論　文

Applying molecular and structural theory to comprehending classroom dynamics and the learning transaction: Observations from the Japanese tertiary sector - a working paper

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教室のダイナミクスと学習相互作用
―分子・構造理論の教育への応用試論―

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日本の高校の教室では、クラスの人数に関わらず、生徒の座席はあらかじめ指定されており、定期的に前列から後方へローテーションする方法が一般的であり、この方法は、多くの西洋諸国の教室でも通例となっている。しかしながら、日本の大学、短大、高専などといった高等教育機関では、このように国際的にも慣例となっている座席のルールとエチケットとは、極めて対照的な状況を観察することができる。すなわち、今日多くの日本の大学において、特に日本人教師の担当する授業の教室では、学生は教師からできるだけ離れた後方の席に座る。多くの大学の教室は、特に古い建物では、100 人の学生がゆったり座れるほどの広さがあり、しかも 1 クラスの平均的学生数は 15 ～ 30 人であるため、その結果生じる空間（隙間・すきま）あるいは「教育的間隙」*pedagogical dissonance* は極めて顕著であり、より詳細な考察と検討に値する。つまり、この「教育的間隙」*pedagogical dissonance* は、まさに「コミュニケーションを阻害するもの」*communication decay* としてはたらくこと、すなわち教師＝学生間の「教育・学習相互作用」*learning transaction*　の中核を蝕むものとなるからこそ、これに注目し研究する意義があると言える。筆者は、このコミュニケーション阻害空間こそ、学習環境の中で生じる他の全てのものに悪影響を与える元凶となっていると論断する。本研究は、この現象を究明するために、二つの枠組みを用いて、教室内の座り方の重要性を認識するとともに、授業担当者に実践的な手引きを提供することを目指すものである。第一の枠組みは、分子科学からのもので、分子のグルーピングの性質に基づき、多様な座席のシナリオに応じて、そのグルーピングが、どのような枝分かれ（網状拡大組織）を持ちうるかを総合的に理解することを助けてくれる。第二の枠組みは、構造工学からのものであり、強度と結合の観点から、学生たちの座り方を解釈することを可能にする。本研究は、試行的予備的研究であり、その最初の探索であるため、未だ量的データを提示するには至っていないが、この分野における問題の所在を明らかにし、直接的参与観察の記録を質的データとして示すことを通して、教室環境の改善方法を提案し、座席の座り方やグルーピングのスタイルがもたらす教育への影響についての学術的研究を促すことを目的としている。

Keywords
Japanese Tertiary Education，日本の高等教育機関、Japanese Education，日本の教育、Japanese

Contemporary Society，現代日本社会、Classroom Management，教室の運営、Structural Dynamics，構造的ダイナミクス、Structural Theory，構造工学理論、Molecular Theory，分子理論

Style Note

i）The author makes extensive use of footnotes as a postmodern stylistic and literary tool to present underlying contextual data and sub-narratives; a secondary conversation which aims to support and enhance the dominant narrative.

ii）To aid pronunciation for the non-Japanese reader and to retain authentic transliteration this paper rejects the c.19th Hepburn system which it deems to be imperialistic in nature in so far as it applies a Western frame to non-Western languages and distorts original phonics in the process. Besides this, it is fundamentally flawed in both assisting non-Japanese to read Japanese and in recording an accurate transliteration of Japanese characters and scripts. Romanised Japanese（*Roma-ji*）is therefore written according to how the characters are actually rendered in the Japanese language. A *kan-ji* compound, e.g. 日本（*ni-hon*）- “Japan”, will be hyphenated to indicate that it is comprised of two interdependent characters. Likewise 日本人（*ni-hon-jin*）- “Japanese person”, is hyphenated accordingly to indicate that the "single" word is actually comprised of three distinct characters. *Kata-kana* words will be written literally in accordance with the phonetics of the elemental kana script, e.g. knife（ナイフ）will be written as na i fu not *naifu*. When a Japanese word is presented it will be done so in the following order; *Roma-ji: kan-ji: kana*

i）Introduction

The author argues that in its most basic form, the learning transaction comprises four distinct elements:

1）*Facilitation*（F）- the methodology by which learning or understanding is mediated,
2）*Content*（C）- the core substance of what is to be learned and comprehended,
3）*Environment*（E）- the physical locus where learning and the use of learning takes place,
4）＋α - the intangible elements of learning, facilitation, and group dynamics.

As the graphic below depicts, whilst the learning environment is not the dominant component per se, it is the foundation stone of all education, undergirding all other aspects. Although long ignored by scholars who have tended to focus on the educand, the facilitator, the curricula, and learning materials, without its careful and due consideration, however, it is highly improbable that any meaningful and sustained scholarship or any genuine learning will occur[1].

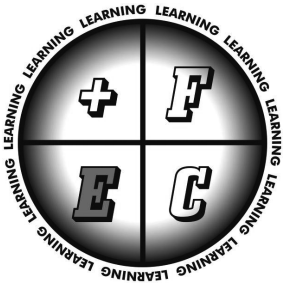

Fig. 1: The author's perspective on the external component elements of the 'learning transaction'

When the author first began teaching in the Japanese tertiary sector, more than two

decades ago, what struck them most forcefully were three factors - factors which still resonate to this day. Firstly, was the nature of Japanese Higher Education (HE), which was, and still remains in actuality, much closer aligned to global standards in Further Education (FE) not HE[2]. Secondly, the learning approaches generally adopted by both native and non-native facilitators were founded on *pedagogy* not *andragogy*, that is they were extensions and replications of modes, methods, and materials used in the teaching of children at the primary and secondary levels, and neither relevant nor wholly appropriate for the teaching of (young) adults at the tertiary level. This point has become much more important since 2022[3], because since then, even first-year university educands in Japan are legally regarded as adults. The final point was the lack of passion, motivation, desire, and inquisitiveness amongst the Japanese educand cohort[4]. Derived from this was, and is, how educands seat themselves within the learning environment and how they prepare for and conduct themselves for their rôle in the learning transaction to take place.

