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Potentials for Social Semiotics in Geotechnical Engineering Education

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ABSTRACT: Social semiotics is a branch of linguistics that has been taken up extensively in many fields across the arts, design and humanities. It is concerned with the meaning of signs and symbols within particular social contexts. The principles and methods of social semiotics have begun to be applied within technical fields such as the sciences, medicine and engineering. This paper argues that social semiotics offers potential for application in geotechnical engineering education. The paper identifies three key ways in which social semiotics can be of value in geotechnical engineering education. It does this through a mix of review and synthesis of extant literature, on the one hand, and through presentation of empirical data collected by the author, on the other. The three arguments presented are: 1) that social semiotic approaches offer potential for understanding specific disciplinary values and interests, 2) that it allows for 'unpacking' of disciplinary representations, and 3) that it may offer insight into student's learning and/or misconceptions.

Keywords: social semiotics, geotechnical engineering education, student learning, research methods

1 Introduction

The professional geotechnical engineer relies on skilful deployment of a range of knowledges, practices and skills. Furthermore, the work of the geotechnical engineer involves collaboration with myriad other professionals, such as design, construction and consulting engineers, as well as environmental organisations and clients, who can themselves range from small to medium enterprises to large, state-owned companies. Because of this, geotechnical engineering work is, in part, *semiotic* work: it involves using signs and symbols to communicate with a wide range of audiences and achieve a wide range of tasks. Moreover, it is *social* in that it involves developing shared practices in order to accomplish these tasks. Despite this, little attention has been given to the nature of geotechnical engineering work as social semiotic work. Such attention is important because practicing geotechnical engineers – and geotechnical engineering lecturers – possess tacit knowledge about geotechnical engineering work and its practical accomplishment. However, this tacit knowledge is not evident to geotechnical engineering students – who may benefit from strategies that make this knowledge explicit.

It is the aim of this paper to explore the potential that social semiotic analysis offers geotechnical engineering education for making the tacit aspects of geotechnical engineering explicit. It does this by proposing three distinct but interconnected arguments about the value that social semiotic analysis might offer geotechnical engineering education. The first of these is that social semiotic analysis has the potential to make the interests and values of the profession clearer to students. The second argument is that social semiotic analysis helps to unpack specific disciplinary representations that might otherwise be opaque to students. Finally, the paper argues that social semiotic analysis opens up possibilities for 'seeing' student learning as well as student misconceptions. Each of these arguments is supported by examples collected as part of a previous study into the social semiotic practices of civil engineering study (Simpson, 2015), as well as through review of the extant literature. Of necessity, these examples are quite simple, but are nonetheless representative of the kinds of activities that students are introduced to early on in their studies in geotechnical engineering.

This paper presents an invitation to others to take these ideas forward – both to more complex geotechnical engineering activities and to more concrete strategies for use in the classroom. In order to do so, researchers will need to move beyond 'impact' studies that focus on intervention and measurement. The use of theoretical lenses from the social sciences helps deepen understandings of pedagogy, but requires reading into these theories and careful consideration of how they might be applied in practical teaching and learning contexts. The present paper is a necessary first step in identifying the potential in applying one particular social theory – social semiotics - to deepen our thinking about geotechnical engineering education.

2 Social semiotics and engineering education

Social semiotics is concerned with "meaning in all its appearances, in all social occasions and in all cultural sites" (Kress, 2010: 2). In order to make meaning, we need access to symbolic resources with which we can represent, categorise, configure and comment on our experiences (Ivarsson et al., 2009). Out of the work of Halliday (1978) and others such as de Saussure (1959), the field of social semiotics arose with the aim of exploring how people produce and communicate meaning in specific social contexts (Kress & van Leeuwen, 1996). However, language is only one of the semiotic systems through which meaning-making takes place. As such, *multimodal* social semiotics pays attention to the full range of communicational modes that people use to express meanings, as well as to the relationships between these modes (Jewitt, 2009).

