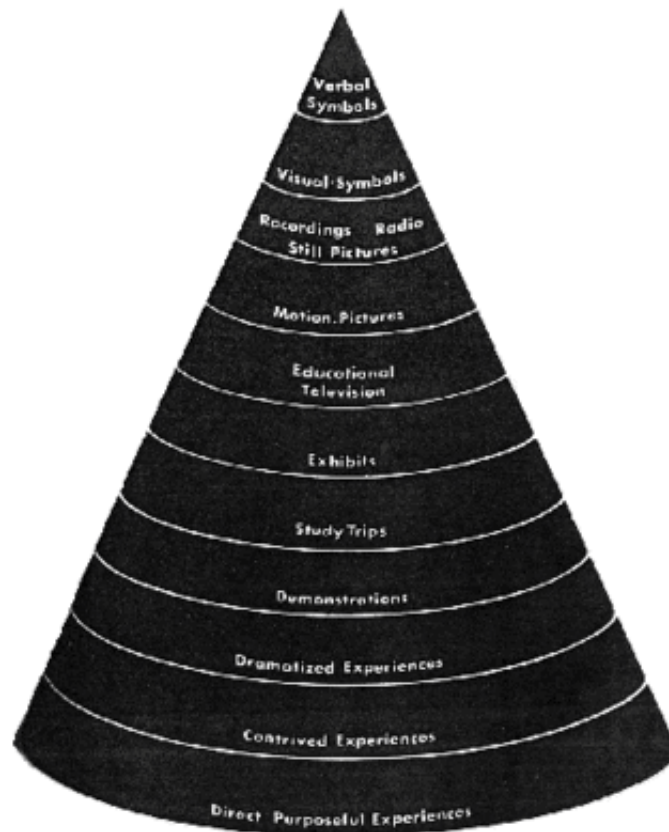
This model suggests that the amount of information people will remember is based on the manner in which they experience and encounter that information. For example, he proposed that individuals will retain more information when they view a demonstration of that information than when they listen to it being explained. He also proposed that most information would be learned when the individual has a 'direct purposeful experience' of the information.

It can easily be seen how this model has been misinterpreted to suggest that some of these techniques would be more valuable in teaching, however, Dale never intended the cone to be used in the absolute manner in which it is often cited today, suggesting that the model not be taken too literally (Thalheimer, 2006). Furthermore, Dale never proposed any percentages as being connected with certain learning techniques, having never carried out any empirical studies to investigate the model, and explicitly stating that the model was intended as a "purely abstract, symbolic expression" (p.108). He proposed that it was meant to suggest potential teaching methods for abstract concepts given a student's ability level, emphasising the relationship between source material, presentation, and individual ability, rather than as a system of rules and techniques which provide increasing levels of retention.

Despite this, a number of papers, such as that by Church (1999) and Kvam (2000), among many others, have proposed Dale's model as being a schema by which teacher's must instruct their students, giving greater value to certain teaching techniques than others.
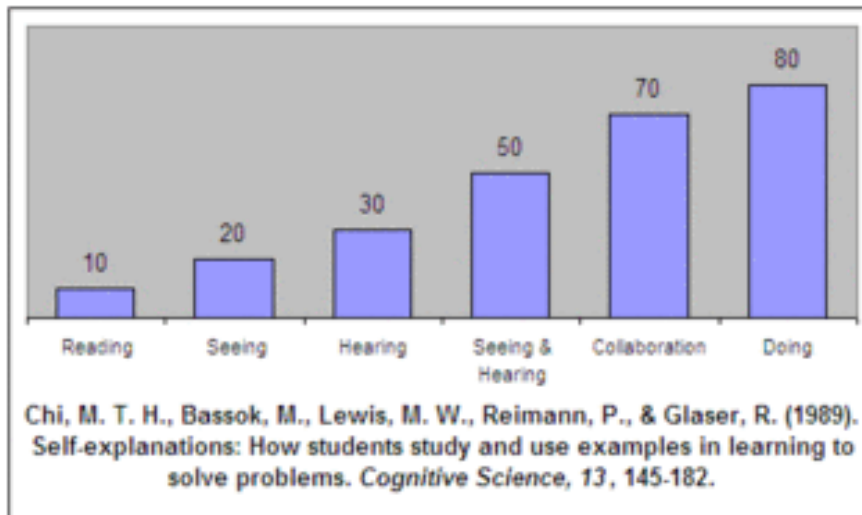
Percentages

