Teaching and Learning Abstract Ideas via the Abstraction Ladder – a Phenomenological Invitation

Photo: Pixabay

ROBERT ISAKSEN says: this paper 1) argues for the inclusion of a phenomenological form of academic textual evidence, 2) makes a case for James Moffett's abstraction ladder for teaching and learning, and 3) provides concrete examples of the abstraction ladder both as inspiration for practical application by teachers and to demonstrate how it may be used to broaden academic written discourse. These three aims are interrelated and mutually supportive.

Keywords: Abstraction Ladder, Teaching, Learning, Higher Education, Phenomenology

Academic Texts and Reading Experience

In education generally (Hasan 2009) and in particular in higher education and academia (Bourdieu 1984; Savage et al. 2015), knowledge and discourse are primarily of the more abstract type. New terms and concepts are introduced, generalizations are cited and referred to, and theories are presented.

This paper takes a somewhat unusual form, and an explanation of why this is done is therefore first discussed. Sayer (1992) provides reasoning to reflect on and question textual conventions in scientific knowledge development; "With only a few exceptions social scientists have paid surprisingly little attention to the fact that their knowledge is invariably presented in the form of texts. Typically they refer to the task of 'writing up' their research, as if it were merely a bothersome conclusion to their real work.

"But this wholly underestimates the significance of the fact that academic knowledge takes this textual form. It is not only that language and the devices and forms we use for constructing texts have a degree of autonomy and a largely hidden influence on how we re-present knowledge and how it is read, they also influence the content of the research itself." (p.258)

One purpose of this paper – related to James Moffett's theory of learning as we shall see – is to take a phenomenological approach to the form and rhetoric of academic text.

This is against a backdrop where authors of academic texts use their own and other's empirical results and theories as evidence – directed at readers – of the correctness of their claims.

Of course, the readers' own experiences and thoughts are involved in either the acceptance or critique of scholarly claims. The purpose of this paper is to focus the argumentative force to a greater extent on the readers' own personal experience while reading the text, and as such invite a more phenomenological approach to academic discourse.

This is an explicit invitation to you the reader to consider a type of experiential evidence known as a 'phenomenological nod' (van Manen 1990, p.27). The evidence of such an approach is an individual one, where the descriptions, arguments, and experiences recounted will be evidence to the reader to the extent that the reader has a 'phenomenological nod'.

Such a 'nod' delineates when a description is such that we recognize it in some way from our own experience.

In the context of this paper, such an approach has not only been to recount the presented theory of learning in a way that you may find agrees with your past experience, but also for you as reader to have an experience of the theory while reading about it.

For example, some sections of this paper may require varying levels of cognitive effort on your behalf, and it may be useful to reflect on how the comparatively effortful and effortless sections relate to the theory of learning that is being presented.

"prioritize"

Within a philosophy of science perspective, it could be said that one of the purposes of this paper is to invite any and all readers to take a further step away from trusting what is claimed by researchers, or even generally accepted, and instead prioritize personal reflection regarding the matter.

I am not making the argument that all academic writing should focus on increasing personal responsibility this way, it is rather an argument that there should be room in academic writing for this form also.

Presenting a barrage of references may "prove' one's point" in the "outside" perspective of academic writing. In this paper references will be kept to a minimum, for the purpose of inviting the readers' personal reflection on the topic instead.

In the context of the pedagogical knowledge and experience of this journals' readership, I consider such phenomenological evidence as epistemically complementary to empirical data that Moffett's theory can explain – which will also briefly be mentioned.

The final section makes explicit how the learning theory relates to various parts of the presentation of learning theory in this paper.

Moffett (1968) provides a learning model, here called the abstraction ladder, that I argue is particularly useful to help students of higher education understand such abstract ideas. Similarly, it may be useful to help readers of academic papers understand abstract ideas. Moffett's learning theory was a critical synthesis of Alexander Bain's (1866) four "modes of discourse", Samuel Ichiye Hayakawa's 1949) "ladder of abstraction", and Jean Piaget's (e.g. 1952) work on stages of cognitive development and learning.