Deconstructing the final comment above, we are then led into the realm of seating. Seating in Japanese tertiary classrooms invariably follows one predominant pattern, that is educands enter a classroom and usually sit as far away from the facilitator as possible. At the most basic level, as a direct result of their seating choices, students are unable to see the board clearly or hear the facilitator when speaking at a normal volume. At the more intangible level there is invariably a significant distance between the facilitator and the educands, a kind of *pedagogical dissonance* which occurs as a direct result of what the author maintains is poor seating behaviour. What occurs as a result of the dissonance is essentially, a fracturing of the class into

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[1] At its most basic level any classroom practitioner will attest to the fact that if the room is too hot or too cold this has an impact on an educand's concentration and attention spans. If the seating is uncomfortable educands get fidgety and if the furniture cannot easily be moved, or impedes free movement educands cannot sit together in small groups or approach the facilitator unfettered. It is a moot point to note that such occurrences have an immediate negative impact on educands which in turn then impacts upon learning. As Cheng (1994) notes, "(The) physical environment and psychological environment are both important; a good classroom environment is highly correlated with student affective performance." It is, therefore, no accident that progressive educators such as Montessori, Steiner, and A.S. Neil reconfigured the learning environment as the starting point for maximising productive learning.

[2] The primary distinction the author draws between these two spheres of education, is that HE is firmly rooted in scholarship being the keystone of academia. FE, on the other hand, is an extension of the vocational school, technical school, or polytechnic system which has its roots in employment, business, and commerce. It could be said the HE provides the 'thinkers' whereas FE provides the 'doers.' In Japan HE has nothing to do with scholarship or academia, and everything to do with employment. In addition to this point, despite any efforts by *Mon-bu-ka-gaku-sho* (文部科学省、もんぶかがくしょう) the far-reaching Ministry of Education, Culture, Sports, Science and Technology, there are no overarching national standards in Japanese tertiary education, no bona fide moderation, no consistency of grades, no academic parity or academic rigour, nor any of the other tenets prevalent in societies with functioning academies. Because most universities in Japan are private, they are able to offer degrees (even terminal degrees) at a level they see fit and not at any coherent or regulate national standard of quality and parity. Because of this situation almost all of the nearly 800 Japanese universities and colleges which comprise Japanese HE cannot participate in any genuine global standards.

[3] On April 1st 2022 the Japanese Law was amended to reduce the age of majority from 20 to 18.

[4] This was and invariably is present in educands from other Asian countries we find in the Japanese classroom, notably those from Korea and China.

two groups; the facilitator（us）and the student cohort（them）. If such a fracture occurs, especially at the start of term, then the chances of reattachment and bonding are significantly impaired and reduced. In such a case, what will likely occur throughout the term will not be a genuine inter-dependent learning exchange and experience, rather, a mutual tolerance and an acceptance of the situation. The result of which will not be genuine and meaningful learning on either the educand or the facilitator's part. The way most Japanese facilitators（we should perhaps call them, lecturers）attempt to bridge this divide is not through direct classroom management, by taking control of their own class and actively rearranging the educands. What pervades in lieu of such professionalism[5] is acute impotence and the inability to directly deal with this situation; something which is a universal Japanese malaise[6] extending beyond the classroom into contemporary society too[7]. What transpires, therefore, is that rather than reorganise the educands, the ineffectual lecturer allows their class to be controlled by the whims of their educands. Because of the pedagogic dissonance which inevitable occurs they then need to over-compensate, and in order to communicate at（not to）the educands, the lecturer reverts to using a microphone as a way to bridge the physical distance. Most tertiary classrooms and support offices in Japan, regardless of size, contain microphones for the staff to use and so the Japanese tertiary lecturer[8], attempts to use physical/amplified sound as a means to cross a ethereal/human or social divide.

Fig. 2: Typical microphones available in all Japanese universities

[5] We should pause here to note for a moment that if such behavour was observed during any teacher training evaluation, or class observation for the purpose of assessing professional competence and teacher aptitude, no regulated institute nor professional organisation anywhere in the developed world which monitors or evaluates facilitators would condone or sanction such practice as being pedagogically sound and a recognisable or appropriate approach to classroom management. Such practice is universally regarded as unacceptable, regardless of culture.

[6] The ideas of willful ignorance; Japanese, *mu-shi*（無視、むし）or dodging ones responsibility; Japanese, *mu-seki-nin*（無責任、むせきにん）are two words/phrases which aptly describe this widespread cultural phenomenon.

[7] Contemporary society, Japan has developed a culture of laziness and not wishing to be bothered by even the smallest thing which may be perceived as troublesome; Japanese, *men-do kusa-i*（面倒臭い、めんどくさい）. The slightest sign of requiring extra work, effort, or genuine perseverance produces the swift retort '*men-do kusa-i!*'（this can be translated as 'really?' 'are you kidding me?' or 'I cannot be bothered' in response to having to perform a task）from many Japanese, certainly those who have yet to enter society.

[8] From more than two decades of primary observations in the Japanese tertiary environment the author has never once seen a Western facilitator using a microphone.

This research uses two frames to investigate and interpret seating phenomenon as a means of both understanding the importance of an individual's placement within a classroom and offering guidance to practitioners. The first frame is drawn from molecular science and offers us help in comprehending the nature of molecular structures and how their formation effects their strength and rigidity, and what ramifications this may have for various seating scenarios. The second, drawn from the field of structural engineering, allows us to interpret educands' seating in terms of strength and cohesion. As an exploratory piece of research this initial thesis presents no quantitative data, however, scholarship from the above fields coupled with primary longitudinal observational data gathered in the field aim to offer recommendations and critique for both improving the Japanese tertiary classroom environment, and also for further research which may examine the effect of the seating/grouping styles noted herein.

ii) The Japanese 'Education' System & Environment: A Brief Contextual Overview

When Japanese first-year educands enter university they will likely have spent 12 years[9] in primary and secondary education. During that time they will have been expertly 'trained' in two areas, learning and behavioural compliance. In the realm of learning, they will have been taught not only what facts they should remember in order to pass their various stage tests[10], but also how to chunk information for retention in their short-term memory (STM)[11]. In addition to and stemming from this regimented approach to memory and recollection, what Rogers (1969) might categorise as 'cognitive[12]' or *meaningless* learning, all educands who have attended school,

[9] The Japanese education system follows an Americanised pattern: Elementary School (6–12yrs), Junior High School (12–15 yrs), and Senior High School (15–18 yrs).

