Abstract

This paper deals with the implications for social transformation of software design, and is based on a doctoral study carried out within the critical realist orientation. The critical realist philosophy works sensitively towards human empowerment in that its focus is on the (mainly) hidden forces governing social phenomena: human agency is viewed as having the potential not only to replicate but also to transform social practices. During the research both theoretical and empirical (practical) models of written composition were formulated, providing the basis for the design of educational software in the form of a writing tutor program. In particular, the models represented the all-important social element in composing as operating intra- and extra-systemically, which explained the infinitely variable forms taken by actual instances of composing. The implications for transformation of the social practice of composing were that in using the software learners could be shown relatively easily which social factors were givens (i.e. systemic) and which were negotiable (i.e. extra-systemic), the latter in terms of reflecting the socio-cultural bias of the specific context in which composing took place. The potential of the writing tutor program for empowering learners in multicultural institutions is discussed, together with some preliminary feedback from learners.

1. Introduction

This paper deals with the implications for social transformation of software design, and is based on a doctoral study carried out within the critical realist orientation. The study resulted in models of written composition showing the commonalities and variables in writing, and composition software in the form of a writing tutor program. Previous papers have focused on the design of the writing tutor program, the derivation of the social algorithm on which it is based, and the educational design principle inherent in the theoretical model. This account focuses on the use of the writing tutor program for learning, in particular, its potential for learner empowerment in a multicultural educational context. It also attempts to explain the relevance of the critical realist orientation to the emancipatory aspect of software design in composition, as very little (if any) critical realist literature has as yet been published on written composition apart from Judd’s definitive work. On the whole critical realism tends to be misunderstood, misrepresented as positivist when it is in fact anti-positivist, or mistaken for critical theory. Critical realism is also referred to as a paradigm, when it is a complex and profound philosophy with ecological implications developed mainly by Roy Bhaskar and Rom Harré, with significant contributions by Margaret Archer. The realist approach is integral to this project, as it is a philosophy which promotes the idea of social transformation by...
praxis. According to Bhaskar, social science “always consists in a practical intervention in social life”, and the writing tutor program is one such attempt to provide a mechanism for transforming social practice.

2. Some Key Features of the Critical Realist Philosophy

Critical realism posits an external reality, and suggests that, while we cannot know all aspects of the “domain of real” directly, we can achieve an approximate view of reality by using transcendental argument. This is in direct contrast to the accumulative-sense-data realism of positivism, where causal relations operating in closed systems are deduced statistically or via rule-of-thumb formulae rather than by depth explanation of the social forces involved, including human agency. Modelling open-ended systems in real-world operation is a typical preoccupation of critical realism, in an attempt to transcend human experience and understand the nature of the “real” in social structures. It must be noted that the postmodern argument that all models are by necessity ideologically-biased does not hold true for critical realism. Moreover, the inclusion of an external reality in the critical realist ontology makes it possible to validate models with reference to actual events. Observation of social processes is not necessarily compromised by being guided by theory, according to Sayer, who refutes the notion that “observation which is theory-laden must be theory-determined.” Bhaskar suggests that some prior level of theory is actually necessary in order to make sense of the inchoate mass of confusing detail observed in social practices.

The positing of an external reality where phenomena can be observed by viewers with very different belief and value systems explains how people can agree on the existence of various surface manifestations of social reality, without, however, necessarily agreeing on their interpretation or value. For example, the models produced in this study support the postmodern position on the social embeddedness of writing practices, without agreeing in the least with the premises - or conclusions - of postmodern perspectives. As composition is dominated by postmodern views at present, which may lead to “normal science” assumptions being made about this study, it needs to be pointed out that critical realism does not hold with the view that reality is a social construct, a position based on the notion that we can know about the world only in terms which have been represented to us. From a critical realist perspective this notion constitutes “the epistemic fallacy, the definition of being in terms of knowledge … or, in displacement of this, in terms of “language or discourse”, the linguistic fallacy”. This is not meant to refute or reject the postmodern contribution to the field of written composition, merely to point out that critical realist research cannot be evaluated (or validated) in postmodern terms.

