

## **Title: Cybernetically informed pedagogy in two tertiary educational contexts: China and South Africa**

Structured abstract:

### **Purpose**

Discussing cybernetics as an enacted practice within specific contexts, the paper identifies key similarities and differences of two cybernetically informed approaches to tertiary education in the distinct contexts of China and South Africa.

### **Design/methodology/approach**

Making explicit and comparing two cybernetically informed educational approaches, we identify shared aspects as well as differences arising from their practice in social contexts that have differing norms and values.

### **Findings**

We find that conversational settings for learning, immediacy of feedback, the key role of the teacher, and assessment strategies that are matched to cybernetic learning and teaching strategies all constitute shared vital aspects of cybernetically informed teaching that are valid across two distinct educational contexts. Enacting these key aspects however requires careful adaptation to local contexts.

### **Research limitations/implications**

Primarily qualitative in nature, this study is limited to the examination of two bodies of work conducted independently of each other in differing contexts.

### **Practical implications**

Arising from long-term examination of applied educational practice, findings discussed in the paper are intended to inform similar practice in other contexts. We however emphasise that enacted ethical practice requires careful adapting of learning and teaching strategies to local conditions.

### **Social implications**

Based on our findings, we demonstrate the value of cybernetically informed tertiary education that emphasises ethical settings for learning on the basis of mutuality, equality, and social inclusion.

### **Originality/value**

Based on two bodies of work that consolidated practice-based insights independently of each other, this paper presents insights on cybernetically

informed education that, shown to work well in two very different contexts, may offer a broader applicability.

## 1.1 Introduction

This paper introduces and discusses key aspects of two overlapping cybernetically informed approaches to education which we have developed as tertiary educators in two distinct yet related educational contexts: the turbulent South African public university context on the one hand, and the Chinese educational landscape that is gradually adapting to a global education context on the other. Christiane works at Xi'an Jiaotong-Liverpool University<sup>1</sup> teaching mostly mainland Chinese students in English language and a British/international educational framework, while Philip works at the university of Johannesburg<sup>2</sup> which is a Westernised comprehensive African university comprising of 93% Africans (Rensburg, 2017). Most of Christiane's students are mainland Chinese (across all provinces) and from a middle-class background, whereas Philip's are mostly black South African and African (other African countries included) from mixed socioeconomic backgrounds.

While developing individual approaches to teaching engineering modules to undergraduate students in their second year of studies, both authors have drawn on cybernetics and radical constructivist theory. This ethically motivated approach can be characterised as "finding theory" in order to clarify and further develop ongoing practice – we see our practice as enacted cybernetic practice rather than a result of "applied theory".

With our respective approaches discussed in detail in previous publications (Baron, 2015a 2015b, 2016a, 2016b, 2017, 2018; Herr and Tu 2011, Herr and Fischer 2012, Herr 2013, 2014) and supported by various teaching awards received by both authors, this paper primarily examines our cybernetically informed teaching and learning in terms of their similarities and differences, seeking to identify strategies that work well in practice across different contexts. Making our approaches explicit and contrasting them, we identify four key shared aspects in our pedagogy that we find successful in our respective teaching environments. Acknowledging the differences of our two contexts, we are also acutely aware that pedagogy is influenced by and must adapt to specific cultural

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<sup>1</sup> Founded in 2006, Xi'an Jiaotong-Liverpool University is the largest International joint venture university in China, a partnership between Xi'an Jiaotong University and the University of Liverpool. Growing fast, the university offers English-language education and a UK-based curriculum along with dual degrees to predominantly Chinese learners.

<sup>2</sup> University of Johannesburg comprises of more than 50 000 students and is in the top 3% of universities worldwide. It is the largest comprehensive university in South Africa. The university aims to provide access to all socioeconomic levels and enrolls into its first-year undergraduate programmes close to 28% of students who come from Quintile 1 and 2 schools representing the poorest public school in South Africa.

norms and values. We thus discuss the four key aspects in light of the differences of these two diverse contexts. The aim of this paper is to inform and support educators with an account from educational practice that discusses enacted cybernetic strategies in education across two different societal settings.

## **1.2 Four shared aspects**

Following a brief overview of the four shared aspects, we discuss them in greater depth and in the distinct contexts of our respective teaching practice in the subsequent sections.