As Moffett particularly drew on Piaget it is not surprising that his learning theory is focused on cognition, though he later moved towards a more sociocultural perspective. Moffett was an educational theorist best known in primary and secondary education in the 60's and 70's.

There has been some renewed interest in his work as it is claimed he still has much to offer (Green, Sawyer and Burgess 2010; Burgess, Ellis and Roberts 2010). The abstraction ladder and its potential pedagogical implications have not been presented specifically for a higher educational context. A purpose of this paper is therefore to make a case for the pedagogic value of this theory in this context.

The three purposes – making a case for Moffett's abstraction ladder for teaching and learning in a higher educational, exemplifying the abstraction ladder for both teachers in a higher educational context and to make sense of the theory in this paper, and arguing for the inclusion of a more phenomenological form of academic text – are related and mutually supportive and necessary.

This is explained in detail at the end of the paper, as that is when the relations are most likely to be clear.

James Moffett's Abstraction Ladder

A ladder is a fitting metaphor for Moffett's learning theory. With feet on the ground and feeling the soft grass between the toes we have raw experience. From here we climb to the first step of the abstraction ladder and find stream of consciousness.

If raw experience is being on the ground, then describing in "real time" what we are experiencing is the kind of thought and discourse found at Moffett's first step of the abstraction ladder.

Our stream of consciousness is not the same as our raw experience but is closely related to it.

Figure 1. The Abstraction Ladder

Because the abstraction ladder is closely related to experience the best way to present this theory is therefore for you as reader to be experientially involved.

Observe the things currently around you. On this page you see black letters against a white background, but you also see many other things in the room or space where you are currently reading this. Notice the sounds. Sense pressure at various places on your skin, under the soles of your feet for example, or your back against your seat. Not only are there many external stimuli, but things are also going on inside your body such as breathing and perhaps digesting of food.

In addition to such senses, you have thoughts that may be about Moffett's theory here, or your thoughts may jump to other related or non-related topics. Such senses and thoughts occur every moment of our existence, most of which we perhaps never recognize.

Our thought and discourse at this level is usually internal. We do not usually state aloud the sensations that we may describe to ourselves.

As mentioned, this level of discourse is not the exact same thing as our sensory experience but is a representational abstraction of it in thought and potentially in discourse.

Moffett (1968) explains, "My perceptual apparatus is recording these moments of raw experience, not in words but in some code of its own that leads to words… It is difficult to separate this sensory recording from the constant stream of thoughts that is going on simultaneously and parallel to the sensory record but may often depart from it" (p.36).

(Moffett calls this abstraction level 'drama' because he described a theatre script as being analogous to our internal discourse about what we observe. I shall here instead use the term 'stream of consciousness' because it more directly refers to the experience Moffett attempted to signify.)

In the same way that raw experience is abstracted to stream of consciousness, so stream of consciousness may itself be abstracted and which brings us to the second step of the abstraction ladder, narrative.

If tomorrow you share your experience of reading this paper with a colleague, you will not recount everything you experienced and thought while reading. It would not be possible to remember every sensation described to yourself or every thought you had, nor would it be interesting or relevant to your colleague.

Even if you were only to recount the experience of reading the paper to yourself, your memory of the experience would not include everything that was in your stream of consciousness at the time. We abstract from stream of consciousness to create pointed narratives that recount our most relevant past experience. Where stream of consciousness is about our concrete experience right now, narratives pick out some of our past concrete experiences.

Narrative as a form of thought and discourse is still concrete, in that it is about specific events in time and space, but it is further removed from experience than stream of consciousness and raw experience.

"generalization"

The next step up the abstraction ladder is generalization. Here we move from thinking and discoursing about specific experiences in time to what happens generally. On the ladder we are starting to move up into the abstract clouds.

There is no longer reference to a specific time or place as there was with narrative. For example, your narrative of reading this paper may become a mere example of reading academic texts generally and may be used to support general statement such as, "academic articles always have abstracts" or "academic articles are long-winded".