[10] Each strata of Japanese education's principle focus is passing a test so as to enter as 'good' school as possible in the next phase. Elementary school educands remember facts to pass tests to gain access to 'good' junior high schools, whilst junior high school educands remember facts to pass tests which will give them access to 'good' senior high schools; finally, senior high-school educands remember facts which will allow them to enter 'prestigious' universities. None of these stages of learning have anything to do with actual education per se. An institution's primary focus is simply to get as many educands through to as many high-ranking institutions in the next link of the chain as possible so that the institution itself then becomes attractive and part of the system. Within this kind of 'Educational Amway®,' however, two important factors are invariably overlooked. The first point is that with the Japanese population decline and the number of young people has reached its peak low and so even supposedly 'prestigious' universities are now casting their lines further downstream to fish candidates from lower pools. Secondly, and most importantly is the fact that there is really no genuine higher education or academia in Japan. Japanese Higher Education (HE) is in reality Further Education (FE) [because, like a vocational college, its principle function and purpose it to provide compliant and diligent workers for Corporate Japan], it is not about scholarship, research or learning. Any perception the Japanese may have as to the supposed 'prestigiousness' of a given domestic university is immaterial, because globally the Times Higher Education (THE) World University Rankings 2018, "shows a continued decline of Japanese universities — with only two of them, the University of Tokyo (43rd) and Kyoto University (74th), ranked among the world's top 200 institutions." (Takamitsu, 2017). The entire system of Japanese education, from start to finish appears to be nothing more than a giant ponzi scheme which at its core is simply about training and inducting the citizens to be a white-collar wage slave (salary man [サラリーマン] or office lady [オーエル]) .

[11] The fallacy of comprehension - information disguised as knowledge.

[12] This differs significantly to 'experiential' learning.

whether private or public, within the archipelago of Japan, will also have been inducted into a quasi-military system pertaining to a minutia of rules, expectations, and regulations. Absolutely everything within the Japanese primary and secondary education systems is microscopically regulated by MEXT[13], enforced by schools, maintained by parents, and reinforced by society. This is noted because with this contextual underpinning to hand, the phenomenon of Japanese tertiary seating is all the more confusing. As noted in the abstract above, Japanese educands are well aware of and well trained in the basic routines and demands of classes and formalised schooling, and thus, should be au fait with adhering to institutional expectations. Having been indoctrinated and conditioned for 12 years, why then, when they transfer to tertiary education, should the Japanese learner apparently and immediately 'forget' all their prior inculcations? And why too, should the Japanese tertiary facilitator, who not only knows this, but also knows well the rigorous demands of Japanese society, sanction or validate such obviously errant behaviour? Behaviour which they know will need to be corrected later once the educand enters society - behaviour which will then be fixed and interned, and all the more difficult to correct.

iii) Structural and Molecular Theories: A Very Brief Overview

It should be stated that the author is neither a scientist nor an engineer. Their grasp of molecular science and structural engineering theory is little more than rudimentary. However, even from this most primitive of standpoints it is clear to see that both fields offer the possibility to transpose theories to classroom practice and studies into group dynamics - and thus influence possible learning outcomes. Shortcomings acknowledged, if we look at intermolecular forces (IMFs) which Alviar-Agnew (2019) defines as "the attractions between molecules, which determine many of the physical properties of a substance" (p.5), and apply a graphic interpretation such as the plates below, the hypothesis presented herein should start to become clear. It is immediately apparent that of the three states; solid, liquid, and gas, a solid - where the particles are tightly packed together and arranged in a regular pattern is the most stable and most resilient. As you will see in the plates below (e.g. Figs. 9, 12, and 15) these configurations have the appearance of a dense solid whereas taking the overall pattern of Figs. 4 and 7 it is immediately apparent that these structures are much closer aligned to liquids and gasses and thus less dense, weaker, and with increased volatility. Again, comparing a disparate distribution of educands (the norm) with a closely seated group we can also apply the theory of 'dispersion forces,' that is:

> "forces that develop between atoms in different molecules can attract the two molecules to each other. The forces are relatively weak, however, and become significant only when the molecules are very close.' (Alviar-Agnew: ibid p.7)

[13] MEXT tightly controls all aspects of Japanese education whether private or provided directly by the State. Regardless of where on the archipelago of Japan it takes place and at what institution, all educands educated at institutions (not at home) in Japan will have been educated in a startlingly similar fashion by a universal curriculum administered through a universal, nation-wide schedule. School uniforms, lunches, festivals, events, building design, class style and format &c will also have been coordinated to coincide and be very similar in contents, as are school excursions, clubs, and other extra-curricula activity. In short, if a person has received an education in Japan they will have been taught to a virtually identical curricula with identical (authorised) textbooks by facilitators who have all received their teaching qualifications at regulated universities and thus taught how and what to teach in the same manner.

What is implied by this statement is that given the vast wealth of longitudinal scholarship promulgating the co-construction of learning[14] (Dewey, 1938; Piaget, 1952; Vygotsky, 1978; Wertsch, 1984; Brooks & Brooks, 1993; Elliot et al, 2000), if we assume timid Japanese students, (especially first-year students) have weak (social) bonds, then it makes sense to seat them close together, so that they will coalesce into some form of cohesive learning entity. Given that Van der Waals forces are 'present in all condensed phases' (ibid p.6), if it is possible to maximise the 'London dispersion force' i.e. the attractive force between molecules, we should endeavour to do so. In simple terms, the hypothesis which is being offered here postulates that the closer students sit together, the more cohesive they are and the stronger their bonds will be. With these ideas in place it can then further be hypothesised and proven[15] that there will be an increased probability of better working relations between the educands (and the facilitator), the class will be easier to manage, be more enjoyable, and maximise the learning opportunity. Those classes with gaseous or liquid-type structures will not only be less productive (in reaching learning outcomes), but me more difficult to manage, require more effort and energy on the part of the facilitator (thus be more tiring), and be less fulfilling.

In addition to molecular theory, to a lesser degree, structural engineering theory and material science also have a bearing upon the seating patterns commonly found in the Japanese tertiary classroom. Looking at Figs. 4, 7, and 10 what is immediately evident is that two entities are in existence, the first being the structure assimilating the educands (with shorter bonds) and the second being the facilitator who attaches to the main core by means of much longer bonds. If we think in terms of steel rods and we calculate the tensility, the strength required to hold the elements in place with the minimum risk of failure we could ascertain by exact calculation the load-bearing required in this instance and adjust our rods accordingly. Clearly, however, if we were to construct the 'educand group' as a physical entity, with say, steel rods and concrete blocks and we were to use the same gauge steel rods to then connect the facilitator (at a significant greater distance), then the chance of flexing, bending, and/or failure would be significantly increased. The load-bearing capacity of the steel rod would (at the same dimensions) be unsuitable if applied to greater lengths. Using the incorrect material over a significantly increased distance would massively increase the risk of fracture or failure. To take this theory and assimilate it back to the hypothesis at hand, it is self-evident to state that given normal circumstances if a facilitator wished to interact with a disparate or distant group of educands on a stable footing, that two possible options exist. Firstly the strength and load-bearing capacity of the long bonds would either have to be significantly strengthened (if steel were to be used) or, if those distances were maintained, another material would need to be found which had much greater load-bearing capacity at that distance in that gauge[16]. This being

[14] Whether 'cognitive constructivism' (Piaget), 'social constructivism' (Vygotsky), or 'radical constructivism' (von Glasersfeld).