The source of the notion of applying percentages to retention levels for different learning techniques has been attributed to a number of sources (Subramony, 2002), but one potential source can be traced back to a publication in *Film and Audio-Visual Communications* by Triechler (1967), which proposed the percentages connecting different styles of learning with amount of recall. Despite such claims however, there has yet to be any research published to suggest that any empirical research was carried out to justify the publication of these percentages.

Given this lack of evidence behind the proposal of these percentages and lack of evidence connecting Dale's Cone of Experience with percentages, the number of researchers who have published papers suggesting these percentages as fact is surprising:

- Hall (2002) – suggests, according to Dale's Cone, that people remember 10% of what they read, 20% of what they hear, 30% of what they see, and 50% of what they see and hear.
- Leggett (2002) – suggests, again citing Dale's Cone, that people remember 5% of what they hear, but 70% of what they do.
- Sorenson (2002) – misnamed the cone as the 'Cone of Learning', while also suggesting that students remember 10% of what they read, 20% of what they hear, and 30% of what they see, while mixing these senses produces greater retention levels, so that 50% of what is seen and heard is remembered. Sorenson also suggested that up to 90% of what is taught to others is remembered.

False Citations

While some have published this fallacious model as fact, others have gone even further, and wrongly cited the model, whether by misinterpreting published research, or by copying a previously published version of the model without checking the source reference. One such false citation is this model which supposedly belongs to a paper by Chi, Bassok, Lewis, Reimann and Glaser (1989):

Chi, M. T. H., Bassok, M., Lewis, M. W., Reimann, P., & Glaser, R. (1989). Self-explanations: How students study and use examples in learning to solve problems. *Cognitive Science, 13,* 145-182.

However, this graph, or the associated percentages, do not appear in this paper, and have been falsely attributed. This not only highlights the issues with inaccurate developments or misrepresentations of others research and findings, but also the more widespread issue in psychology of simply copying references from sources without checking the original source to determine the authenticity of a model or theory.

Model Development

There are a number of scenarios which have allowed the propagation of the current 'Cone of Learning' model. Firstly, a number of researchers have incorrectly combined Dale's model with the 'percentages of memory' theories, and proposed an unsubstantiated model of learning. In this case, publishers have often falsely cited the source of such a model as being attributable to the work of Dale, as can be seen in the a number of online academic resources, such as the ones linked here: Truman State University (http://excellence.truman.edu/tutoring/userfiles/ConeOfLearning-Flyer.pdf), Triton College (http://www.triton.edu/uploadedFiles/Content/Academics/Continuing_Education/Cone_of_Learning.pdf),

and Percepysis Online Learning (http://www.percepsys.com/images/Percepsys_SIMSTUDIO.pdf). Related to this is the issue of false citations, as noted above, in which publishers falsely attribute findings to researchers who never published such findings. In another, arguably less serious and less common scenario, researchers have cited the model correctly from where they saw it published, but that the model they have cited has been incorrectly proposed in the initial instance. Circumstances such as these have lead to the model being so popular, and so commonly cited.

In the following video, presented by American businessman and motivational speaker Robert Kiyosaki, in which he discusses features of the 'Cone of Learning' which are relevant to his area of expertise, a nnumber of the common issues regarding this model and its usage are highlighted.

There are a number of problems demonstrated by this short presentation:

- He inaccurately credits Dale for the creation of the model.
- He states that the 'worst way of learning is reading', which is not what Dale suggested. Dale proposed that certain experiences would lead to greater retention, but that all would be appropriate at different levels of information to be learned, and the individual's ability level.
- The model he discusses has been split into 'active' and 'passive' learning, which again, was never part of Dale's original model, and it is unclear where this distinction originated. In could be argued that because reading is less personally involving than an actual experience, then this can allow for such a distinction. However, when studying a topic by reading, if the reader is engaging properly with the material, utilising attentive skills, focus, and critical thinking, then this involve equally as much personal immersion as engaging with a physical demonstration of a concept.