Most textbooks are largely written at this level of abstraction. Lectures are often primarily presented at this level. Scientific discourse itself is often at this level of abstraction. Moffett's argument is that such generalized thought and discourse necessarily draws on narratives, which in turn draw on stream of consciousness, which draws on raw experience.

For example, the scientific term "parabolic trajectory" is an abstract generalization but is only intelligible – and relevant – because it is related to some concrete experience that it may describe and from which the term was developed. If we had never seen individual cases of a ball or stone or any other object flying through the air in a rainbow-like trajectory, scientists would never have thought of developing an abstract term to cover all such cases.

In the words of Moffet, the term "'Parabolic trajectory' ignores bat, cannon, and rock and fastens only on the kind of course produced by any projectile under any circumstance as it overcomes and then submits to gravity." (p.21)

The important point here is that generalized statements do not occur by themselves but are necessarily a generalization of more concrete thought and discourse. One potential pedagogical implication of this insight is to bring students up the abstractive ladder, from the more concrete to the more abstract, especially when presenting particularly abstract ideas to them for the first time. This and other pedagogical implications will be discussed in greater detail later.

Moffett's final step on the abstraction ladder is called theoretical argument. Here we are well into the clouds. What he means by this is that generalizations are applied as premises to develop theoretical arguments about what may be.

For example, based on the generalization that "academic articles are long-winded" we may infer – correctly or incorrectly – that "academics love their own thoughts". The claim that academics love their own thoughts does not refer to an event that can be sensed directly. Neither is it a generalization of observable events, and this is what makes theoretical argument a step higher up the abstraction ladder than generalization.

Theoretical arguments can include claims about the nature of things, proposed causal explanations, ethical judgements, theoretical discussions about knowledge, and logic. Moffett's argument is that all of these can be related, in one way or another, to concrete experience.

The following is a simple example of the process from stream of consciousness to theoretical argument: I meet someone at a party and talk to them. While talking to them I have a host of senses and thoughts (stream of consciousness). While I am talking to them, I am building up memories about my interaction with this person (building a narrative).

Towards the end of the conversation, against my better judgement, I create a generalization about what they do, for example that they are always kind or always arrogant (generalization). It is a short step from this generalization to making implicit claims about the kind of person they are and why they are that way (theoretical argument).

Moffett's argument can be summarized in this way: Without generalizations there could be no theoretical arguments, without narratives there could be no generalization, without stream of consciousness there could be no narratives, and without raw experience there could be no stream of consciousness.

Even though theoretical argument in discourse seems far removed from raw experience, stream of consciousness, and narratives, it is Moffett's argument that the former could not exist without the latter. Since generalizations and theoretical arguments, as found to a great extent in academic textbooks, were developed out of streams of consciousness and narratives, in one way or another, it may also be helpful to lead students up the same abstractive scale that they were initially developed.

Figure 1 is a representation of Moffett's theory of abstraction where we move from the more concrete to the more abstract. By being wider at the bottom of the ladder than at the top, the figure represents that we have more experience in stream of consciousness than we include in our narratives, that we often need more than one narrative to come to a generalization, and that theoretical arguments requires more than one generalization as their premises.

Clearly for Moffett the concrete and abstract are not dichotomous but related. The abstract can be seen as an abstraction of concrete experience, and the concrete can be seen as a concretization of abstract thought. As such, Moffett's abstraction ladder has similarities to embodied approaches to cognition (e.g. Lakoff and Nuñez 2000).

The abstraction ladder provides a cogent explanation why such educational approaches such as examples (Bills et al. 2006), video (Carmichael, Reid, and Karpicke 2018), narratives (Willingham 2004), and experiential learning (Roberts 2018) can be effective for students to understand abstract ideas.

A further insight of Moffett is that the concrete is not only about specific things and experiences, but about such specifics in time. When moving from narrative to generalization we move from events in time to a generalized way of being. The abstract is therefore also related to an abstraction of temporality.