It must also be emphasised that critical realism is by no means a lockstep position with everyone marching to the same beat, and that there is considerable debate within the orientation itself. As with most orientations, there are areas which are problematic, such as the nature of the causality provided by human agency, and the role it plays in social mechanisms. This is not a problem specific to critical realism, however: social science literature in general contains
diverse and somewhat vague definitions of the term “social mechanism”. The term “mechanism” in itself is unfortunate, as critical realism does not take a mechanistic view of human existence: the preoccupation with mechanisms, or complex systems of forces, is an attempt to understand the deep structure or “essences” of things, including the complex social processes in which we are involved as part of our daily lives. As human agency has the potential to transform not only our own lives but the lives of those around us, and its role is central to this study, I have suggested tentatively that it is necessary to differentiate between contingent and intentional mechanisms (i.e. those which happen without human volition and those which happen with intent).

3. The Implications of Critical Realism for Written Composition

The role of human agency in this study is critical, because, while writing, like other social practices, is already established when we first come to it, a social practice is maintained/transformed by means of human agency, as shown in Bhaskar’s transformational model of social activity (Figure 1). In other words, we not only produce social products, but we produce or reproduce the conditions of their production. Thus, the social relations that must exist to make particular social phenomena possible must be social relations of production. And in order to understand the essence of a particular social phenomenon, we must understand the social relations of production making that phenomenon possible (my emphasis).

![Figure 1](attachment:image_url)

Bhaskar’s transformational model of social activity

If the social practice of writing is to be transformed, then, it is in terms of human agency or social production. As it is the process of production which critical realists have represented as being crucial in transforming social structures, the
The focus of the doctoral study was on composing. To transform academic writing so as to apprise educators of the social issues which permeate individual instances of production, and to empower learners by showing them which social issues are more negotiable (i.e. socio-cultural) and which are less amenable to change (i.e. systemic), it was considered necessary to investigate how individual acts of composing might reflect the larger social forces involved. This required a model of composing which shows how social aspects operate both inside and outside of the social system.

Models do not merely provide explanations of social mechanisms, however: they can also in themselves constitute social mechanisms. This is because, while thinking does not create any reality except the mental (i.e. Bhaskar’s “domain of empirical”), concepts and beliefs drive human behaviour and thus have true causal force. Moreover, according to Judd, people need concepts to inform everyday social practice.40 One option, then, for transforming social structures is to provide people with simplified concepts which reveal both the systemic operation and the context-specific variables in a given social practice, and which can be used to guide everyday social practice. Such models might enable participants to gain mastery over the systemic operation of a practice and at the same time prompt them to question local socio-cultural requirements. For the beginner writer at a multicultural institution, particularly at undergraduate level, it is difficult to make sense of academic writing in terms of the requirements of different disciplines, in particular, to distinguish between generally accepted academic practice and highly idiosyncratic requirements which may have a cultural bias, usually masked as “the way things are” or “common sense”;26 and even generally accepted academic practices may be found to have a cultural bias. Students of diverse ethnic groups studying at western-orientated institutions are potentially disempowered in not easily being able to perceive - or challenge - any cultural bias in written assignments or to negotiate compromises which will allow them to draw on indigenous or community-based knowledge.

4. The Systemic Relations Involved in Composing

When people engage in literate practices they both reproduce (or transform) the social phenomenon of literacy itself (i.e. social structures are “activity-dependent”40). Social structures by their very definition do not admit of ad hoc or random functioning, or there would be no social constraints on human action, nor would self-actualisation through human agency be possible, as we would have no concept of the social genres available, or knowledge as to how to engage in them. This implies that there are systemic elements in social structures which exist over and above local social conditions or mores, for example, the existence of social genres or forms (precisely which shape these forms take in specific instances is the work of the social anthropologist or ethnologist). It is generally accepted that systemic relations exist in both the structure and operation of language, as illustrated by various grammars and schematics (e.g. Chomsky’s generative grammar,19 Halliday’s functional grammar,32) and also in communication (e.g. Grice’s maxims,31 Hymes’ Model of Interaction,38 Searle’s Speech Acts,52). This
study investigated the possible existence of systemic relations in written communication which might operate at a deeper level than the surface idiosyncrasies of the specific socio-cultural context in which communication occurs.46