The foundation of semiotic work is the notion of the sign: a symbolic entity that is used as a signifier of a particular meaning, the signified. Within this view, all forms of communication (or representation; or meaning-making) are a process in which a sign-maker has a meaning (or signified) that s/he wants to express and selects the most appropriate sign (or signifier) to represent that meaning, be it an object, concept or entity (Kress & van Leeuwen, 1996). Social semiotics allows investigators to analyse how those signs are used and what their use means, and it is taken as given that different social groups produce different representations of meaning. That is to say, social groups, through their socio-historical development and needs, have fashioned a set of semiotic resources that individuals within that group can use to realise particular intentions and meanings (Kress, 2010). Within this view, learning is a process in which individuals construct knowledge for themselves using "culturally available resources imbued with the meanings of those who have shaped and reshaped them in their social environments, responding to the needs of their times" (Kress, 2010: 14).

The social historicity of signs is important, as it allows researchers to examine the ways in which a specified social group – such as geotechnical engineers – routinely constructs meanings. This has opened up a wealth of research opportunities. For example, social semiotic analyses have been applied to the communication and representational practices of particular groups, ranging from courtroom trial lawyers in both the United States and China (Yuan, 2019), to doctors in a surgical theatre (Bezemer et al., 2011), to Rastafarian herb-sellers in a Cape Town railway-station (Williams, 2017). Social semiotics has also been applied to understanding new forms of communication, such as social media (a recent special issue of the journal Social Semiotics investigates this issue) and memes (Grundlingh, 2018).

Social semiotic analysis has also offered rich potential for investigating educational settings. Again, the breadth of education-related studies undertaken using social semiotics is significant. Such studies range in context from early childhood education (Nichols & Snowden, 2015) to higher education (Ma, 2017), and in discipline from architectural education (Lymer et al., 2011) to language education (Atoofi, 2019), and even physical education (Wright, 1993) and sex education (Liang et al., 2017). Moreover, social semiotic study of educational settings ranges in focus from textbooks (Alayan, 2018; Milaras & McKay, 2019), to teaching methods (Atoofi, 2019), to assessment (Bates, 2018), and to playground interaction (Ranker, 2018), among many other aspects.

While comparatively little social semiotic work has been undertaken in the areas of science and engineering education, a significant and growing body of knowledge in this area nonetheless exists. As early as the 1990s, research attention was given to the value of semiotics in science education (Groisman et al., 1991) and maths education (Vile, 1999). More recently, a selection of papers in the journal Designs for Learning focus on social semiotic approaches to science education (see Airey & Simpson, 2019, for an overview of these papers). Regarding the use of social semiotics in engineering education, specifically, South Africa has seen some attention given to this topic. Initial work in this area was undertaken by Archer (2008; 2009; 2010), and subsequently taken up by Simpson (2013, 2019), Simpson and Archer (2017; 2019), Prince & Simpson (2016) and le Roux & Kloot (in press). However, little work in this area appears to have been done outside of South Africa.

Moreover, a search of the Taylor and Francis online database and EbscoHost's online database using the key terms 'geotechnical engineering' and 'semiotics' yielded only 35 results, of which none were in fact related to the application of semiotic analysis to either geotechnical engineering or geotechnical engineering education. As such, given the occasion of the fifth International Conference on Geotechnical Engineering Education, it is important to consider what this theoretical and methodological approach might offer research in this area. This is particularly important given the value being derived from this approach in other disciplines, including a significant body of research work devoted to the application of social semiotics in maths and science education; see, for example, the work of Lemke (2002; 2004), O'Halloran (2009) and Airey & Eriksson (2019), amongst others. This paper addresses this gap, and proposes three arguments in support of the value of social semiotic analysis in geotechnical engineering education.