To demonstrate the abstraction ladder in relation to the development of pedagogic theory we can plot Lev Vygotsky's (1978, pp.79-91) argument for the zone of proximal learning onto the model. Firstly, we can assume that Vygotsky, and the researchers he cited, had many observations of children in pedagogical settings even though these observations and experiences (at the level of stream of consciousness) are not specifically mentioned in the book.

What is presented is an imagined narrative about two schoolchildren who manage more with an adults' help than they can by themselves, though to varying degrees. After the brief narrative about the two imagined schoolchildren Vygotsky presents the generalization that all children can do more with an adult's help than they can by themselves to varying degrees (generalization).

The difference between what the student can do by themselves and what they can do with assistance he termed the zone of proximal learning. It is with this generalization, that all children can do more with assistance than they can by themselves, that he moved to Moffett's final level, theoretical argument. Vygotsky argued that the zone of proximal learning, the difference between what a student can do by themselves and what they can do with the help of a teacher at a point in time, can be considered evidence of the student's maturing development.

He therefore argued that learning comes before finished development (which theory famously contradicts Piaget's theory that development must come prior to learning). The best-known pedagogical implication of Vygotsky's theory is the importance of scaffolding (Wood, Bruner and Ross 1976).

Examples of Pedagogical Applications

In the following, I shall focus on teaching and learning in a lecture and seminar setting, though the principles can in many respects be applied to other learning situations, and to curriculum development and textbook writing. For example, Moffett's (1968) own primary intent with the learning model was to develop a conceptually sound approach to curriculum development. The pedagogical implications that I shall suggest in regards to developing a lesson plan are; 1) consider the level of abstraction of the intended learning outcomes, 2) consider the level of abstraction at which the students are in relation to the intended learning outcomes, and 3) find or develop experiences, narratives, generalizations, and/or theoretical arguments that can lead the students from the level of abstraction at which they currently are to the level of abstraction of the intended learning outcomes.

When preparing a lesson plan, it may be helpful first to be aware of the abstraction level of the intended learning outcomes. The intended learning outcomes in history may be mostly at the level of narrative, for example about the French revolution or the rise of Genghis Khan. In sociology the learning outcomes may be more abstract, such as theories about social inequity or about system-theoretic perspectives of social organization.

However, and as Moffett mentioned, historical narrative may have as a more or less implicit purpose to say what happens generally by referring to what happened specifically, and historiography (historical research methodology), though a part of history as a discipline, is an example of content at primarily a theoretical level of abstraction.

It may be useful in some cases to consider which generalizations and theoretical arguments the students find most difficult and focus on these in the teaching encounters because of time restraints in teacher-student interactions.

The next point is to consider the abstraction level of the students in relation to the intended learning outcomes. A student, or student group, may be very high on the abstraction ladder about one topic but very low on the ladder about another topic.

In a business leadership course, for example, students who have worked in leadership and are taking the course as part of their MBA are likely to grasp generalizations about leadership and strategy faster than are students who come directly from secondary education. This is because the students who have worked in leadership have personal experiences that help them make sense of the abstractions they read about in textbooks and hear about in lectures while the students coming straight from high school often do not have quite the same experiences to connect the abstractions to.

The third and final point is to seek out and consider experiences and/or narratives that can lead the students from the level of abstraction at which they currently are to the level of abstraction of the intended learning outcomes. In teaching a philosophy of social science class, for example, I handed out chocolate to teach about epoché and the hermeneutical circle. There were roughly 30 social science Bachelor students in the class.

Before we started, I handed out pieces of chocolate on plates to groups of students (I did not think to mention that the chocolate was part of an exercise so a couple of students ate a piece before we started). At the beginning of the class, I explained that we were going to have an exercise to learn about the central methodological approach in phenomenology, known as epoché, writing the word up on the whiteboard. I explained that when they ate the chocolate, they should try to forget everything they previously knew about chocolate and focus all their attention on the experience of tasting the chocolate. When they had finished tasting the piece, they were to write one or two brief paragraphs describing what they had experienced. When it seemed to me that all the students had completed the exercise, I explained that they had now carried out epoché! I explained that epoché is about bracketing, or setting aside, all previous knowledge about something and instead giving the object one's full attention.

