LANGUAGE IN INDIA

Strength for Today and Bright Hope for Tomorrow

Volume 10 : 4 April 2010

ISSN 1930-2940

Unmasking Student Competence: Using Computers to Teach Writing

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Abstract

Although many of us use computers to compose texts for everyday tasks, we resist the idea of allowing our students to compose their essays on computers. This paper describes a study conducted in Singapore that compared the essays written by school students in three conditions: by hand, on the computer, and by hand after one month on the computer. The analysis shows that students have latent writing skills that are constrained by classroom requirements but these emerge when they are allowed to compose on computers.

Introduction

Today, many of us use computers to compose texts; it could be for professional purposes, such as writing reports, memos and research papers, or for personal purposes, such as email and letters. It has become such a standard tool that we never consider writing anything longer than a paragraph by hand; in fact, we may now find it difficult to write a memo or letter by hand.

However, we seem to resist the idea of allowing our students to do the same when they have to produce an essay. We expect them to write essays by hand, either in class or as

take-home assignments. Teachers put forward several arguments against using computers in the English class:

a) Students will plagiarize their essays from the Internet. If this is such an issue, the Internet resource can be eliminated.
b) In their final examinations, students have to write by hand; if they use computers in the classroom, they will get out of the habit of writing by hand and will be penalized in the examination. Here, we need to distinguish between the tools used for teaching and testing; for example, we use textbooks for teaching, but these are not allowed in closed-book examinations. In the same way, we could teach writing through computers, but test students in a different mode.
c) Students should display 'neat handwriting' in their essays; if they use the computer, their essays cannot be graded for neatness and further, their handwriting will deteriorate. This argument stresses only one component of writing, namely, penmanship, which is a relatively low-level skill; writing does not merely involve the mechanics of forming the letters, but also involves linguistic competence (spelling and grammar) and discourse elements (organization and cohesion).
d) Not all students own computers; issues of access and equity will penalize some (if not most) students. This is slowly becoming less of a problem as the prices of computers drop further every year and the government willing to invest in technology to upgrade educational institutions. In fact, using computers is becoming more imperative to meet the demands of the workplace and to engage this generation of students, which is already tech-savvy.

One factor behind the resistance to using computers is that we have come to associate writing with using pen and paper, and find it difficult to think of using another medium for writing. Pen-and-paper technology satisfies only one of the many functions of writing—the need for a permanent record—but it is not central to writing. Scribbles on the blackboard, slate and chalk, and marks on the sand are still forms of writing; although the product is less permanent than pen-and-paper, an impermanent medium allows us to easily erase mistakes so that errors do not show up in the final product. Here, it is useful to distinguish between the process of writing (drafting/composing) and the final product, and the tools that support each; during the process stage, an impermanent medium allows frequent changes that leave no trace, whereas for the final product a permanent medium is required.

From the students' perspective, essay writing is very difficult. During the composition class, students are expected to generate ideas and organize them, after which they have to plan each sentence and write it out neatly. This requires them to coordinate a complex set of sub-skills. They have to manage both the higher-level skills of planning and organization as well as lower-level aspects, such as spelling and punctuation (Flower and Hayes, 1981). When writing with pen and paper, which allows minimal corrections, they either have to compose the entire essay in their heads or discover what they want to say

as the essay progresses. The teacher's feedback shows their concern with numerous levels of writing, from the mechanics of writing (legibility, spelling and punctuation) to word-choice, grammar, and organization. Because of the complex coordination of skills as well as the teachers' focus on errors, most students prefer to play safe and do not stretch their abilities.

Once we acknowledge that writing is a complex skill and that pen-and paper is an imperfect medium, it becomes easier to tackle the problem of teaching writing skills. A medium that allows more flexibility during writing would help students acquire writing skills. Here, the word-processor offers a solution. It is an alternative to the inflexibility of the pen-and-paper medium; at the same time, it offers permanence in the form of the final printout.

The computer is not merely an expensive typewriter. It has the potential to handle a number of jobs that are not possible when working with pen and paper. First, it makes the mechanics of writing (such as the physical labor of forming letters) much easier, leaving the writer free to develop ideas and attend to organization (Cochran-Smith, Kahn, & Paris, 1990). Second, the word processor is a fluid medium that allows writers to repair mistakes. Pennington (1991) points out that students can:

- obtain a neat display of the text
- erase text, and
- move text around.

In addition, current word-processing programs offer tools, such as spelling checkers and grammar check, that provide students with a database against which they can check their written work.

Although it sounds as if word-processing can work wonders for student writers, studies have not always found dramatic changes in student writing. One consistent finding is that students write longer texts on the computer (Jones, 1994; Morton, 1988), but this does not always mean that the quality of their writing improves. In some cases, writers plan less when they write on the computer (Haas, 1989) and do not change the structure of their texts during revision (Peterson, 1993). Although students write longer texts on the computer, this is because they add text to the end of their papers rather than revising within their papers (Daiute, 1986).