Engaging in the modelling process described by Franck28 revealed that the social aspect of communication operates at two levels in composing: intra-systemically, as part of the system of functions involved in the social structure, and extra-systemically, as input into the system, that is features of the specific socio-cultural context which impact on the system. The intra-systemic operation of a social function in communication can be explained by the fact that communication is a key social process without which social cohesion would not be possible. The extra-systemic operation of the socio-cultural context has long been acknowledged by sociolinguists,29 social constructionists,6,13,16,21 critical language theorists,7,20,25,39 and movements such as the New Literacy approach.18,55 However, it was the discovery of the interplay between the intra- and extra-systemic relationships in communication which made it possible to explain the constants and variants in composing which make individual instances highly idiosyncratic and open-ended.

5. The Pedagogical Model on which the Writing Tutor Program is Based

The starting point of the modelling was a pedagogical model, comprising five recursive stages of composing, namely prewriting, draft writing, major editing, minor editing and evaluation.47 The model included advice as to how the learner should address the underlying purpose of each stage (subsequently identified with the system of functions necessary for communication to take place). This schema was shown to modify not only learner writers’ concept of composing but their actual composing behaviour (i.e. towards behaviour identified in the literature as that of competent writers) in five out of six cases. It proved to be highly effective in composition programmes and coaching at secondary and tertiary level over a period of fifteen or so years. However, before it might be used as the basis for the proposed writing tutor program, it was considered necessary to investigate the existence of any deep-level underpinning which might account for its effectiveness and explain its precise nature. This is because there is an intransitive (i.e. non-discursive) aspect to social phenomena,9 which means that our experiences of them, while providing a tentative concept of their operation, may cause us to overlook possibilities for transformation because our concept is based on superficial or “false” aspects of the phenomenon. An “experiential model of writing”, that is one which falls within the scope and experience of the learner writer, would therefore need to be validated by showing how it might be underpinned by a more complex model explaining the systemic relations involved in communication in written mode.
6. The Theoretical Model Underpinning the Pedagogical Model

In a follow-up doctoral study Franck’s modelling process, involving a type of reverse engineering or classical induction, was used to arrive at a theoretical model - or system of functions - which might be seen to underpin the pedagogical model (Franck’s term for the latter is “empirical”, as it relates to real-life functioning). The resulting theoretical model comprises five communicative functions which can be seen to manifest in different ways in the different modes. A second - more analytical - empirical model was formulated in order to explain the way in which socio-cultural influences impact on the whole composing system in the form of local input. This study suggested that different input (i.e. immediacy/distance and the material mode of production) into the system of communicative functions can be seen to explain the different communication modes, and explained why, in composing, the communicative functions become strung out into the typical recursive stages observed by teachers and researchers. Identifying the constants in written communication (i.e. the communicative functions performed) and the variables (i.e. the socio-cultural - and other - input provided in specific instances of composing), made it possible to account for the highly idiosyncratic forms composing could be seen to take in specific instances.

Figure 2

The theoretical model showing the system of communicative functions

The theoretical model (Figure 2) comprises a “functional architecture” which represents felicity conditions for communication, consisting of the contextual, ideational, interactive, social and reflexive functions. As language is one of the mechanisms which performs many (but not all) of these functions, it should not be surprising that there is some correspondence between the first four functions and
Halliday’s three functions of language, the textual, ideational and interpersonal. His textual function, however, is represented by two communicative functions, the contextual and the social. It must be noted that Halliday is describing the functions which language performs, and then only as applied to written texts, which are encoded in predominantly verbal language. The communicative functions, on the other hand, are those which need to be performed for communication to take place, and not the functions which communication itself performs. For communication to take place, it first needs to be contextualised by being set in a specific context, and some form of interaction is required, which in turn generates ideational content. The social function relates to the social loading of the message, and the reflexive function operates in the manner of a feedback loop regulating the interaction. While the system of functions relates to communication in general, composing can be viewed as a specific mechanism for effecting distanced verbal communication. The systemic or formal representation of the mechanism lies in the system of functions; the actual manifestation of the mechanism in real-life social functioning lies in the pattern of recursive composing strategies identified by researchers and educationists, notably Britton, Raimes, Shaughnessy, Spack, Zamel and Widdowson.