3 Social semiotics and disciplinary interest: The first argument

> The physical world is governed by laws whose properties can be captured (in part) by abstract symbolic notation. However, having achieved abstraction, those laws are used to act on the world.
>
> (O'Halloran, 2009: 113)

This quote introduces the core 'interest' of geotechnical engineering: it is a multi-stage, meaning-making process that moves from 'reading the world' (gathering real world data and using this to capture the properties of the physical world in abstract numeric terms) through 'data manipulation' (understanding the data collected and using them to generate designs) to 'changing the world' (using designs to transform the physical environment through construction activities). Johri et al. (2013) refer to this as an inscriptional or representational chain, as depicted in Figure 1. According to them, science moves along this representational chain from left to right (from the world to the word) whereas in engineering movement tends to be in the opposite direction, "as ideas are translated into sketches, formal designs, prototypes, and objects in the material world". However, geotechnical engineering includes elements of both science and engineering design and, as such, incorporates movement in both directions along this inscriptional chain, first from the world to the word and then back into the physical world again. As such, there is "continuous circulation" (Johri et al., 2013: 10) through this representational chain.

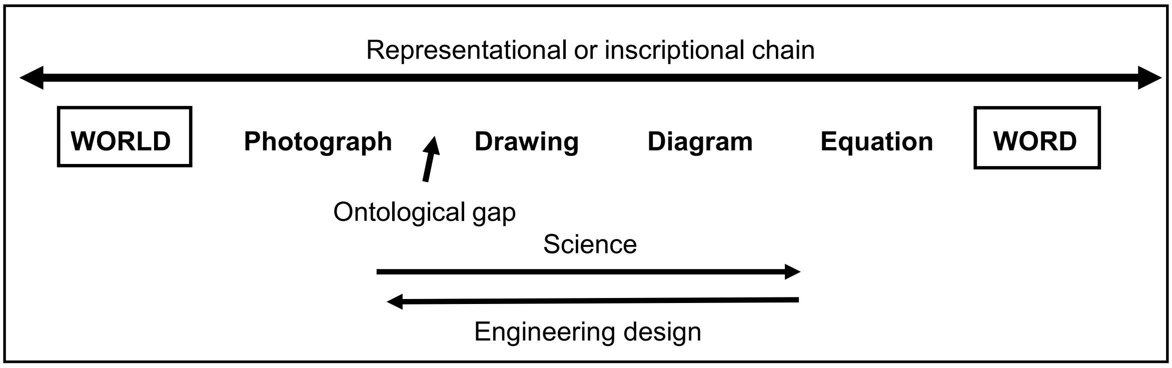

Figure 1. Representational chain in the engineering and natural sciences (adapted from Johri, et al., 2013: 9)

In Figure 1, the elements to the left resemble the physical world. In contrast, representations to the right are more abstract in that they bear no physical resemblance to what they represent. This has the implication that highly abstracted representations are not the entirety of the 'things' they represent; rather, they depict only certain aspects of the real-world phenomenon. A diagram of a truss, for example, represents the forces acting on a structure, but does not say much about the material from which it is made, which is depicted in a photograph or in a naturalistic drawing of a truss. Johri et al. (2013) call this the ontological gap between representations: two different modes of representation capture different aspects of a phenomenon. O'Halloran (2009) recognises this fact in the quote with which this section begins by noting that abstract symbolic notation only partly captures the properties of the physical world. Crucially, however, it captures those properties that are the specific interest of, in our case, the geotechnical engineer.

In multimodal social semiotic terms, the process of transforming meaning from one semiotic form to another has been termed re-semiotisation (Iedema, 2003) or transduction (Kress, 2000a). In this paper, I will use the term transduction. Of course, the notion of transduction does not constitute the entirety of a social semiotic perspective; rather, it is a useful point of departure in that it helps to explain how meaning undergoes shifts as it proceeds along the semiotic narrative of engineering practice, and how these shifts in the representation of meaning point to specific communicative and representational interests. This is possible because different representational modes offer different potential for meaning-making. In other words, some semiotic forms are better for representing specific meanings than others. Indeed, a plethora of representational means have arisen precisely because each is "embedded in distinct ways of conceptualising, thinking and communicating" (Kress, 2000b: 195). As such, the selection of a particular form of representation is never arbitrary; rather, it reflects the particular interests of an individual or group.