### **1.2.1 Conversations as platforms for learning**

In both teaching contexts (Christiane: Xi'an Jiaotong-Liverpool University- China and Philip: University of Johannesburg – South Africa), we find conversations essential in providing context as well as a domain all involved in the learning and teaching process can inhabit and share. Conversations bring forth self-consciousness and allow for individual construction of understanding. We encourage mutual conversations between student and teacher where both learn about the other. Emphasising conversational settings, both authors employ dynamic social environments and peer learning in various ways. We find these allow students to get engaged in and identify with learning processes. Students pay great attention to their peers and often develop individual motivation in social learning contexts while in community of their peers. Teachers may or may not be directly involved in peer learning processes but are responsible for creating contexts and frameworks in which they occur.

### **1.2.2 Immediacy of feedback**

We use the term “feedback” in the cybernetic sense, as indicating types of process in which interim outcomes re-enter and influence the direction and nature of the overall process – which can include, but extends beyond, the scope of giving comments in response to learners’ outcomes during teaching (Brand 1976, p.34). Processes of mutual learning between students and teachers are steered by dynamic feedback on various levels. Delay in feedback between learners and teachers impedes learning. Individual ideas arising from student responses about the content needs to be acknowledged and should recursively inform the curriculum.

### **1.2.3 The key role of the teacher**

We agree that the attitude and posture of teachers is a vital aspect in successful teaching. Rather than transmitting knowledge or instructing, teachers are

primarily motivators inspiring students to reach *their own* goals. We understand teaching as performing and sharing with an openness to being challenged.

### **1.2.4 Matching assessment strategies to learning and teaching strategies**

Questioning the effectiveness of numeral marks as proof of learning, we aim to develop assessment strategies that are geared towards supporting our learning and teaching approaches. We assume that in ethical teaching, assessment cannot be the aim of teaching: Students' learning should be motivated by individual learning goals. Our approach to assessment does not challenge the validity of institutional frameworks but seeks to find ways to work with and around them for learning experiences that matter to both learners and teachers.

## **1.3 Four shared aspects contextually described**

### **1.3.1 Heterarchical reflexive conversational learning and teaching [Philip]**

South African public universities are currently undergoing a transitional period as they traverse the sensitive road of curriculum redesign that achieves an inclusive approach to learning and teaching with the goal of decolonising knowledge. There is a requirement to move away from a “one size fits all” approach to a socially just pedagogy that acknowledges the epistemology of the students who are the consumers of the curricula. As ethically ideal as this may sound, it is an unfortunate fact that traditional learning and teaching is still the dominant approach offered throughout the South African education system. In addressing this challenge, I have presented strategies for ethical curricula design, inclusive pedagogy, as well as classrooms as conversational spaces whereby students and teachers may act as co-designers of their curricula (including the assessment methods and teaching style). This requires a shift in the thinking and acting of the educators—an epistemological shift. One aspect of this shift is the moving away from seeing students as *tabula rasa*. I have in turn proposed envisaging students as *metaphoric nunataks*<sup>3</sup> —active participants who act as reference points/markers for the curriculum (Baron, 2018).

I have argued for and enacted the dynamic acknowledgement of students, not only in terms of their epistemology, but in terms of their inputs for the trajectory of the curriculum. The term “nunatak” is a metaphor that describes a knowledge platform that learners present within the classroom. Since the decolonisation goal

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<sup>3</sup> Exposed element jutting out of a plain often used as landmarks or reference points in glaciers. They rarely have any ice covering them and usually are the only places where plants can survive.

is to re-design the curricula embracing the students' worldview and understanding (local knowledge), the students should be given the opportunity to act as "anchors" providing contextual understanding of the often-imported knowledge into a locally understood context in which knowledge needs to be viable. The creative teacher may use the students' reference points to inform the curricula, thus adapting the content to the generation that is meant to use this content in their working life. The aim is to adapt the curricula according to the students' already present knowledge and ways of understandings. This means that students are invited to provide their reference points (inputs and reflexions) for the content, and through their participation, a way of knowing these concepts should be represented within the curriculum. The description of the content and how it impacts the lives of people (and communities) is then understood in terms of the epistemology of those who experience these issues, which also acts as the measuring system in terms of the contents' fit for purpose.