It is important to distinguish between the functional (i.e. hypothetical) and applied (i.e. actual) aspects of a social mechanism, and to have some idea of the level of complexity involved: this is not a simplistic “five-step skills model” of communication. For example, in specific instances of communication, input of various context-specific factors into the system means that social factors impact on all functions, thus the context is socially charged, as is the interaction, including the feedback loop. Conversely, aspects of the various functions can act as causal factors performing other functions. For example, while the actual context can perform the contextual function, it can also contribute to message content (e.g. a woman alone in a bar), as can interactive elements (e.g. avoidance of interaction with panhandlers). The most useful insight provided by the model was that social factors could be seen to operate both intra-systemically (i.e. in the realising of the social function) and extra-systemically (i.e. in the impact of specific socio-cultural factors on the performance of all of the communicative functions).

The insight that social elements function both intra- and extra-systemically in composing suggests that the teaching of composition should not in fact be treated entirely in terms of either composing processes or situated practice, but needs to take into account that both approaches are focusing on different aspects of the same social phenomenon. Approaches which focus on composing to the exclusion of the socio-cultural context, particularly the power relations which remain implicit in this context, have not been found to be particularly effective for teaching writing in the disciplines (see Cazden’s Foreword). On the other hand, Cazden et al admit that one of the problems of immersion in a given socio-cultural context is that it does not lead to a “conscious awareness and control of the inter-systemic relations of a system”, a problem which this study attempts to address. The interplay of extra- and intra-systemic social aspects is shown in more
detail in the more analytical empirical model of composing which was formulated to analyse composing for research purposes.

Figure 3
The “analytical” empirical model of composing

Figure 3 shows how the communicative functions (which were in fact implicit in the pedagogical model) become adapted in composing. For example, the social function becomes “editing” in terms of this being the composing function which regulates the social appropriateness of the message (orthographic correctness is a social concern, see Palmer43). Figure 3 also shows how social influences impact on composing as contingent factors. While the second empirical model made it possible to validate the theoretical model with reference to actual instances of composing, it was not considered as suitable for pedagogical purposes as the first empirical model, which was therefore used as the basis for the writing tutor program (see Figure 4).
The key issue in terms of social emancipation revealed by the modelling process is that it now became apparent how to clarify for beginner writers how social aspects could be seen to operate in composing. This is particularly important in a multicultural institution of learning where local academic requirements are by no means a given to all students and are often (as with most socially-embedded practices) not made explicit by academic staff. The earlier pedagogical model, while it showed editing as a social function, did not, however, clarify to the learner writer how socio-cultural influences permeated the whole process of production in composing, apart from enjoining the learner to “consult audience and purpose” in Stage 1. This was because relevant features of the context in which composing was set were dealt with in an ad hoc way during teaching or coaching sessions, mainly by means of conferencing, but they could also be specified in handouts detailing assignment specifications. The problem is that both methods require individual teacher intervention, and do not extend to subjects where teachers do not necessarily have the insights or skills (or the time, as it is often claimed) to brief learners effectively on composing, or who represent academic subject requirements to students entirely in terms of detailed textual conventions, represented as “rules” (the latter regularly omit to describe the kind of knowledge construction required in student assignments, which, one would have thought, would be key “input” in academic composing). Finally, the concept of “context-variable input” (and its effect on all stages of composing) is difficult to signal in a simplified printed representation for learners. This problem is solved when the model is translated into educational software, however, as will be shown below.