[15] In addition to the usual feedback elicited from educands by universities, the author has conducted their own anonymous feedback specifically pertaining to their class style. Longitudinally, the most striking comment from students was not the class content, nor the facilitator themselves, rather, the strength of the bonds and the friendships between the educands. Given that at most universities, students attend from all over the nation (and increasingly from overseas too), one of the most important aspects of university life should be the establishing of a learning community and friendship bonds. An organised classroom where students are required to interact will achieve this, a fragmented or disparate classroom will not.

highly unlikely, the then next best option would be to shorten the lengths of the adjoining rods (between facilitator and educand), Even in the latter case, however, the materiality would have to be reassessed to allow for the increased length of the bond between the facilitator and the educand group.

iv) The plates

Presented below are thirty plates presented in clusters of six. Each cluster of six presents a visual depiction of a specific and singular seating configuration often observed in the Japanese tertiary classroom. Each of the six graphics depicts a different focus for the seating pattern being examined: basic class seating, structural interpretations one and two, pedagogical dissonance, and communication decay. Specific information pertaining to each pattern is noted underneath the corresponding graphic and also explained in depth in the appendices, (p.352).

v) Suggested Resolution

In most tertiary classes in Japan, especially where educands are timid and passive, it can be extremely hard for a facilitator to remember everyone whilst simultaneously monitoring their progress and development. Because Japanese educands invariably forget their name-cards, or fail to take them with them when doing small group work, monitoring educands is always a challenge. Coupled to this, that in the age of COVID[17], where their faces are also covered by surgical masks, it can be extremely hard to keep track of educands' progress. In light of this and as a means of directly dealing with the obvious deficiencies demonstrated in most of the seating patterns contained in the plates above, the author has developed a grounded solution. This solution not only solves the problem under discussion, but is also one which simultaneously requires no continual recollection on the part of the educand. In addition, it indicates the educand's time of arrival which is invariably a reflection of one's learning attitude. By having educands first sit at the front of the class, and assimilating time of entry to seating, as depicted in the graphic below, i.e. the first to arrive in class sits in seat No.1, and the last to arrive sits in seat No.20, this provides the facilitator with a useful barometer to gauge 'studentship and learning attitude,' two factors which are elements of the class evaluation clearly outlined in the

[16] Applied to actual classroom practice, what this means in real terms is that if we transpose the idea of (steel) rods into 'energy' or 'effort', if the facilitator were to permit the group to remain at a significant distance, they themselves would have to expend a significantly larger amount of energy (including speaking in a louder voice too) in order to keep attached to the group. If they did not, then the likelihood is that the bonds (rods) would be fractured or broken and in essence the group cut adrift; the class would in effect become two units within a single space. If they did expend more energy then simply mainlining rudimentary levels of communication and cohesion would render the facilitator exhausted. This is likely why most classes conducted by Japanese nationals reject a truly communicative approach and revert to becoming a quasi-lecture where the instructor spends much of their time with their back to the class writing on the board, or hiding behind a lectern.

[17] In actuality this was a problem long before COVID, as educands are increasingly choosing to hide behind their surgical mask. Even when there is a low pollen count, no seasonal illness, and no overt reason to wear a mask, some educands choose to do so. The author recorded this phenomenon in fieldnotes, noting they had never once, in three years seen the face of two educands, one male, one female, as they always wore masks.