The outcomes of this approach have been promising which includes increased participation in the class, reduction in social tension, revised curricula that reflect content that is immediately useful for the students and their communities, and classroom formats that reflect knowledge as a negotiated practice tied to the observers who are included in the system. There is an awareness that knowledge is not apolitical and that methodology is tied to epistemology. These outcomes are relevant in other contexts too, not only in the turbulent and unpredictable South African context.

#### **1.3.1.1 Conversations as platforms for learning**

African tradition and teachings are known for their oral dissemination through storytelling. Folklore helps us to understand what people believed and how they felt about their environment. Oral knowledge is a vital part of African culture (Brown, 1998; Okpewho, 1992). Embracing this verbal heritage by proposing it within the classroom has proven fruitful in a variety of formats. Firstly, in the form of a dialectic, whereby the students may converse with their teacher [and their peers] in a manner that ties the immediacy into the conversation. Students are invited to clarify, suggest, contextualise, exemplify, and adjust the trajectory of the communication and hence the content. In this format, conversational teaching and learning is achieved whereby the teacher is provided with a moment by moment snapshot of the curriculum from the students' viewpoint. The teacher is thus informed about the students' perceptions of their curriculum in terms of their environment. This provides the active teacher with an error-correction option for the early awareness of misunderstood aspects within the curriculum or even curriculum items that may need to be refined. Secondly, it is a valid form of measuring student's performance. Whether through verbal presentations of the

students' work, debate, or Teachback<sup>4</sup>, the educator can determine the level of understanding that the students have attained. Lastly, the conversation is a scientific method for understanding how the learner learns and conceptualises his/her work. By understanding that each student has his/her own learning strategy and style, the conversation provides a glimpse into how the student has created meaning (see Pask, 1976b).

Conversations in the classroom should not be thought of as simply a space for the students to provide feedback. Conversations must ultimately shape the curriculum.

### **1.3.1.2 Immediacy of feedback**

Immediacy of feedback in a general sense reflects an urgency of a response within the classroom. However, my understanding of the strategy of immediate feedback is closer to the position of the phenomenological psychologists in their use of the word immediacy. For example, in the therapeutic context (counselling), instead of only focussing on the client's issues during a session, the therapist may find a better route by asking questions like "How do you experience what I've just said?", "Are you satisfied with this direction in our conversation?", and even "How did I do in our last session?". These questions introduce a theme of what Rogers' (1980) termed the "here and now" into the therapeutic conversation. In the classroom, I have adopted and adapted this immediacy by acknowledging the students sitting in the classroom who may be bored, may not like the manner of teaching, or may have important contributions that could shift the trajectory of the classroom conversations. Thus, I often ask the students "How did you like the last class we had?", or "What topics would you like to have for your assignment and how would you like to be assessed?" The students' responses open the conversation to refining the pedagogy and content with the outcome of moving from a hierarchical relationship to one that is heterarchical. For instance, I have found that students like to see animated videos of certain concepts, they also like to be given examples of these concepts in a format that they have experienced in their daily life—contextualisation. In order to contextualise the often abstract concepts, the teacher would thus need to be well-informed of what the daily life is like for his/her students. This requires the teacher, who is probably from a different generation, to keep abreast with the trends that are relevant to his/her audience.

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<sup>4</sup> Teachback is a conversation theory tool developed by Gordon Pask and Bernard Scott as a method in which, after the teacher has presented to the learners the topics of the learning outcomes, the learner is invited to teach back his/her understanding of this material/information to the teacher (Pask 1976a, 1976b; Scott 2000). Teachback can also be used as a mechanism for curriculum design, social learning, and language practice (Baron, 2016a). A pilot study on teachback in a pre-school showed that the teacher who used teachback had her learners score higher on memory retention tasks when compared to a traditional teaching style (Baron & Baron, 2015a).