This argument is best explained by way of an example, albeit a rather mundane one within geotechnical engineering. One of the fundamental aims of soil mechanics is to classify soils in terms of their properties so as to make judgements as to their suitability for particular construction applications (Verruijt, 2012). As such, the study of soil mechanics is replete with laboratory and field methods for understanding the behaviour and properties of soils. One of the first laboratory tests that geotechnical engineering students are introduced to is sieve analysis, which enables determination of the range of particle sizes that make up a soil sample and, in turn, allows for broad classification of the soil as either a sand (if it is primarily made up of large particles) or as a clay (if it is primarily made up of smaller particles).

The sieve analysis laboratory test is a simple one. A sample of the soil under investigation is taken and passed through progressively finer sieves. These sieves have standard sizes (75mm, 53mm, 37.5mm and so on, down to 0.075mm) and they must be vibrated so as to ensure that only those particles that are larger than the sieve size remain. The sample remaining on each sieve is measured and tabulated. An example of the resultant product is provided in Table 1, which is taken from the results of a sieve analysis undertaken by student-participants in a previous study into the social semiotic practices of civil engineering study (see Simpson, 2015).

Table 1. Tabulated results of a sieve analysis undertaken by student participants

A Sieve Size (mm)	B Mass Retained (g)	C % Retained	D Cum % Retained	E % Passing
9.5	5.5	1.2	1.2	98.8
4.75	68.3	14.3	15.5	84.5
2	143.1	30.0	45.5	54.5
1.18	25.8	5.4	50.9	49.1
0.6	13.6	2.8	53.7	46.3
0.425	8.9	1.9	55.6	44.4
0.3	15.7	3.3	58.9	41.1
0.15	35.9	7.5	66.4	33.6
0.075	17.0	3.6	70	30
Pan	143.6	30.1	100.1	-0.1
Total	477.4			

In Table 1, Column A lists the standard sieve sizes used in the test, ranging from a hole diameter of 9.5mm to one of 0.075mm. Column B indicates the mass retained on each of the sieves. The amount indicated in the 'pan' row is the total weight of those particles that passed through all the sieves and were therefore smaller than the smallest sieve.

Table 1 constitutes a representation of the data gathered through the sieve analysis laboratory work. It is undertaken using the particular coding scheme adopted by the profession for this purpose, namely, a numeric-tabular representation. The selection of a numeric-tabular representation is not arbitrary; it facilitates manipulation of the data obtained according to specific disciplinary interests. This can be seen in the remaining columns. In Column C, the raw numbers obtained in Column B are converted to percentages of the total soil sample. In Column D, those percentages are converted into a cumulative percentage which indicates the total percentage of the soil that is larger than each sieve size. (For example, 58.9% of the sampled soil is larger than 0.3mm in diameter.) Finally, in Column E, this cumulative percentage is inverted so as to give the percentage of the sample that is smaller than each sieve size. (Again, if 58.9% of the sampled soil is larger than 0.3mm, the remainder, 41.1%, is smaller than 0.3mm.)

This example is useful in illustrating how these representational moves, or transductions of meaning, rather than being arbitrary, reflect the particular interest of soil mechanics. In this case, the affordances of the numeric-tabular representation are leveraged so as to manipulate the gathered data (the real world) in order to determine the proportion of soil particles that are smaller than each sieve size. This procedure is standard – and, as already mentioned, rather mundane – practice in soil classification; yet, it nonetheless points to a specific interest in smaller particle sizes. Often, a key interest of soil mechanics is the determination of the proportion of 'fines' (small particles) in a soil sample. This is because such fines can have specific properties that have significant impact on potential construction work undertaken in, on and around them. Put differently, the suitability of soil for construction is sometimes determined by the proportion of fines therein. To this end, the construction of Table 1 results in the observation that 30% of the sampled soil is made of particles that are smaller than 0.075mm in diameter. This is not random, or arbitrary; rather, it is often the specific interest of the geotechnical engineering. This information, along with much more information not discussed here, allows the geotechnical engineer to make determinations as to the suitability of a soil for use in a particular construction project.