However, writing on the computer appears to help lower-ability students (Dalton & Hannafin, 1987) and ESL writers (Pennington, 1993). This is because computers support some of the multiple processes in writing, such as forming letters and checking spelling, leaving the student free to generate and expand their ideas.

This paper describes a study that introduced word processing into the English composition class. It examines the effects of this single change on the quality of student writing and on student motivation. Although the study was conducted in Singapore in 1996, there are enough parallels with the current situation in India to make this re-telling pertinent. In both situations, there was a push from the government to incorporate computers in teaching and the facilities were made available. However, teachers were skeptical about the effectiveness of using computers as well as hesitant about their own technology skills. The study found that a single change, namely, allowing students to compose essays on the computers instead of by hand, resulted in substantial improvement in their writing that transferred to later compositions that they wrote by hand.

Details of the study can be found in series of papers and chapters (Gupta, 1998a, 1998b; Gupta, Hvitfeldt, and Saravanan, 1997, 1998). Here, I will focus on a single student, Student Z, and track his writing strategies and development over a period of three months.

The Study

Background

The study was conducted in Singapore, where most of the schools were equipped with computer laboratories, each of which had 40 computers. Few schools used the computer laboratory for anything beyond teaching Computer Applications.

The 17 students in the class were 15 year-olds in the ninth grade who belonged to the weakest academic stream. Although English is the medium of instruction in Singapore schools, the students' proficiency in English was very weak; they were more comfortable in their home languages (Malay, Tamil, or one of the Chinese 'dialects'), using Singlish for everyday communication.

In the first three months of 1996 I observed students and collected their English compositions. In January, the students wrote their compositions by hand; at the end of January, I persuaded the English teacher to move his class to the computer laboratory where students wrote their English compositions on computers for a month. In March, students again reverted to writing by hand because the computer lab was unavailable. Hence, we were able to compare essays written by hand versus the computer, as well as look for any transfer to handwritten essays.

The class met four times a week for English. In each session, the teacher showed students a visual, such as a picture of some men cycling through a flooded street, and spent one hour writing a composition based on it. This format was followed both when the students wrote by hand and when they wrote on the computer. In the computer lab, students composed their essays directly on the computer using Microsoft Word. Since there were more computers than students, each student worked alone at a computer.

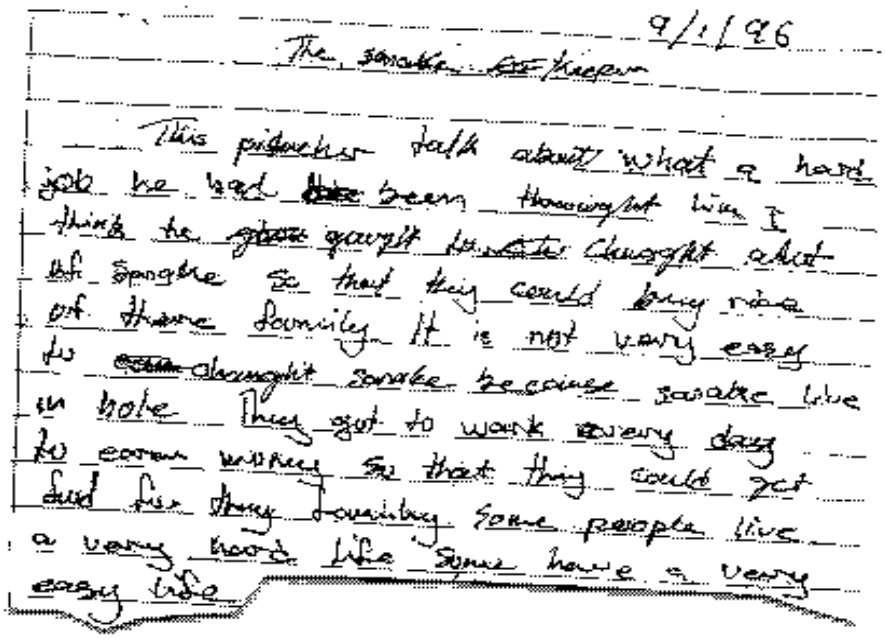
Each student wrote about 18 compositions by hand and 13 on the computer. In all, there were 520 compositions. These were analyzed using the style program on UNIX and statistical analyses were run to compare essays in the three modes: handwritten, computer, and post-computer. The results showed significant improvement in the students' written work (in terms of number of words, syntactic complexity, and range of vocabulary) as well as student motivation. Further, these results transferred to essays that the students wrote by hand in the latter half of the study.

Case Study of Student Z

Student Z is representative of the students in the sample.