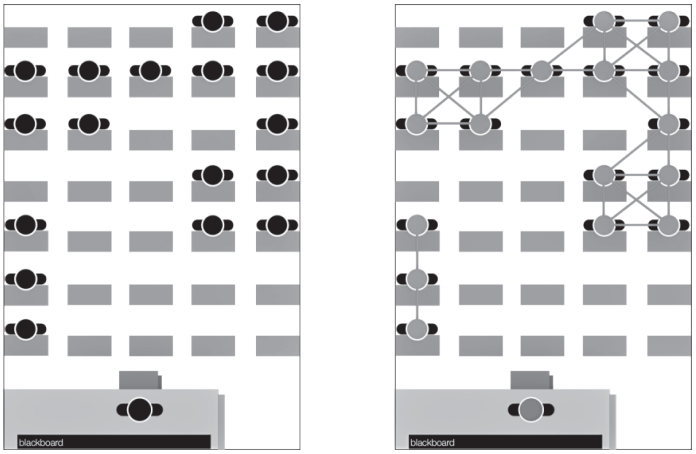

Fig. 3: 17 educands poorly seated（L）Molecular overview（R）. ©Woollock

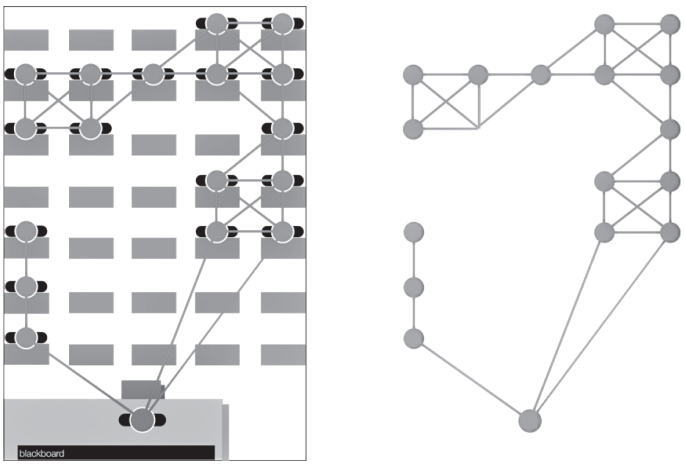

Fig. 4: Molecular overview v2（L）Molecular overview v3（R）. ©Woollock

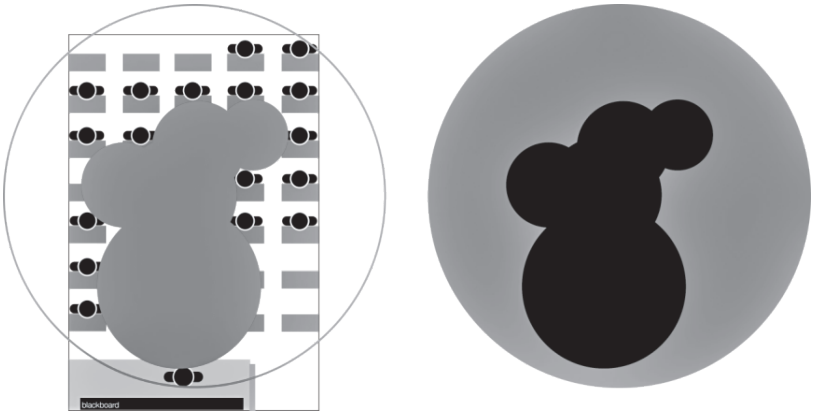

Fig. 5: Pedagogical dissonance（L）Communication decay（R）. ©Woollock

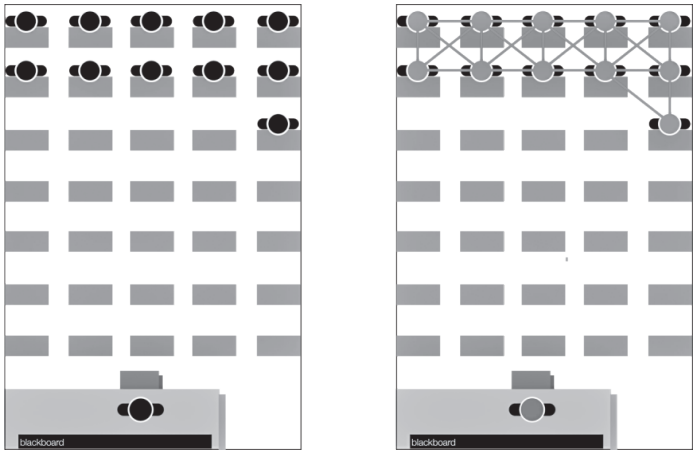

Fig. 6: 11 educands poorly seated（L）Molecular overview（R）. ©Woollock

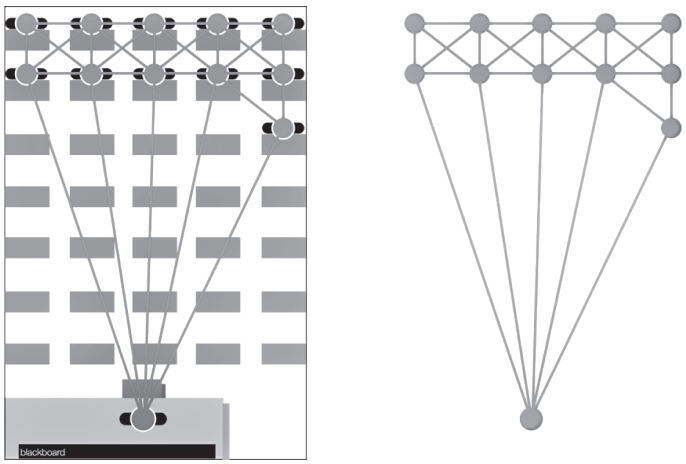

Fig. 7: Molecular overview v2（L）Molecular overview v3（R）. ©Woollock

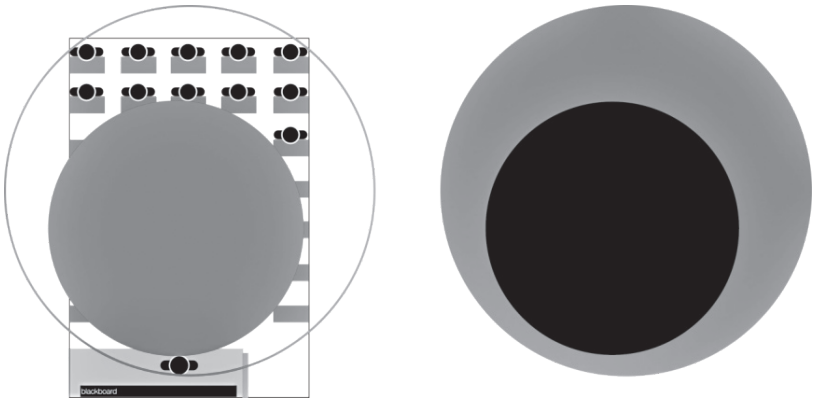

Fig. 8: Pedagogical dissonance（L）Communication decay（R）. ©Woollock

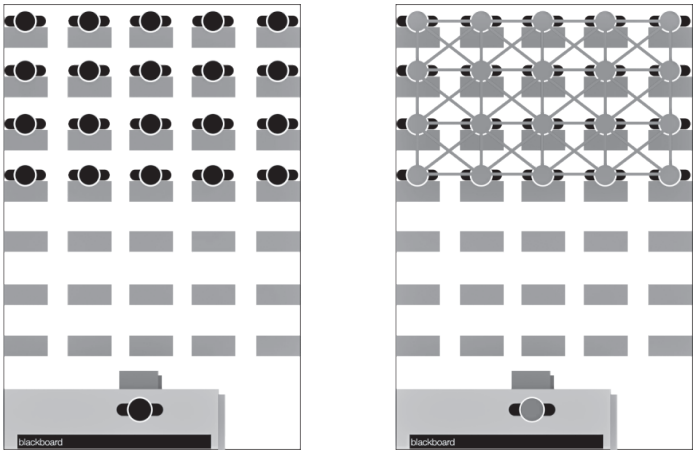

Fig. 9: 20 educands seated at the back (L) Molecular overview (R). ©Woollock

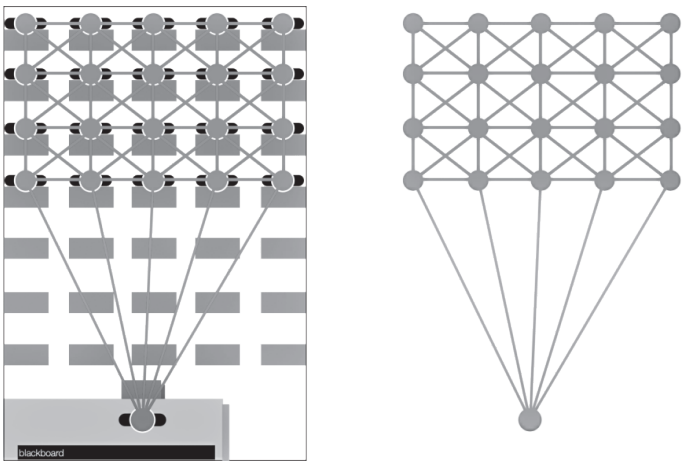

Fig. 10: Molecular overview v2 (L) Molecular overview v3 (R). ©Woollock

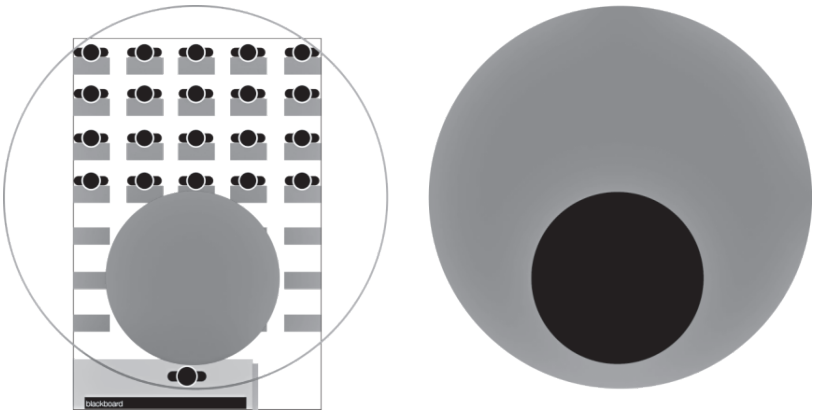

Fig. 11: Pedagogical dissonance (L) Communication decay (R). ©Woollock

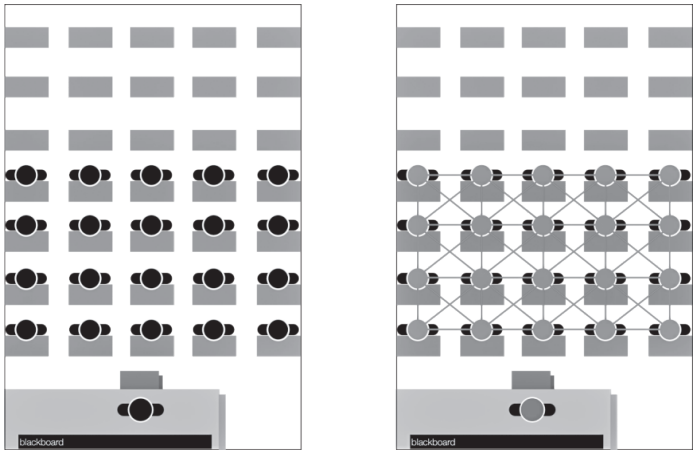

Fig. 12: 20 educands seated at the front（L）Molecular overview（R）. ©Woollock

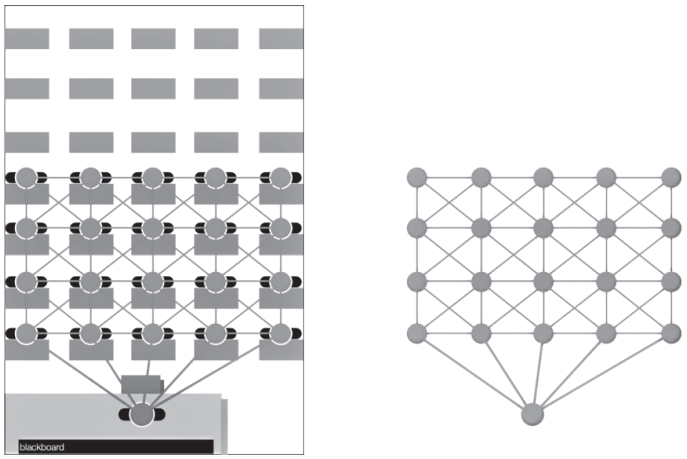

Fig. 13: Molecular overview v2（L）Molecular overview v3（R）. ©Woollock

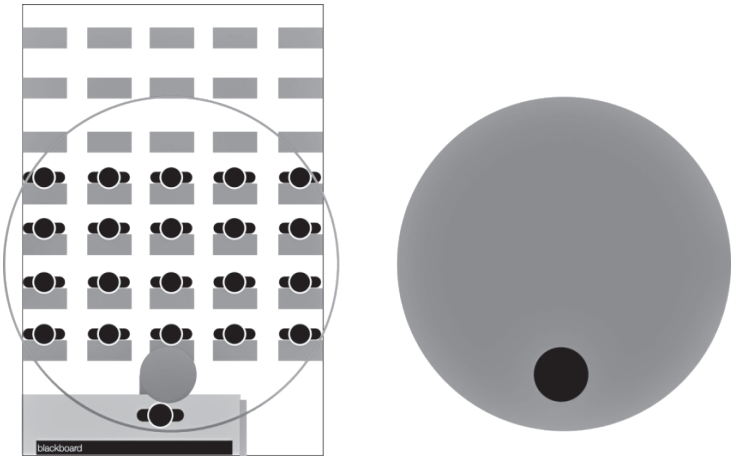

Fig. 14: Pedagogical dissonance（L）Communication decay（R）. ©Woollock

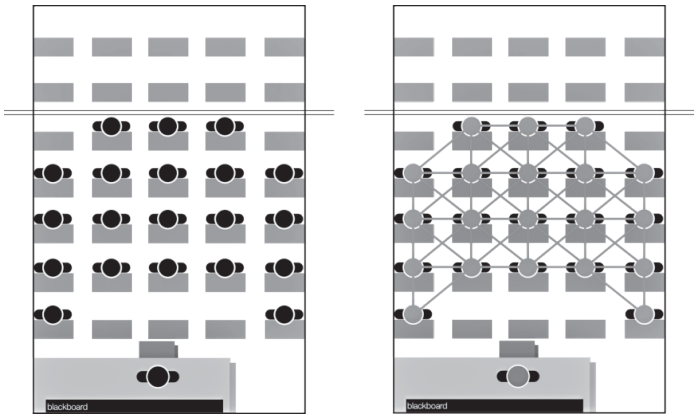

Fig. 15: 20 Well-seated educands（L）Molecular overview（R）. ©Woollock

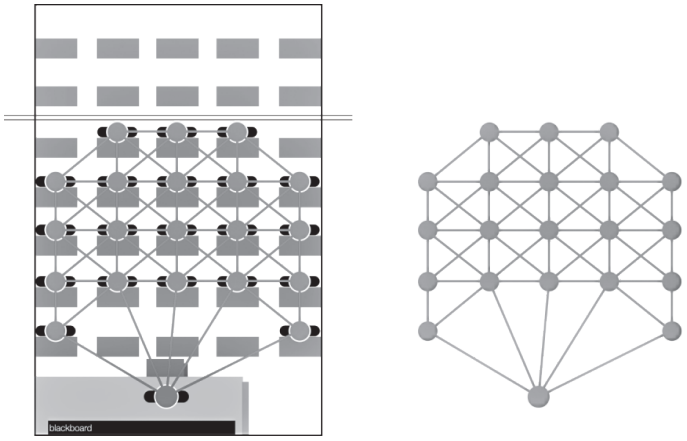

Fig. 16: Molecular overview v2（L）Molecular overview v3（R）. ©Woollock

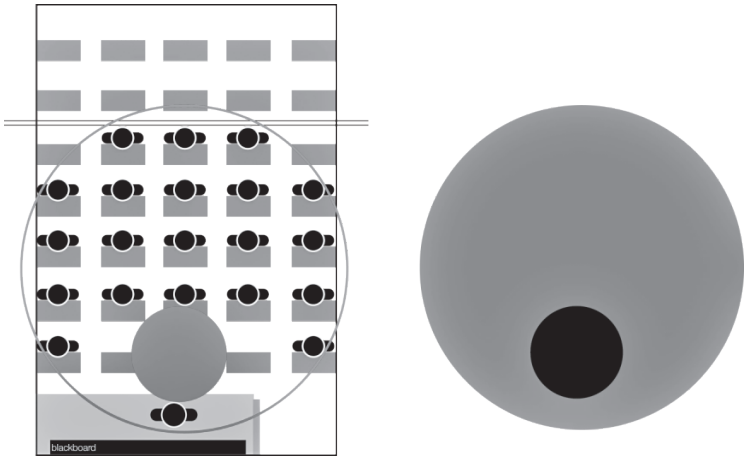

Fig. 17: Pedagogical dissonance（L）Communication decay（R）. ©Woollock

author's class rubric. In addition to this, as a way to help educands to mix, the author also introduced gender separation[18], so if the first educand to arrive is male, then the males will sit on the odd numbers and females on the even numbers or vice versa. This last aspect was introduced because without such a rule, in Japanese tertiary classrooms, males will invariably sit on one side of the class and females on the other. In Japanese universities, educands rarely, if ever, freely mix with the opposite gender; many educands in Japan having attended single-sex high schools are severely lacking in social skills or confidence to interact with the opposite sex[19].

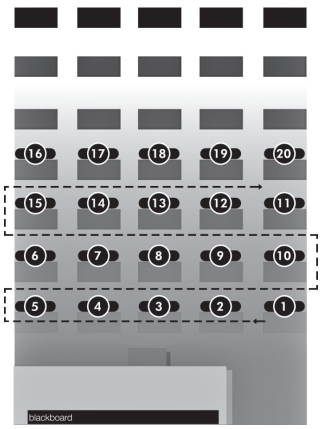

Fig. 18: Seating based upon order of arrival, with seating viewed as 'hot' (front) and 'cold' (rear). ©Woollock