This example speaks to the general interest of most work with a scientific heritage: gathering and documenting observations, before producing, organising and reproducing representations of these observations (Juhl & Lindegaard, 2013). More importantly, the semiotic resource utilised – the numeric tabulation – acts to highlight particular information that is tied to the specific interest of, in this case, geotechnical engineering. However, these activities are rendered meaningless to students if the particular disciplinary interest in undertaking them is not made clear, as these practices realise the "social, cultural and historical structures, investments and circumstances" (Iedema, 2003: 50) of geotechnical engineering, in that they are embedded in the broader norms and values of the discipline (Titscher et al., 2000). Thus, the first argument of this paper is that students can be given greater access to the interests and values of the discipline if the ways in which these interests and values are embedded in representational work is made explicit. In so doing, students may experience activities such as the sieve analysis example described here as more meaningful. This pertains to what is *signified* by the representations used in geotechnical engineering. As the following argument will show, the *signifiers* used also require unpacking.

4 Social semiotics and unpacking disciplinary representations: A second argument

Social semiotics is interested in understanding why and how meaning is constructed in particular ways in particular contexts. As shown in the previous argument, this allows for a focus on the particular interest in what is being signified within a particular disciplinary representation. However, social semiotics also offers a lens through which to unpack the highly particular and often highly specialised representations developed within a given field – that is, to unpack the signifiers themselves. For example, recent work in science education by Airey and Eriksson (2019) has shown how social semiotic analysis of the Hertzsprung-Russell Diagram, a central resource in the field of astronomy, can assist in unpacking the peculiarities of this particular representation and, in so doing, overcome potential barriers to students' disciplinary learning.

The same can be done with representations in geotechnical engineering. For example, the data gathered in the previous sieve analysis example is often subsequently re-materialised through a further process of transduction by way of development of a particle size distribution curve, or grading curve. Such a curve is shown in Figure 2. (Note: this figure is an example, and is not the grading curve for the data obtained above; the student participants were not required to draw a grading curve for the data obtained in the above exercise.) As can be seen in Figure 2, the particle size distribution curve is drawn on a semi-logarithmic graph. This means that one of the axes makes use of a logarithmic scale, rather than a natural scale.

This is done because it is not possible to fit the wide range of particle sizes on to a sheet of graph paper using a natural scale in such a way that the graph would be easy to interpret. To explain further: the particle sizes range from 0.075mm (and even lower) to 75mm (and even higher), which represents a thousand-fold variation (and even greater). In a natural scale, the length representing 75mm would therefore have to be a thousand times greater than that representing 0.075mm which would be difficult to achieve within the confines of one page of A4 graph paper, which measures only approximately 300mm in its longest direction. A logarithmic scale, on the other hand, allows certain intervals of space to represent a ten-fold increase in what is being represented. In the example provided, the distance between 1 and 10 (on the x-axis, or horizontal axis), for example, represents such a ten-fold increase. That same distance applied anywhere else along the axis represents not a specific value, but a ten-fold increase in values. Space, herein, represents a proportional increase in value, and not values themselves.

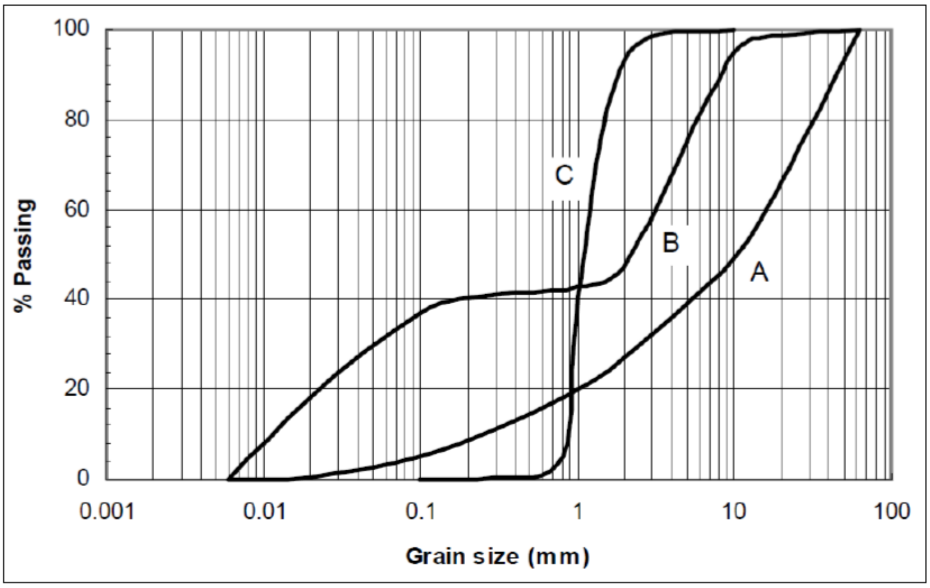

Figure 2. Particle size distribution curves for differently graded soils (Sivakugan, 2000: 3)