What evidence is there for each of the 7 bits of the pyramid?

Despite the aforementioned limitations in the development of this model, it's vast popularity suggests that it is not obvious to naive viewers that it has been fallaciously developed. In the following section, we examine evidence for and against for the levels of the pyramid, in order to determine if there is any research which supports, or disproves, the structure of the model. For the sake of discussion, we have

utilised this example (http://pbs.twimg.com/media/BheYvy5IYAIOUPE.jpg) of the model when analysing the levels proposed.

10% of what we read / 20% of what we hear

In the 1980s people began seeing through the method of teaching listening like reading was taught (Brown, 2011). Reading and listening are extremely different, for example, readers are able to skim through a text and understand what the gist of the text is, listeners, however, are not able to skim. Listening also involves understanding when each word begins and ends. Further to this listeners usually show some kind of reply to the speaker (e.g. "really?"). (Brown, 2011)

Brown (2011) suggests one limitation of this stage in the pyramid is the difference between, listening and hearing. Just because we hear something it does not mean we are listening to it. For example you may hear a noise outside whilst you are listening to the radio. Maybe the method of 'hearing' to learn is low in the pyramid as individuals are simply hearing information and not listening to this information.

Lund (1991) compared the reading and listening as methods of learning. Participants for a second language German course from a US university were interviewed on a piece of text that was either previously presented to them orally, or in written form. Readers overall remembered more ideas then the listeners did, however, listeners recalled more of the higher-order, main ideas. This suggests if we take a 'quality over quantity' approach to learning, as stated in the pyramid, listening is a more effective form of learning then reading. However this depends on whether the 'hearing' mentioned is 'listening' rather than hearing.

30% of what we see

Audio-visual teaching methods are extremely under studied (Lalley, 2007). This may be as audio-visual methods are barely used on their own, they usually include audio, or text.

VanHell, Bosman and Bartel (2003) studied the use of audio-visual materials for children with spelling difficulties. They found that using visual 'cue cards' improved the children's spelling

Hodges, Chua and Franks (2003) showed students videoed feedback of their performance of learning motor movements. The children who were shown video feedback had better retention rates up to a week after the initial performance.

50% of what we hear and see

Clark (1983), introduced interactional listening by which people maintain social contact with transactional listening, for example buying a train ticket through the glass window (Brown, 2011)

Polhemus, Dambe, Moorad & Dambe(1985) – they studied students learning about the concept of length and how context is not important. Students who were given demonstrations showed significant pre test to retention test gains than a control group that received no demonstration.

70% of what we discuss with others

Johnson, Johnson and Stane (2000) found that student learning was improved with cooperative learning over competitive learning. Learning together was the most successful cooperative learning strategy. However in their discussion they mention how this would only be beneficial in certain situations. They

However in their discussion they mention how this would only be beneficial in certain situations. They mention that not all methods of cooperative learning will work in all situations.

Johnson & Snider (1986) compared group learning with individual learning. Students in the individual learning group used materials and only talked to lecturer. The researchers found that group learning was more beneficial than individual learning.

80% of what we experience personally

There is a large amount of research that suggests false memories are quite common in personal experience, this would decrease the reliability of learning in this way. Roediger & McDermott (1995) studied false memories. In their study they found a 55% false recall rate on a list of words. Participants were highly confident that their recall was correct. These results suggest that people remember events that never happened. So we may believe we learn 80% of what we experience personally, however what we have remembered may in fact be completely made up.

In other versions of the pyramid this section is coined 'practice by doing', this may be a more reliable term form this as this would not involve false memories. Practice whilst doing is seen as early as 1960. Bruner encouraged the use of discovery learning in maths, science and social science. (Lalley & Mill, 2007)

90% of what we teach others

Lalley & Mill (2007) believe the most common form of teaching others is peer tutoring. Much of the research in this area focuses on the tutee rather than the tutor, however, there are few studies that show the benefits of the tutee.