Incidentally, it should be noted here, that from two-decades of longitudinal observations on this matter, the educands who are seated in the lower numbers, the 'hot zone' are invariably the ones who, when their classwork, homework, and learning portfolios are assessed at the end of term, turn out to be firmly in the upper percentile. There seems to be an inverse law which states that averaged out over the term, the lower the educand's seat number, the higher their overall score, and the higher their seat number, i.e. the further they are into the 'cold zone,' the lower their overall score.

vi) Discussion

It is a sad state of affairs, indeed, that one needs to seat adult learners. Having taught adult education classes in Northern Ireland, the author can confirm from experience that he never once had to seat adults in those classes. If anything, the converse was true, and educands would confirm if their chosen seating was appropriate (i.e. would they need to see a screen during the class). That, especially during the first half of a term, valuable time is wasted in most classes in Japan, having to repeatedly ask educands to move to an appropriate seat, (after first sitting away from the front of the class,) is extremely tiresome and unnecessary. Likewise that

[18] This approach is non-discriminatory as educands are free to sit in which ever gender seat they identify with.

[19] In actuality the situation is worse than this and in many instances educands find it difficult to have meaningful interaction with their own gender too. This situation s further compounded by the various cliques, factions, and exclusionary groupings which are extremely prevalent in Japanese education and society; Japanse: *batsu*（閥、ばつ）

Japanese educands seem to 'forget[20]' between classes probably alludes to the perceived importance of a class in their sub-conscious[21]. Finally, that tertiary education in any country, (but more so in Japan) is about bridging the divide between study and work, between childhood and adulthood (Woollock, 2009), and about transitioning to become an active and cognizant member of society, should not be forgotten.

Some might argue, however, that the educand's rejection of logic and reason in their choice of seating[22] is a positive thing, especially in a draconian society like Japan, for it shows their desire to assert themselves and express their individuality. This position is, however, a fallacy. For, even if this apparent act of defiance were an attempt to assert power or agency at the micro level, it is a completely wasted and inappropriate gesture and demonstrates an absolute lack of understanding pragmatics. The 'when', 'where', and 'how' one should exercise choice in society is negated in favour of a solipsistic or narcissistic desire to apparently express oneself unfiltered regardless of context. In the case of the author's class, agency, ownership, and self-assertion are always welcomed and encouraged in