In addition, the particle size distribution curve affords the creation of new meanings not possible from the tabulated results. This is made possible by leveraging the particular affordances of a line graph. Whereas numeric tabular representations represent values as discrete, where the intervals between values are not rendered meaningful, line graphs represent data as continuous where the intervals between values consist of innumerable observable and definable values. This allows for the kinds of determinations required to calculate metrics such as the uniformity coefficient, the coefficient of curvature, grading modulus and effective particle size. Thus, the process of transduction not only reflects particular interests but also shifts the meaning potential of the information being represented as different modes offer different potentials and afford different kinds of expression (Kress, 2000a). However, this is only possible if students understand the meaning-making function of the representation being used. In this instance, they need to understand the nature and affordances of a logarithmic graph as well as the differences between discrete and continuous values.

Thus, the second argument of this paper relates to the fact that the representational practices of geotechnical engineering transform concepts and processes into symbolic and visual forms (Nathan et al., 2013). Students require access to these symbolic and visual forms, which relies on classroom strategies that unpack these representations in order to promote understanding on the part of students. In so doing, this paper affirms the finding of Airey and Eriksson (2019) that pedagogy needs to introduce and emphasise the basic features of disciplinary representational resources, and that these features should not, instead, be taken for granted. In the particular example referred to in this section, this may require discussion of the nature of a logarithmic scale, and the difference between discrete and continuous values.

5 Social semiotics and making student understanding visible: A third argument

So far, this paper has argued that the social semiotic question of how meaning is constructed in particular social contexts allows for identification of the particular interest of geotechnical engineers in what is being signified in representations used within the profession, as well as for the need to unpack these representations to assist student understanding. As such, the focus thus far has been on what practitioners do. However, social semiotic analysis can also be applied to the texts that students produce and, in so doing, can be used to make signs of student understanding or misunderstanding visible – an important goal of geotechnical engineering education.

By way of example, let us consider another important property of soils. The way fine particles interact with water is a crucial property of soils (Verruijt, 2012). This is because small particles, or fines, form a plastic-like substance in the presence of water and may expand and contract as water flows into and out of an area with soil that has a high proportion of fine particles. To this end, laboratory tests conducted on soil samples often include determination of the Atterberg limits of a soil. The Atterberg limits determine the water contents at which soils with fine particles lose their solid-like properties and begin to act more like plastic or, ultimately, fluid. One of the most commonly used of the Atterberg limits is the liquid limit (LL), which determines the water content beyond which a soil behaves more like a liquid.

As most geotechnical engineers would know, the Casagrande liquid limit test is undertaken using a device that makes a groove in the sample. The tester turns the handle on the side which causes the device to apply taps to the sample and the number of taps required for the groove to disappear is recorded. The sample is then dried to remove all the water from it. Again, these results are recorded in tabular form. Table 2 is a reproduction of the results obtained by one student-participant as they completed this experiment. As can be seen in Table 2, the test is repeated 6 times, twice each with three different soil-water consistencies. In the table, Row A indicates the number of taps recorded before the groove was closed. Row B indicates the tin number, which is provided only for record-keeping purposes and for ensuring that the samples are not mixed up. Row C indicates the measured weight of each sample, before drying and including the tin in which it is placed. Row D provides the measured weight of each sample, after drying and still including the tin in which it is kept. Row E indicates the measured weight of the tin itself, which would have been obtained before the sample was placed into it. These first five rows therefore record information measured in the course of the laboratory experiment. They are, as was illustrated previously, materialised representations of the information obtained from the laboratory work. They are, in accordance with the terminology previously used, instances of reading the world, and constructing representations thereof that reflect the particular interests of geotechnical engineering as a discipline.