The educational purpose of this exercise was to start at the level of raw experience and stream of consciousness, which I hoped would form a narrative in their mind that they could refer to later and which could make sense of the following abstract expression; "epoché is about bracketing, or setting aside, all previous knowledge about something and instead give the object one's full attention."

Later in the course when I used the term "epoché" and saw some of the students with glazed-over eyes, I could say, "remember when we tasted the piece of chocolate and how I asked you to forget your prior experience when doing so? Well, that was you carrying out an epoché." Following this first activity, I informed the students that they had not all had the same type of chocolate. I explained that the students on the one side of the room had tasted one type and the students on the other side had tasted another.

I therefore invited the students to find a student from the other side of the room and exchange their written notes about the chocolate-tasting experience. The purpose of this exercise was to try to understand the experience of the other from what they had written. Not all students followed the instructions, however. Some tasted a piece of the chocolate from the other side of the room.

Others asked questions in addition to reading their texts. This became the basis of an interesting discussion about the hermeneutic circle. I asked the students how easy or difficult it was to understand the text written by the other student. I then asked how they tried to understand the other student's text.

Some explained that they drew on their own experience and others explained that they tried to read the text in relation to what they knew about the student who had written it. When they mentioned these points, I drew up a figure of Wilhelm Dilthey's hermeneutic circle and could explain that they were conceptualizing their interpretive actions according to this approach.

Figure 2. Dilthey's Hermeutical Circle

One aspect of this hermeneutic circle is that we always draw on our own prior understanding when we try to interpret what others have written or said, which in turn gives us a new understanding for the next time we read a text or hear someone speak. To the students who also asked questions of their fellow students or tasted the other chocolate I asked why they did so and if it was of any benefit to their understanding.

They explained that by talking they could ask further questions to better understand the other person's experience and in tasting they could experience the difference for themselves.

From this I generalized our discussion to ask what this experience could mean for the kind of knowledge we can get from research methodologies such as textual interpretation (reading other's words), interviews and focus groups (asking further questions), and participant observation (in some respects experiencing for ourselves).

This is an example of starting at the level of raw experience and stream of consciousness and supporting students up the abstraction ladder.

However, such an approach may not always be necessary or be the best use of time. It will depend on the level of abstraction of the intended learning outcomes and the level of abstraction the students have in relation to this.

On another occasion, when teaching about social constructionism I used narrative rather than stream of consciousness as the first step to generalize from.

In this case I presented a fictional narrative from Vivien Burr's Social Constructionism (2003, p.57) that she wrote to demonstrate a social constructionist approach to communication and identity. The narrative is of a woman and a man sitting in a car at an intersection. The woman is driving.

Him: There's nothing coming after the blue van…you can pull out. Oh, you've missed it now. You just keep looking the other way and I'll tell you when it's OK to go.

Her: Thanks – but if you'd just keep your head back I'd be able to see perfectly well anyway.

Him: There's no need to be like that – I was only being helpful.

Her: I don't really need you to help – I'm perfectly capable of getting us to the supermarket without constant instructions. I bet you wouldn't do it if I were a man.

Him: What's that supposed to mean? You're always complaining that I don't help you enough, and then when I try to be helpful, you just throw it back in my face.

Her: You know perfectly well what I mean. If I were a man you wouldn't dream of suggesting that I'm incapable of driving down the road without your assistance. You only do it to assert your masculinity.

Him: That's complete rubbish, and you know it. You're just spoiling for a fight, and you drag that feminist stuff in just to score points. Well that's the last time I'm going out of my way to be helpful to you – if you don't want my help, then that's fine."