A common challenge noted by educators is that they do not get the level of engagement that they would like from their students. Humour is available as an option for overcoming this challenge as well as for reducing boredom. Humour is incidental and spontaneous and is dependent on the comments made by the students. In South Africa, it is common for students to follow political news, be opinionated, and offer debate. Freedom of speech is a human right in the multicultural context of South Africa; however, cultural and racial stereotyping is deeply enmeshed in the mass consciousness. An example of this was a project proposal for a *culturally sensitive* elevator music system that adapts to racial profiles. The student proposed that for white people who use the elevator, the music played would be a classical genre, while for black people it would be rap music. The student argued that different races like different music genres. When the white teacher plays *locasie*<sup>5</sup> music and then jives to the beat in the classroom, the shock and amusement shown by the predominantly black students fundamentally shifts the posture of the classroom to one of immediacy as the students cannot contain their responses, indeed breaking away from a rigid stature, to one of openness. Immediacy thus rests on openness and honesty which are core features of a conversation. Once the students decide to provide honest comments, the teacher is then able to get candid responses from the students regarding the course content. This process could be thought of as a rite of passage to entering the students' world; thus, immediacy in conversational teaching relies on openness from both teachers and learners and often entails an ice-breaker that resonates with the students.

### 1.3.1.3 The role of the teacher

A performer should have knowledge of his/her audience to create appealing content ideas and persuasive arguments. I have realised that for students to actively and energetically converse with me (or in my presence) within the classroom, they need proof that I understand their world. This means that I need to understand their interests, their slang, and their reason for being in the class. This ties into Pask's (1976:45) crucial point: "Learning begins with each student's aims or outcomes". I have realised that the only way to determine the students' aims is to ask them why they are sitting in the class<sup>6</sup>. The answers vary, but the

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<sup>5</sup> Location in a South African sense refers to the former apartheid-style residential developments that were for non-whites. Location is also called a township, or in everyday language a *locasie*. Kwaito music genre has a house flavour with rap-like lyrics. This South African music genre, although widely recognised, is not necessarily popular among young Black South African adults though (Baron, 2016c).

<sup>6</sup> One may assume students attend classes as they want the qualification, or they must attend, or their parents want them to be engineers, for example. This may be the overarching goal, but the daily motivating aspects for getting up and following through with the task of sitting in the class do differ. Similarly, to how adults engage in their work life. Some days our goals are driven by financial aspects (pay check), other days it may be an aspect of work that is interesting, or even something that happens en route to work. Upon deeper enquiry, it is not surprising to find out that most students do not have a daily goal of learning the curriculum which they are registered for. By

role of the enquiry is to demonstrate that I have an interest in the students' life. It is a truthful enquiry as their answers assist me in achieving my own goals of providing an interesting, motivating, and inspirational teaching and learning platform that is useful to the students. My goal is only possible if I at least know the reason for the students' participation. By knowing the reasons for why the students attend the class assists me in adjusting my narrative in line with their interests. In this light, the teacher could be thought of as an improv performer, hence the opening premise.

#### **1.3.1.4 Matching assessment strategies to learning and teaching strategies**

Adopting a dialectical approach in conversational teaching and learning demonstrates the argumentation of knowledge. For example, if students are simply asked to state, list or describe features of their curriculum, they do not prove they have an understanding. With the engineering accreditation process in South Africa<sup>7</sup> focusing on attainment of a skill set, proof of competence is thus required for each skill/outcome. A list of facts on a page is insufficient as proof of competence. What is required is the demonstration that under various contextual scenarios the student can adapt and adjust their answer/solution. Thus, the students need to demonstrate they have understood the underlying concepts and are not simply copy and pasting information with the hope that there is a fit. If the learning and teaching approach matches the assessments, the students have a better chance of success having already practiced and made their errors early in the conversational dialectical context of the class. Thus, the students have previously rehearsed their knowledge in the presence of the teacher enabling a better outcome in the assessments that "count for marks".

Students also learn from the comments made by other students who have similar ideas about the topics. Thus, it is not expected that every student needs to openly converse in every class as vicarious learning is also at play (see Bandura, 1977). There is often a sample that represents most of the students, especially in groups larger than 60 students.

### **1.3.2 Learning to want to learn: Teaching large cohorts of undergraduate Chinese learners [Christiane]**

The cybernetically informed learning and teaching approach presented in this section has been developed over the course of more than six years (Herr 2013, Herr 2014a), in an inquiry-based process framed as action research (Kemmis et

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adopting an open-ended approach inviting students to provide their goals for the class in return removing the consumption aspect of learning, to one of designing one's learning.