Again, the particular affordances of tabulation are employed so as to manipulate the readings obtained. To this end, Row F indicates the calculated mass of the water in the sample, which is determined by subtracting the mass of the dry sample from that of the wet soil sample. Row G provides the calculated mass of the dry soil by subtracting the mass of the tin from the mass of the dry sample with the tin. Row H presents the moisture content (labelled M.C. by the student-participant) which is determined by calculating the mass of the water (Row F) as a percentage of the mass of the dry soil (Row G). Finally, Row I presents the average moisture content for the two tests done on the soil at each of the three consistencies. As was the case with the sieve analysis, the results of this process are then represented in the form of a line graph, another transduction of meaning. The line graph in Figure 3 was produced by the same student-participant; it represents the number of taps (shown on the horizontal axis) and the calculated average moisture content (shown on the vertical axis), that is, the information from Rows A and I in Table 2.

This example is relevant to the current argument when attention is drawn to the fact that the student concerned obtained an outlying result in the sixth test (a moisture content of 15.75). This outlier is circled with a red, dashed line. The student ought to have repeated the test, given that the result obtained is obviously inaccurate. However, instead, the student chose to ignore the test result and, in Figure 3, took the average moisture content to be 20.22 (the result from the fifth test), simply scratching the sixth test from the record, so to speak.

Table 2. Tabulated results of a liquid limit test

A	No of taps	17	17	28	28	34	34
B	Tin No	33	34	35	36	37	38
C	Tin + Wet Soil	42.04	37.96	32.23	29.34	33.68	38.98
D	Tin + Dry Soil	38.64	35.32	30.66	28.28	31.87	36.82
E	Tin	22.97	23.08	23.08	23.17	22.92	23.11
F	Water	3.4	2.64	1.57	1.06	1.81	2.16
G	Dry Soil	15.67	12.24	7.58	5.11	8.95	13.71
H	M.C.	21.7	21.57	20.71	20.74	20.22	15.75
I	Average M. C.	21.64		20.73		17.99	