the appropriate realm of class participation and preparatory homework. As the author acknowledges the relativity of truth within the 'soft sciences[23]', they use no prescribed textbooks, have no tests, and always encourages multiple perspectives in their classes. The author's approach to adult education is founded on the tenets of Freirean (1970) scholarship together with those of Laudrillard (2002), Lindeman (1926), and Knowles' (1973, 1978) theories of adult education and andragogy. It is within that appropriate and fitting frame, therefore, within those loci where freedom, agency, and self expression should be expressed as intellectual discourse and debate, and not in some petty gesture expressed through 'defiant' seating. In actuality any tenuous link between agency and seating is further nullified because, in the author's class, once educands' preparatory homework has been checked at the start of class, the remaining period will be spent in small group work with fellow educands, sharing their opinions and research, spread out around the classroom. The educands being randomly rotated four or five times during each class so as to maximise their contact with fellow classmates and encourage the less active members to engage.

One difficulty to note here in respect of the practical application of theory is that although the seating arrangement depicted in Figs. 14, 15, and 16 would appear to be the optimum under inert conditions, in actuality, whilst the structure remains the strongest formation, the practicality of seating such educands could be troublesome. Seating Japanese educands is invariable a tiresome practice as noted above, they seem to *forget* from week-to-week exactly where or how they should sit. If one adds into this some abstraction or introduces an organic element such as a shorter back row or dropped-down front row, this is highly likely going to cause a significant problem.

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[20] Whether educands actually forget, or whether they are merely 'playing the fool;' Japanese, *ba-ka fu-ri* (馬鹿振り、ばかふり), is sometimes hard to distinguish in Japan.

[21] The author argues that if a Japanese educand were given a ticket to a concert of their choice, where the seating was unassigned, that it would be highly improbable that anyone of them would choose to seat themselves as far away from the stage as was physically possible.

[22] In actuality, of course, the seating is not assigned per se, and educands are free to sit in the seat which corresponds to the time when they arrive in class. In this way the seating acts as a refection of intrinsic desire and motivation, qualities which should be encouraged and nurtured in the andragogical classroom.