<sup>7</sup> This is common in countries aligned to the Washington and Dublin Accords.



al. 2014). This has allowed for the collection of data in order to track and analyse the effects of decisions taken over time and has established a recursive process in which explicit reflection – “feedback” in the cybernetic sense – leads to strategic ongoing change from one instance of the module to the next (Schön 1995). Initiated as part of the founding of a new Department of Architecture at Xi’an Jiaotong-Liverpool University in 2011, the learning and teaching approach for a technical module titled “Structures and Materials” discussed in this section needed to coordinate several key requirements. On the one hand, the approach was to be oriented towards the individual learner, aiming to enact a radical constructivist epistemology (Herr 2014a, Glasersfeld 1992). On the other hand, the approach needed to accommodate large groups of learners, with cohorts typically around 220 students – significantly more than typical architectural cohort sizes of about 50 students. The teaching format was defined by institutional requirements as three contact hours per week, in the form of one two-hour and a one-hour lecture or seminar per week over the course of 14 semester weeks.

While the core of architectural education characteristically focuses on enacted learning and teaching in an applied, dynamic and conversation-based teaching format known as “design studio” (Schön 1984, 1988, 1995; Herr 2014b), accompanying technical subjects are typically taught in a more conventional format based on a transfer model of learning and teaching (Herr 2015). In the module discussed here, the scope of a technical subject has been extended by integrating many aspects of studio teaching, building on communication and representation skills, which students are learning in the design studio that is taught in parallel.

The process of adapting the above-listed key aspects of cybernetically informed learning and teaching to the specific context of XJTLU was significantly influenced by the consideration of prevalent learning culture in China. The Chinese education system is one of the most rigid and competitive in the world and emphasises standardised testing across all subjects (Gao 2014, Zhao 2014). As a result, students graduate from high school with excellent rote memorisation skills and are expected to achieve – often repeat – “correct solutions” predefined by teachers, without much consideration of context or implications. Under intense external pressure to score well, Chinese students entering XJTLU are not accustomed to pursue learning through personal motivation or through enacting or experimenting with what is learned. Owing to the traditional approach of teachers handing down textbook knowledge, students are not used to critically reflect or discuss the taught content, and understand their appropriate role as diligent yet passive recipients of knowledge. Students tend to trust the textbook rather than the teacher and are not used to conduct own inquiries into questions they may have. Students who achieve test results high enough to enter universities

such as XJTLU can be assumed to be exceptionally good at fulfilling these expectations. While Chinese students will adapt to a more flexible learning and teaching style upon entering a Western-style university, this process is gradual and requires teachers to find ways of teaching “in between” the expectations of different cultural contexts (Herr 2016). In the pedagogy discussed here, these issues are addressed in and through a combination of different settings for learning that offer learners a variety of ways to develop personal motivation and understanding. The following sections give a brief overview of the approaches employed to this end, which due to the limited scope of this paper remains primarily at the level of strategy and does not delve into much detail regarding the specific implementation.

### **1.3.2.1 Conversations as a platform for learning**

In the context of this paper, conversation is understood in a broader framework, as a form of exchange that involves a self and an other - who can be imagined, human, or even consist of material objects. A conversational encounter is characterised through its process, which involves an exchange that allows conversing parties to express their understandings, listen or otherwise perceive responses from an other, to change understandings as a consequence to listening, and to express changed understandings in a next iteration of the conversational cycle (Glanville 2007). Conversations are typically unpredictable and tend to generate surprising or new ideas, and underlie radical constructivist notions of learning (Glanville 2006, Herr 2014a, 2015). In teaching large classes of more than 200 students, a key question is thus how to engage students in meaningful conversational encounters in a way that all students are able to develop “ownership” and motivation. I have developed a variety of conversational formats specifically for this purpose and the specific cultural context of teaching Chinese learners.

In societies based on Confucian traditions, respecting elders such as parents or teachers is paramount, with the primary duty of students consisting of learning by following. Posing questions to teachers in class is not only seen as disruptive and disrespectful to the teachers, but also as an embarrassment since the student is perceived as not intelligent or diligent enough to correctly understand what is taught. For this reason, I tend to avoid conversations with individuals in front of a large class and replace them with conversations held between the teacher and the class as a whole. Feeling comfortable with answering as a group, students tend to answer together. Once students feel comfortable with voicing their views on simple and straightforward questions together, as a group, I start asking open ended questions – with the class still answering together, this time however inadvertently voicing a variety of answers at once. I then respond by discussing

the implications of different answers I hear from students, staying away from suggesting single correct answers.