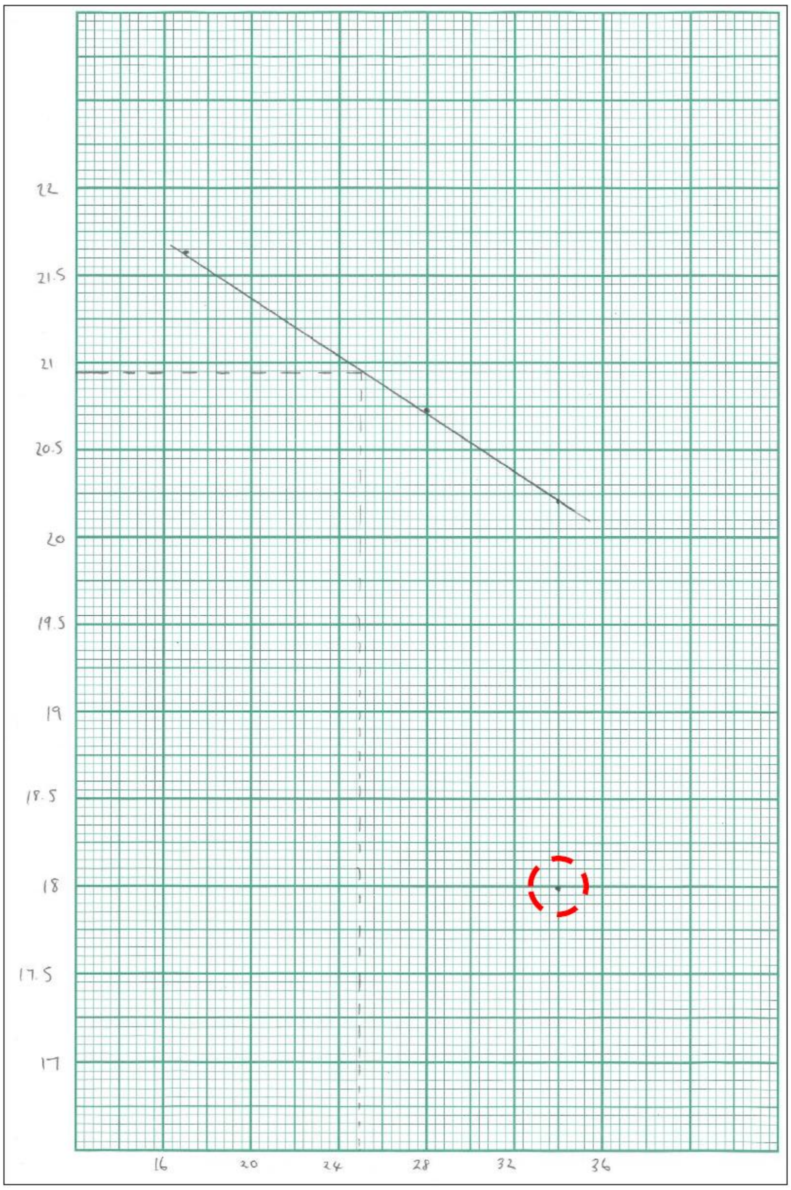

Figure 3. Line graph used by student-participant to determine liquid limit

During a subsequent interview with the student, he indicated that he did this because he knew that the results of the Casagrande procedure should yield a straight line. Although he plotted a point for average moisture content for 34 taps (17.99), he realised that it would be impossible to construct a straight line from the findings obtained. When asked why he did not repeat the test, he indicated that he only realised his results were flawed when he came to draw the line graph, by which time it was too late to repeat the test. It became evident, therefore, that, while undertaking the experiment and tabulation, the student did not understand how the values being recorded were meant to relate to each other. The student, in this example, displayed limited understanding of the purpose of the experiment and of the values obtained and represented in the table, and was only able to assign meaning to the values when representing them in the form of the line graph.

Social semiotic analysis acknowledges that individuals produce texts as per their specific interest in and understanding of that which they represent (Kress, 2000a). As such, when students produce texts that do not meet disciplinary standards and expectations or, more simply, contain errors, these point to a lack of understanding of the subject matter. In this way, social semiotic analyses view ‘mistakes’ as evidence of understanding and misunderstanding. As students are absorbed into a ‘culture’ of representation, the more their representations are socially and culturally shaped (Kress, 2000a), the fewer errors they make, and the more invisible their learning becomes.

6 Conclusions

This paper works from the point of view that geotechnical engineering work is social semiotic work, in that it seeks to represent data gathered from the physical world, either in the laboratory or in the field and to represent this information through processes aimed at transduction of meaning, using the affordances of various representational modes in order to achieve particular aims and interests. The examples provided have all focused on an initial process of ‘reading the world’: this process gathers data about the physical world which then becomes input for subsequent practices aimed at manipulating these data, which in turn become input for further practices aimed at effecting changes in the natural and/or built environment. Such social semiotic analysis of geotechnical engineering education offers unique insight into the practices that underpin the discipline and, in so doing, offers significant potential for improving pedagogy.

However, this paper has not extended the analysis to design and construction (those processes aimed at moving back into and effecting change in the world). Moreover, the paper has considered rather simple examples of geotechnical engineering, albeit that the examples selected are quite typical of initial activities that might be undertaken as students begin their studies in geotechnical engineering. Finally, this paper has not attempted to develop concrete strategies that can be deployed in the geotechnical engineering classroom. Instead, this paper should be read as an invitation to geotechnical engineering educators to consider the potential of the social semiotic approach presented herein and take the ideas forward by applying it to more complex activities, and to a range of classrooms.

Geotechnical engineering education researchers should make attempts to imbue their analyses and findings with theoretical – as well as methodological – rigour. Social lenses, such as that provided by social semiotics, may offer geotechnical engineering education scholarship robust vocabularies for talking about teaching and learning that may, in turn, elevate their analyses and findings above mere anecdote or intervention. They may offer depth of understanding of the causal factors that hinder student understanding.

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