[23] Arts & humanities, social sciences, and liberal arts.

vii）Conclusion

This working paper has demonstrated that if molecular science or structural theory specifically pertaining to bonds and strength within structures is applied to seating in the Japanese tertiary classroom, it provides an extremely illuminating leaping off point for comprehending why much learning which occurs in this domain is ineffectual. Furthermore, and perhaps more importantly, it questions the significant lack of pedagogical (or andragogical) underpinning and negative long-term impact for both learning and future work. How and where educands sit in our classrooms is, as had been amply demonstrated, vitally important and is part and parcel of a facilitator's professional responsibility to ensure the possibility of maximum learning potential. It should be noted that whilst the author does not agree with the commodification of education, nor do they believe that the realm of education is situated within the sphere of the 'service industry'. As has been noted prior (Woollock, 2009), however, and to draw upon a certain Weberian sensibility, faculty members eat because the parents of our educands work and pay tuition fees to the University, who then pay our salaries. In light of this fact we are charged with the responsibilities of providing an holistic education to those entrusted to us, and it is our professional duty to uphold our part in such a bargain. Ideally this should mean that part of this responsibility includes fostering and nurturing educands who can take their place in and activity contribute to global society. The elements which combine to fulfill this obligation are broad and numerous, and obviously include content-specific and scholastic knowledge together with other things such as study skills, technical skills, pragmatics, conduct, manners, and other more micro skills which will assist their smooth transition into society. If we fail to equip educands with these 'life' skills then not only are we negating our responsibilities as educators, but we are also not preparing those in our care to succeed - in fact, the opposite. If, therefore, a facilitator fails to control their class, fails to assume their rightful post as leader, coach or conductor (not dictator), then it is arguable that not only are negligent, but derelict in their duty. Furthermore, given that all faculty members (irrespective of discipline or specialism) share students; in real terms, therefore, the selfish facilitator who fails to manage their class professionally, is simply externalising their own unprofessionalism and inadequacies and passing the buck to the next facilitator who will receive the untrained or undisciplined educand in their class. Ignoring the problem does not make it go away, on the contrary; instead the problem gets worse because such behaviour then becomes ingrained as the educand's *modus operandi*, making it all the harder to correct either in class or when the individual eventually graduates and takes their place in society. Of course, if the truth be told, at the most basic of levels, what is taking place in the vast majority of Japan's tertiary classrooms, is, in effect, not a genuine educational exchange per se, rather, it is a temporary hiatus or imposition in the educand's day as they drift passively towards the day they graduate and take possession of a certificate which will almost certainly guarantee them white-collar wage-slave employment. Before this inevitable conclusion is reached, however, what occurs in probably most Japanese tertiary classrooms is part distraction, and part illusion (McVeigh, 2002; Woollock, 2020) - what Baudrillard might call 'simulacral education;' something which looks like bona fide education, but is little more than a vague pastiche. That established, however, those of us who have traveled from cultures where this is not the case where education is still a prized rite of passage can, and should make efforts to not only maintain our own integrity and our professionalism, but also attempt to lead our educands to higher goals and aspirations.

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Appendices

Appendix 1: Explanation of figures

Explanation of Figures	
Fig.	Descriptor
i (L)	A typical scattered distribution of educands seated around the classroom. In such a format the facilitator is almost ‘playing in the round’ and on such a stage cannot maintain contact with left, right, and back (centre) simultaneously, therefore any
	interaction will alienate at least two-thirds of the class
i (R)	How this distribution appears when converted into a molecular structure
ii (L)	Distribution interpreted from a structural perspective. Note the long connectors between the core and the facilitator are long and weak whereas for the most part the educand inter-group connectors are short and strong(er)
ii (R)	(as above)
iii (L)	The pedagogical dissonance in such a formation
iii (R)	The communication decay in such a formation
Fig.	Descriptor
iv (L)	A few educands at the furthest point from the teacher. Not only is this the ‘coldest’ part of the room, but actually the hardest to hear the facilitator and the hardest to read the board. The chances of meaningful exchange occurring in this hostile configuration are extremely small. If the facilitator wishes to be heard they will have to shout which is not only tiring, but the loss of subtleties in nuance and tone reinforces a militaristic style of ‘education.’
iv (R)	How this distribution appears when converted into a molecular structure
v (L)	Distribution interpreted from a structural perspective. Note the extremely long connectors between the core and the facilitator are excessive and extremely weak.
v (R)	(as above)
vi (L)	The pedagogical dissonance in such a formation
vi (R)	The communication decay in such a formation
Fig.	Descriptor
vii (L)	A real ‘us’ and ‘them’ dynamic is represented in this graphic which depicts the entire class hunkered down in a reverse example of good practice. Not only is this an aggressive structure, but with educands located at the back of the class in such a way as this, it is highly unlikely they can see the board and hearing the facilitator clearly will be near impossible.
vii (R)	How this distribution appears when converted into a molecular structure

viii (L)	(as above)
ix (L)	The pedagogical dissonance in such a formation
ix (R)	The communication decay in such a formation
Fig.	Descriptor
x (L)	Almost optimum seating. Depending upon the built environment and space available the front row can always be pushed back a little. In the case that the class will be spent in small-group work this is immaterial as they will be distributed in small groups evenly throughout the classroom for the duration of class. If the class remains as is, this
	formation provides a very strong structure which conveys positive qualities like attentiveness and engagement. It is impossible to 'hide' in this formation and easiest to hear the facilitator, read the board and interact with peers.
x (R)	How this distribution appears when converted into a molecular structure
xi (L)	Distribution interpreted from a structural perspective. Note the even shape of the educand core is attached to the facilitator by a number of connectors which are evenly distributed and not too long - this gives excellent strength.
xi (R)	(as above)
xii (L)	The pedagogical dissonance in such a formation
xii (R)	The communication decay in such a formation
Fig.	Descriptor
xiii (L)	Near optimum seating with the educands seated at the front of the class in a gentle curve. All educands should be able to hear the facilitator and see the board. The result of the curved shape is a structurally strong group that almost requires the facilitator to join for near maximum strength. The lack of corners here renders the shape almost circular.
xiii (R)	How this distribution appears when converted into a molecular structure
xiv (L)	Distribution interpreted from a structural perspective. Note the round shape of the educand core is attached to the facilitator by a number of relatively short connectors which are evenly distributed - this gives excellent strength and cohesion to the structure.
xiv (R)	(as above)
xv (L)	The pedagogical dissonance in such a formation
xvi (R)	The communication decay in such a formation
Fig.	Descriptor
xvi	How the author arranges seating in their classes. The assignment here is based upon time of arrival. Where possible gender too is also a factor in this seating, e.g. If the first educand to arrive is female then the odd numbers will be occupied by females and the even numbers by males, or vice versa.