The challenge of dealing with very large classes also led to the development of other conversational formats, among the most successful being a conversation with and through materials. By inviting students to develop large-scale physical models from a limited set of materials, I encourage students to engage in conversational encounters with objects - the dynamics and intensity of which tend to surprise students who are not used to experiment and explore. Learning derived from these encounters is treasured by students and literally reflects a “constructive” approach to learning, often mediated by multiple and productive failures (Herr and Fischer 2012, Herr 2014a). Conversations with materials are conducted in teams of five or six students to encourage peer learning emerging from discussion and analysis of observations made in teams. Similar to conversational learning encounters with materials and objects, peer learning draws attention away from the authoritative role of the teacher and supplements it with a context-based and individually determined style of learning. Reflective statements in students’ final reports consistently show that both conversations with materials and learning in peer group settings are among the most valued learning experiences students encounter in the module.

### **1.3.2.2 Immediacy of feedback**

In conversational encounters, both conversants need to be able to experience immediacy in the sense of being part of and staying involved in an ongoing process based on mutuality. Moreover, immediacy refers to the sensation of being listened to, of being allowed to “matter” by being able to change the course of the conversation with one’s contributions to it. In the context of this module, the aim to establish immediacy led me to allow and embrace individual expression in open ended exchange formats, the most unique of which is probably a technical drawing-based design exercise. Conducted within the scope of a few hours, design exercises allow students to document and express their personal understanding of a design task. One assignment will result in a different answer for every student, and create a context in which students create and “own” personal interpretations of the taught content. In cybernetic terms, this also generates a large variety that cannot be matched by one teacher and thus results in an “out of control” classroom setting (Glanville 2012). Accepting the large variety obtained, I then simplify my response by sorting exercises into four rough categories that reflect students’ performances as quickly as possible. Exercises are then handed back to students such that in the following class, about three to five scanned (and anonymised) typical examples of each category are discussed in detail in front of the entire class. Giving response as general comments as well as discussion of specific examples, I

then rely on students' ability to reflect on these comments to rethink and redraw the original exercise. Students report that such exercise discussions are of great interest to them, and many immediately enact teacher feedback and changing understanding during the discussion in class by annotating and correcting their own exercises, taking on the role of the "teacher".

Another strategy to create immediacy in class I regularly employ involves translating key vocabulary into Mandarin or asking students for help in translating key terms. Students are confident regarding their Chinese (native) language skills and immediately engage in these exchanges, usually finding the attempts of teachers to pronounce technical terms in Mandarin amusing. Signalling to students that learning is mutual and the teacher does not shy away from embarrassment during learning, this immediately leads to increased student engagement.

### **1.3.2.3 The key role of the teacher**

While exchange should happen on eye level as much as possible, the role of the teacher is key in the approach to learning and teaching practiced in the discussed module. On the one hand, teachers need to perform a role that inspires and motivates students by example – employing lots of questions, emotional language, rich examples with plenty of visual materials and clear passion for the subject. On the other hand, teachers need to fulfil their roles as experts to be respected by students in a Chinese learning context – where teachers' roles dictate to always be right and to always know the answer to any question. In playing with these aspects of teaching, a teacher can subvert students' expectations and create a classroom atmosphere of imminent surprise. As a teacher, I can be both knowledgeable and full of questions, praising and critiquing examples at the same time, admitting ignorance but engaging in research to find out more, and disagreeing with other experts while acknowledging my subjectivity. I explicitly discuss the social nature of knowledge in class, which implies that proposals and solutions are not necessarily correct or wrong – as expected by students – but more a "fit" to specific settings. This approach offers students more room for personal approaches to learning in the spirit of the contextual cybernetic and constructivist notion of "viability" instead of binary opposites of "true" and "false". Enacting these contrasts with humour in class in the context of this module works well to maintain attention, even in large lecture theatres. Teaching thus becomes more performative and less instruction based. Instead of teaching students to "know" a specific fact, I prefer to describe students' learning processes as offering students a new way of "seeing", changing their perception of the subject alongside their preconceptions of the nature of knowing and how it is attained.