After sharing this narrative, I asked the students to discuss in groups how the man and woman were presenting themselves and the other. I specified that the social constructionist approach is not to psychologize, it is not about trying to understand how they are feeling but about analyzing how they present their own identity and that of the other.

After five minutes of group discussion, we met in plenary to discuss how the two characters presented their own identity and that of the other. The groups agreed that the man presented himself as helpful and the woman as ungrateful, and the woman presented herself as a capable woman standing up to an arrogant man. From the responses of the groups, it seemed that they had very quickly understood the general approach to social constructionist analysis.

Reflecting on Pedagogical Implications

In my experience, the first point about considering the level of abstraction of the intended learning outcomes does not require a great deal of effort once the abstraction ladder is understood. There may be a need to prioritize among the different intended learning outcomes because of time-restraints, and this reflection about what to focus on and what potentially to leave out may in many cases require some effort and reflection.

Of greater difficulty is the second point, attempting to judge at what abstraction level the students are in relation to the intended learning outcomes. One strategy for gaining a better understanding of the students' abstraction level is to reflect on past experiences with similar student groups.

Other strategies for understanding the abstraction level of the current student group are; attempting to remember the one's own abstraction level when the same age and academic stage as the students, trying to understand the student group by engaging to some extent with contemporary popular culture, iteratively developing learning resources based on observations and on written and oral student evaluations.

There are many aspects of the human condition which are very similar across groups.

We have a sensory apparatus, we engage in relationships with friends and family, we have goals and purposes, we have heartache. In these and other cases we as teachers can have a good idea of the way students will react, what they understand, and how they will engage.

Quantitative and qualitative diagnostic assessments are also useful (Ambrose, Bridges, DiPietro, Lovett and Norman 2010). Judging the abstraction level of the students in relation to the intended learning outcomes is complicated by the fact that student groups are not homogenous, that different students are at different levels on the abstraction ladder, and structural restraints such as class size and lack of preparation time affects the possibility to be aware of individual differences.

Another complication is that student groups, however homogenous, differ from year to year and it is therefore necessary to seek to understand the current groups' level on the abstraction ladder.

The most time-consuming is the final point, namely finding and/or developing resources to help the students from where they are on the abstraction ladder to where they need to be.

Though Moffett did not mention it, such an approach can be understood as a form of scaffolding in relation to learning abstractions.

It may be useful to find or develop learning resources that are beneficial to the students who are at the most concrete level of the abstraction ladder because research seems to suggest that concrete knowledge about a topic is beneficial to all learners but particularly beneficial to learners with limited prior generalized knowledge related to the topic (Arya and Maul, 2012; Wolfe and Mienko 2007).

It may take time to find and develop experiential exercises, narratives, images, figures, videos, virtual reality experiences, and other kinds of examples that are interesting and relevant (to the students!).

It is beneficial to actively search for and develop such resources. However, it is also my experience that many of the most useful ideas may come after or in between times when I have actively thought about how to develop such resources (as also the creativity-literature describes (Danek et al. 2014; Dygert and Jarosz 2020)).

For example, the chocolate-tasing exercise that I used to teach about epoché and the hermeneutic circle was adopted from a unrelated trip.

Tasting chocolate is something that, I assumed, all my students had done many times previously, and which I imagined would be an experience they would easily remember. It could therefore serve as a useful exercise for them to experience, and later to remember the generalized statement that epoché is about bracketing previous experiences and ideas to fully focus on the experienced properties of the object at hand.

In preparing the lesson on social constructionism I returned to the book by Vivien Burr that I had read many years prior.

I came across the narrative and considered it to be relevant because, again, it is a narrative many people will be able to relate to and which was designed specifically to demonstrate the social constructionist approach to discourse and identity. The examples in this paper are of a traditional lecturing format.

However, the most important point of the abstraction ladder is how students learn, not how teachers should teach. This implies that courses may be reworked towards a more active learning approach, if deemed relevant, but where the learning resources and formative assessment are provided in such a way as to support students in their learning of abstract ideas via the abstraction ladder.