Rekrut (1994) found that students who were tutors showed higher retention rates up to 6 months after learning took place. Students were however given training on how to tutor, which could mean that this effect would not be shown in individuals who have no experience of teaching.

Feldon et al (2011) compared the quality of skills represented in research proposals of two groups of post graduate students; those with both teaching and research responsibilities and those with just research responsibilities . They found that students who took part in both teaching and research demonstrated significantly greater research proposals. These results suggest that teaching is beneficial to a greater extent than simply personal study.

Conclusions

There is evidence to support that all the later stage methods of learning are effective, however there does not appear to be any evidence of where the percentages on the learning pyramid come from.

Further to this the pyramid does not mention the effect of writing on learning. Butler, Phillman & Smart (2001) introduced writing to answer questions in lectures. After writing they were asked to discuss and share their responses with fellow students. They found that writing encouraged students to attend the lectures, and that this writing facilitated learning however this writing did not stimulate discussion outside of the lecture situation.

To conclude the validity of this pyramid, research will have to be conducted on all of the stages on this pyramid. By comparing all the stages, it would be possible to see the validity of the percentages stated in the pyramid.

Other educational approaches

Throughout the years, the educational methods have been developing and changing according to the needs of the students and the researches of the moment. Without forgetting the pyramid, we will show different educational approach.

Direct instruction is a highly structured teaching plan often associated with Hunter's Mastery Teaching model (1982). It emphasizes teacher direction and student teacher interaction. Here, the teacher provides explicit experiences to assist student attainment of lesson objectives (Eby, Henell, & Jordan, 2006). Direct instruction is the most researched teaching strategy and the one strategy, more than others, that has improved student achievement (Kim & Axelrod. 2005). Direct instruction is a useful teaching strategy for students throughout the grades, students with exceptionalities (Eby et al, 2006), and children from low socio-economic backgrounds who typically come to school with less background knowledge than those from more affluent backgrounds (Kim & Axelrod, 2005). Further, direct instruction has been shown to have a significant effect on retention.

One of the levels of the pyramid is concerned with reading and a lot of researchers have investigated this issue, as it is an issue which has always had importance in education. Reading is not only an effective teaching/learning method; it is also the main foundation for becoming a "life-long learner" (Lalley & Miller, 2007). Its fundamental importance was noted early on by Dale who in 1946 stated he "would give much more attention to effective reading in all curricula". New approach to improve the reading methods could be an interesting issue to future investigation.

The traditionally demonstration method typically involves an expert (i.e.. teacher) performing a learning task while students observe. The intent is to model the correct behavior in an attempt to minimize ambiguity in instruction, and therefore, limit the potential for student errors and misconceptions. It is the classical model of teaching and is very widespread but, nowadays, professionals in this general area are trying to find more effective innovative alternatives. A good example of this is the cooperative learning and discussion groups. The cooperative learning is an approach that tries to turn the classroom activities into social and academic learning experiences. Students work in group and exchange information collectively. Discussion Groups are intended to stimulate student thinking and articulation of ideas related to a topic (Jacobsen, Eggen, & Kauchak, 2005). The teacher's role is to set the conditions in the classroom to increase the chances students will participate in the discussion.

Continuing with practical approaches, which are currently on the rise among institutions, one of the most highly advocated types of practice by doing is Discovery Learning. It is thought to be effective because it encourages students to work like a professional in the field (e.g., a scientist). Students work on their own or in groups to discover principles and relationships in a given content area to develop a personal understanding of concepts and relationships that are more meaningful and better understood than if they were simply told about them. It fits with the pyramid level of personal experience.

The newest educational methods bet on educational application, use of social network, as highly known twitter and facebook, and all kind of electronic tools that they are easily accessible to everyone. However, the development of educational applications has always been a challenging and complex issue, mainly because of the complications imposed by the cognitive and psychological aspects of student–computer interactions (Triantafyllakos et al., 2008). The findings show by Cheung's (2013) review suggest that educational technology applications generally produced a positive, though modest, effect in comparison to traditional methods. Moreover, the findings provide some suggestive evidence that approaches that

integrated computer and non-computer instruction in the classrooms and innovative approaches are effective in improving student achievement.

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