#### **1.3.2.4 Matching assessment strategies to teaching and learning strategies**

Assessment strategies in the module discussed here were gradually developed and adapted to align with the emphasis of the learning and teaching approach as closely as possible. Reconsidering assessment as a tool to support learning (Shepard et al. 2005), the module gradually changed from initially emphasising a formal exam at the end of the semester, with a weight of 60% of overall marks, to finally no exam but coursework now holding 100% of overall marks. The reasoning behind this shift is primarily based on the principle of never assessing students' first attempt at any task but providing plenty of formative assessment, such that gradual learning and improvement can be supported even in a large class of more than 200 students. Giving students sufficient opportunities to fail and revise is necessary for learning, which is in the spirit of a radical constructivist approach to constructing individual understanding (Herr 2014a). Coursework in the form of reflective reports provides room for descriptions of process, including explicit reflection on learning. In my experience, documenting and assessing the learning process itself is as important as assessing the final outcomes as this encourages students to focus on the quality of their learning in addition to the quality of the final outcome. Directing assessment to give weight to and support individual motivation and reflection enhances self-awareness and allows students to "own" their learning process and value learned content as a personal achievement.

## **1.4 Conclusion**

Both authors are committed to the scholarship of ethical teaching and learning and have found that cybernetics and radical constructivism are philosophies that support ethical pedagogy. In our approach to cybernetically informed learning and teaching, we try to avoid "application" of abstract learning and teaching theory in favour of focusing on acting reinforced by consistent reflection on the ethical dimensions of actions taken. We aim to introduce conversational encounters that provide a platform for mutual learning, i.e. the teacher also taking the role of learner. We have found that students who are aware that they are "listened to", and who see their contributions transforming the teacher as well as the teaching, in turn take learning seriously. While engaging students at the level discussed in this paper takes effort on the part of both learners and teachers, it does have the advantage of producing learning that is "owned" – and likely also kept by learners. With ownership comes responsibility and a basis for awareness of ethical implications of learning. The discussion of two different settings for two

approaches to learning and teaching that share key motivations and strategies shows how context shapes teaching practice. Further research examining commonalities and differences to similar pedagogy employed in yet other contexts would be beneficial to the approach presented here, which may broaden its scope and allow further insights into its viability.

Active engagement in practice leads both authors to engage with reflection as part of scholarly discourse. We see understanding arising from practice and cybernetic enactment of theory as complementary aspects of the reflective learning cycle that leads to new knowing. In this spirit, we arrive at both new insights and new questions that we offer to cybernetic discourse, which we now outline briefly below.

A key question of broader significance in education may relate to how variety creation and reduction in classroom teaching (Glanville 1994) can be steered without trivialising learning results? How can classrooms be managed which, in terms of requisite variety, are maintained in a state that can be described as “out of control” or “unmanageable” – and therefore creative (Glanville 1998)?

Future work may also address the question of what constitutes correctness in a learning approach that is grounded in acknowledging individual construction of understanding? Can personal understanding be understood as primarily a contextualisation of predefined “correct” knowledge introduced by teachers? Or are there further-reaching consequences, leading to a more radical acknowledgement of the negotiated nature of understanding? Our mutual approaches show both tendencies at work.

Challenges for the approach presented arise from practical as well as theoretical issues. Glasersfeld (1992) highlighted that people need to be allowed to make sense for themselves of their experiences, which the teacher needs to allow before attempting to modify or correct. This process enables the teacher entry into the learner’s world to see how the learner is interpreting the teacher’s information. Thus, being ethically motivated requires the actors<sup>8</sup> to submit to the option that they may need to change (teacher) in order for the other (student) to undergo a change. This means that teachers would need to be able to accommodate incompatible parallel viewpoints during their teaching. This can be unsettling for many educators who assume the role of a knowing person. Educators may not be able or willing to construct simultaneously, refraining from correcting students while the students’ own creations grow. Impatience or simply giving students the final *correct* learned answer is much easier than steering students allowing for their reflection to perturb the direction.

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<sup>8</sup> Austin (1962) refers to actors in terms of speech acts.

A major challenge facing our approach is that most universities are geared for traditional classroom layouts and pedagogy: The classroom design, the generic assessment approaches and so forth. Rather than arguing against, we thus find value in developing alternative strategies for cybernetically informed learning and teaching approaches that can be enacted within traditional institutions.

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