Indeed, one of the reasons formative assessment may be so beneficial to learning is that such feedback is based on the students' current level of abstraction.

The Abstraction Ladder in This Paper

Before ending with a final obstacle to applying the abstraction ladder, I wish briefly to touch on some of the ways I have used the abstraction ladder in the presentation of this abstract theory here. I have attempted to follow my own pedagogical advice in the development of this paper.

Following the first pedagogical implication, I have reflected on the level of abstraction of the abstraction ladder itself and concluded that it is at the level of theoretical argument.

It is not about events as such, but rather a cognitive theory about how the mind works that can be inductively inferred and argued from experience. Following the second pedagogical implication, I have considered the prior knowledge that most of you would have in common.

Following the third pedagogical implication, I have chosen concrete examples at levels of abstraction I considered would most effectively communicate Moffett's abstract theory to you. Firstly, I used the visual imagery of a ladder to make an abstract learning model more concrete.

I then invited you to participate experientially in following the abstraction ladder through your stream of consciousness while reading this paper, via narrative and generalization, up to theoretical argumentation about what academic texts may say about academics. This experience of following the process could produce a relevant narrative – a memory – that you could later relate the abstract theory to. Since grasping a new abstract idea is often not accomplished in one go – as visualized with the ladder – I chose to describe other concrete examples of the abstraction ladder, examples being "parabolic trajectory", being at a party and making a judgement about someone, and the development of Vygotsky's zone of proximal development.

In presenting the pedagogical implications of the abstraction ladder, I both sought to provide examples of the abstraction ladder in pedagogical settings to help make the theory more easily applicable and – in so doing – sought to provide further concrete exemplifications of the abstraction ladder.

Though I have followed the three pedagogical implications the process has not been linear. It has been an iterative process, particularly regarding thinking through which examples would make most sense to all of you – the third point – and reflecting on my assumptions about the prior knowledge you have in common – the second point.

I have also attempted to find a balance between writing the concrete exemplifications and the theoretical abstractions, for though the concrete examples fill the most space they are not the primary purpose of this paper. The primary purpose, or the intended learning outcome so to speak, is that the learning model is understood.

The concretizations have been presented to support this understanding. It may seem that Moffett (1968) assumes the purpose of such an abstraction model or ladder is always to move away from the concrete to arrive at the more abstract, but this is not his position. "The goal is not so much to attain higher levels as it is to practice abstracting all along the way. No greater value is ascribed to one level than to another. Both concreteness and abstraction are dangerous and valuable." (p.25)

The primary purpose of this paper has been to introduce Moffett's abstraction ladder.

I argued that the best way to do so was not only to explain it abstractly but also through concrete examples, including for you as reader to hopefully experience it while reading about it. This is related to the phenomenological approach of the paper, and which invites the readers' personal experience and reflection to a greater extent than is usual in traditional academic texts.

Though time and space restraints always exist, they become more pronounced when "laddering" because presenting narratives or giving learners experiences takes more time and space than presenting succinct generalized statements in expository form.

In the same way that time restraints may affect what we can teach in a given period, space restraints mean that I have had to leave out other of Moffett's insights on the relation between the concrete and the abstract (e.g. Dixon 2010; Moffett 1968, pp.54-59) and important nuances to his theory (e.g. Britton et al. 1975; Ricoeur 1984).

REFERENCES

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C. and Norman, M. K. (2010). *How learning works: seven research-based principles for smart teaching*. San Francisco, CA: Jossey Bass.

Arya, D. J. and Maul, A. (2012). 'The role of the scientific discovery narrative in middle school science education: An experimental study', *Journal of Educational Psychology*, 104(4), pp.1022-1032. https://doi.org/10.1037/a0028108

Bain, A. (1867). *English Composition and Rhetoric: A Manual*. New York, NY: D. Appleton and Company.