7. The Writing Tutor Program

The pedagogical model represents a type of stochastic algorithm, in being a series of recursive stages used to effect a process, with a probable rather than definite outcome. As computer programs operate on an algorithmic basis, the model lent itself to program design, providing the “core” of the program main menu (see Figure 4). The resulting writing tutor program can be considered to be a type of “reusable learning object”. It contains both procedural - knowledge how to - and declarative knowledge - knowledge about. It also provides a form of guided discovery, and, while I have referred to the schema on which it is based as a “pedagogical model”, the writing tutor program actually follows Malcolm Knowles’ andragogical (adult) model of learning. However, it can be used in teacher-centred (i.e. pedagogical) composition teaching programmes with younger learners. A computerised writing tutor program offers the following benefits to learners:

- It is more convenient, and more time- and cost-effective than human coaching.
- A program can be distributed economically and easily to students (i.e. in existing laboratories or as an Internet download) by the institution.
- Given that students have access to computers and basic computer skills, there is no limit to the number of learners a tutor program can accommodate at any one time.
- A tutor program does not become tired or irritable no matter how many times the same question is asked or the same procedures are rehearsed.
- Individual differences in optimum learning pace and variations in the duration needed to master a competence are more easily accommodated.
- When the desired level of competence is achieved, the user can drop a topic or break off a session without giving offence to the teacher or wasting money spent on tuition.
- Students appear to enjoy using computers, and to prefer them to formal “live” instruction.
- A computer program is not generally perceived as judgemental by learners in the same way that human teachers are, and is controlled by the learner, not the teacher.

![Figure 4](image)

The basis for the writing tutor program help menu
There are, of course, disadvantages, such as the fact that the interaction with a program is at best an interaction by proxy, lacking the immediacy and warmth of face-to-face interaction, and in which the user has to supply most (if not all) of the initiative. A human mentor is obviously needed to address psychological problems which might require counselling rather than procedural advice. However, there is no reason why the writing tutor program should not be supplemented with human tutoring or teaching programmes, or why a learner should not consult a teacher or coach in working through a problem revealed by using the writing tutor program. Computer access might also be a problem for the educationally disadvantaged ESL students who are most in need of tutoring, although in most developing countries access to hardware and the Internet is more easily available than ICT teaching expertise or suitable educational software.

![Figure 5](image.png)

**Figure 5**

A submenu running off the writing tutor program main menu

The advantages in representing the pedagogical model as a program in the form of a help menu are as follows:

- The help menu format emphasises the recursion and flexibility of composing, and the fact that one can focus on different composing functions at different times, depending on the learner’s need rather than a set formula.
- More in the way of supporting advice/tuition/routines can be included without confusing or diffusing the effect of the main elements of composing (see Figure 5).

- A computer program can easily accommodate the input aspect which reflects the importance of questioning local socio-cultural requirements, and which is problematic in static print diagrams.

8. The Potential of the Writing Tutor Program for Empowerment

Educational software tends to be planned with profit margins rather than marginalised learners in mind, and is often based on what computers can do rather than educational need or actual research into social processes. This is the first process-based composition software which is underpinned by a model of composing as a social process rather than being based on a cognitive model. The pedagogical model in five stages, far from being a write-by-numbers or skills-based approach, constitutes a stochastic algorithm which is in effect a social mechanism for carrying out the essential functions needed for effective communication. The writing tutor program is considered to be emancipatory in the sense that, being process-based, and therefore concerned with social relations of production, it provides learners with a conceptual mechanism informing everyday social practice. Specific features of the actual program could also be considered emancipatory:

- Learners can use the program completely on their own (it is self-explanatory and involves no hidden costs): this give them more control over their own learning.

- By explaining (i.e. not just modelling) the social process of composing in the “About composing” menu option, the program gives learners more control over their own composing practices.

- There is no right way to use the program: students can use it as and when they need (i.e. they are not burdened with re-learning what they have already mastered or do not need to know.)

- The program gives away expertise to the student rather than holding it back as the prerequisite of the teacher, by summing up teaching tips and advice in supplementary materials and routines.

- Because it shows learners how composing actually works, the program makes it possible for learners to self-diagnose and find solutions to their composing problems.

- While general social concerns are included within the composing algorithm, the input option fosters the awareness that there are issues beyond mastery of a systemic process.