Bernstein, B. (1966). 'Elaborated and restricted codes: An outline', *Sociological Inquiry*, 36(2), pp.254-261. Online

Bills, L., Dreyfus, T., Mason, J., Tsamir, P., Watson, A., and Zaslavsky, O. (2006). Exemplification in Mathematics Education. *Proceedings of the 30th Conference of the International Group for the Psychology of Mathematics Education*. Prague, Czech Republic: PME. Online.

Bourdieu, P. (1984). Distinction: *A social critique of the judgement of taste*. Cambridge, MA: Routledge and Kegan Paul.

Britton, J., Burgess, T, Martin, N, McLeod, A. and Rosen, H. (1975). *The Development of Writing Abilities (11-18)*. London, UK: MacMillan Education.

Burr, V. (2003). *Social constructionism*, 2nd edition. London: Routledge.

Carmichael, M, Reid, A. and Karpicke, J. D. (2018). 'Assessing the impact of educational video on student engagement, critical thinking and learning: The current state of play'. SAGE Publishing. Online.

Burgess, T., Ellis, V. and Roberts, S. (2010). "How One Learns to Discourse': Writing and abstraction in the work of James Moffett and James Britton', Changing English, 17(3), pp.261-274. Online.

Danek A. H., Thomas, T. von Müller, A., Grothe B. and Öllinger, M. (2014). 'It's a kind of magic: what self-reports can reveal about the phenomenology of insight problem solving', *Frontiers in Psychology*, 5, pp.1-11. Online.

Dixon, J. (2010). 'Dialogue and theory: On James Moffett's work in English teaching and language education', *Changing English*, 17(3), pp.275-284. Online

Dygert, S. K. C. and Jarosz, A. F. (2020). 'Individual differences in creative cognition', *Journal of Experimental Psychology: General*, 149(7), pp.1249-1274. Online.

Green, B., Sawyer, W. and Burgess, T. (2010). 'Re-reading James Moffett', *Changing English*, 17(3), pp.237-240. Online.

Hasan, R. (2009). 'The ontogenesis of decontextualized language: Some achievements of classification and framing'. In J. J. Webster (ed.), *Semantic variation: Meaning in society and sociolinguistics*, pp.403-432. London: Equinox.

Hayakawa, S. I. (1949). *Language in Thought and Action*. New York, NY: Harcourt, Brace and Co.

Lakoff, G. and Nuñez, R. E. (2000). *Where mathematics comes from: How the embodied mind brings mathematics into being*. New York, NY: Basic Books.

Moffett, J. (1968). *Teaching the universe of discourse: A theory of discourse*. Boston, MA: Houghton Mifflin.

Piaget, J. (1952). *The origins of intelligence in children*. Madison, CT: International Universities Press.

Ricoeur, P. (1984). *Time and narrative, vol. 1*. Chicago, IL: The University of Chicago Press.

Roberts, J. (2018). 'From the editor: The possibilities and limitations of experiential learning research in higher education', *Journal of Experiential Education*, 41(1), pp.3–7. Online.

Savage, M., Cunningham, N., Devine, F., Friedman, S., Laurison, D., McKenzie, L., Miles, A., Snee, H. and Wakeling, P. (2015). *Social class in the 21st century*. St Ives, UK: Penguin Random House.

van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. State University of New York Press.

Vygotsky, Lev S. (1978). *Mind in Society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Willingham, D. T. (2004). 'Ask the cognitive scientist: The privileged status of story'. *American Educator*. http://www.aft.org/periodical/american-educator/summer-2004/ask-cognitive-scientist

Wolfe, M. B.W. and Mienko, J. A. (2007). 'Learning and memory of factual content from narrative and expository text', *British Journal of Educational Psychology*, 77(3), pp.541-564. https://doi.org/10.1348/000709906X143902

Wood, D., Bruner, J. S. and Ross, G. (1976). 'The role of tutoring in problem solving', T*he Journal of Child Psychology and Psychiatry*, 17(2), pp.89-100. Online.

Acknowledgements

I am very grateful to artist X for the figures drawn specifically for this paper.