With reference to the last point, while the composing algorithm explains how and where the intra-systemic function of the social operates, the inclusion of an input
function prompts learners to ask questions about local academic requirements. The input option feeds into all stages of the composing algorithm, so that learners can see how thoroughly composing is embedded in its socio-cultural context.

It may seem incongruous that the input option on the menu, meant to assist empowerment, is represented as “Teacher’s advice”. However, it is through the teacher (or lecturer) that local social requirements are filtered through to the students. The inclusion of “Teacher’s advice” is in a sense a subversive tactic in two ways. Firstly, it prompts the students to ask questions about academic requirements. Asking questions is the first step in questioning why one should do something in the first place, and sets up a kind of dialogue which can develop into collaborative rather than adversarial discussion. Secondly, it alerts teachers to the fact that requirements which have not been made explicit can be a problem to students, particularly ESL students of diverse cultures who may not pick up on nuances which are more obvious to MT students of the same culture as the teacher. It also obliges teachers to articulate their requirements for themselves, again setting up a reflective inner dialogue along the lines of “Why should I expect these (particular) students to do this?” This may, of course, re-affirm rather than transform teaching practice, but at least it will be a re-affirmation informed by conscious assessment of teaching practice. The desired outcome of this feature is that students will ultimately become engaged in a process of self-empowerment by dialogue and negotiation with the teacher.

9. Conclusion

Use of the pedagogical model in teaching and coaching over the past twenty years has revealed that its most valuable aspect is its flexibility in being easily adapted by learners (and teachers) to suit their needs, as well as its ability to transcend a narrow consideration of linguistic - or even composing - issues. So far the writing tutor program has not yet been tested out extensively in actual teaching situations, although this is part of a materials development project scheduled for the second semester of 2006. A type of “consumer response” session was held with twelve first-year students whose composing was used to validate the second empirical model. The students took part in video protocol sessions capturing their initial response to the writing tutor program. All students found the program self-explanatory and easy to use, and all said that they would use the program if it were made available in laboratories. There were also various helpful suggestions for more animation and chunking of text, as well as music and colour, which budgetary constraints had restricted in the prototype.

One ESL student in particular found that the program offered insight into his poor performance in the recorded composing session. On discussion of his response to the program afterwards, he declared: “This is the most wonderful thing that has ever happened to me,” as he had managed to use the program to self-diagnose his writing problem. His lecturer had put the student’s poor performance down to lack of fluency in English, and I myself had wondered whether he might be using oral strategies to compose, as his text resembled casual speech. Before being introduced to the program, the student himself had actually
sensed that his text had not developed beyond the rough draft stage, saying: “This is not yet finished.” When left alone to look at the program for twenty minutes, he concluded that his most serious error had been not to consider his audience and purpose before starting to write, and not to establish the exact nature of the academic expectations operating in this specific case. This appeared to be a more accurate diagnosis than either the lecturer’s or mine, as composing which is not properly contextualised lacks the social impetus necessary to drive it through redrafting to its completion, leaving it raw and “unfinished”, and a first draft often resembles speech rather than writing. More in-depth case studies are obviously required to show how various learners (and teachers) respond to the writing tutor program, and in which ways they might use it (if at all), and the 2006 materials project will offer a chance to explore student and teacher responses more widely and in greater depth.

The example of a student’s perceptive self-diagnosis after a very brief exposure to the writing tutor program should, however, illustrate the point that the program is not intended as a band-aid application or “patch” meant to offer “one solution to fix all problems”, or for students to arrive at a perfect product by dutifully following five steps in unison. The program was designed as a versatile tool for the sensitive exploration of a social process which is crucial to the development of social and intellectual functioning, and which is even now mutating into different forms in response to a bewildering array of new media. The software produced in this study represents an attempt to harness one of these new media to the ends of offering a better explanation for the venerable social process of communication. In this way learners can at least face the future equipped with strategies which are more easily adapted to a rapidly changing world, in being modelled on the intrinsic patterns of human communication rather than its ephemeral surface manifestations.

References


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