Initial Handwritten Essays
Figure 1 shows an essay that Student Z wrote by hand in January. It gives some idea of his initial writing skills and the problems he faces.

Text 1. Essay written by hand



In a more legible format, this is what Student Z wrote.

The sanake ~~ca~~ keeper

This picture talk about what a hard job he had been throught him. I think he ~~gave~~ ??? alot of snake so that they could buy rice of there family. It is not very easy to chaught sanake because sanake live in hole. They got to work every day to earn money so that they could get food for they familiy. Some people live a very hard life. Some have a very easy life. (73 words)

It is not just the teacher who has a hard time reading such a text; the student could not read what he had written and so was unable to improve it. In writing, some cognitive attention is used for the lower-level skills of forming letters as well as language accuracy (in spelling, grammar and punctuation). In the case of weaker students, most of their attention gets diverted to this level.

Essays composed on the Computer

In February Student Z composed the following text on the computer.

Text 2. Essay Composed on the Computer

POOR PEOPLE

Last time were also like this, we were poorer that this people in the picture, we also live in flimsly shacks like this. At that time the living condition was very poor, and there are many manual worker there had to earn money day and night. To pay there rent. Some of this people are unskilled so that they had to build there own houses to protect themselve for the rain and sun

I think not many people like living here, so they had to workhard to own a big house. I think some of other village are better that this in the picture. Because there water pipe is outside there home but some of other people village had build the pipe inside there own home no need to go outside and take water. Some of the village do business outside there own home. There had very poor hygiene standard and i think many people may get sick.

I think there future development are to build free house so that they would not have to pay there rent, so they can pay for other thing (185 words)

Handwritten Essays after Composing on the Computer

In March, when the computer lab was no longer available, Student wrote the following essay by hand. Notice the marked improvement from Text 1 that was written before he had practice composing on the computer.

Text 3. Handwritten Essay after One Month in the Computer Lab

The entertainment wold

They are a lot of entertainment and many kind of them in Singapore. Some of this entertainment make you laugh and some of them can enjoy you. And some of it make you relax some of the entertainment are very voicen.

In Singapore that why there are a lot of torise come to Singapore because there are a lot of entertainment around us. They is to much to tell. Every where you go you will find it very entertaing. The torises come here to relax themself. So they come to this place to entertain themself. Some of them come in group but most of them come with a guide. I always see alot of toris every where in Singapore. As time past many of this torise come for different country and they are growing alot in Singapore. Last year only they cover half the popelesion of us in this country.

Entertainment are some of the importan thing that are growing fast in Singapore you can find them any where you go. And there are many kind of them to. The tourise come here to have new situations in Singapore some of them come here to have social interaction with us. Some of them whan new experience so that they could learn new thing from us. And some of the new idea they took and they will talk about it with there friend back at there country.

The tourise come here for fun, enjoyment and to relax theyself so they came here to see us entertain them. They would also whan to change there view of us. So that they think Singapore is a clean and green country and they would come back for more.

(284 words)

What changed

Essay length

Comparing the three essays, the increase in length is obvious. Student Z could barely manage to write 73 words at first; on the computer he generated185 words and even when he returned to writing by hand, he was able to compose an essay of 284 words. This parallels the results for the other students. When students first wrote their essays by hand, they averaged 112 words per essay. On the computer, the mean rose to 182 words. Curiously, when students went back to writing by hand, the mean was even higher at 215 words.

Text Organization

The second change was in the organization of the texts. The structure of Student Z's three essays can be seen in Figures 1-3. The three texts were diagrammed by breaking down the information into T-units (Hunt, 1965) and using the text analysis procedures laid out in Langer (1986). The numbers in the figures represent the sequence of idea units in the text.

Figure 1, which represents the structure of a handwritten essay, shows that the composition is merely a loose collection of ideas under the topic *The Snake Keeper*. Of the three main ideas, one (*Easy life*) is not even connected to the topic. Only one of the ideas (*Hard life)* is developed and the details are merely a loose collection of random points. There is considerable repetition of ideas; notice that the student has mentioned *the hard life* three times in the text.

Figure 2 is a marked contrast to Figure 1. Figure 2 not only has twice as many ideas as Figure 1, but is also better organized. Here, the student has not merely collected the ideas under a single topic but has set up three implicit sub-topics under which he groups related information: information about the past, information on changes, and future plans. This allows the student to handle the ideas that he generates with the word processor. Notice that the ideas are mentioned in sequence and no sub-topic has a loose collection of points. There is still the problem of information that hangs in mid-air with the idea of *Business Outside their Own Home*. However, Student Z has taken the trouble to set up a contrast. The text could be organized better, but at least the student has worked out the top-level organization of the essay; it is no longer a random list of loosely connected ideas but shows clear divisions into sub-topics under which related information is subsumed.

These notions about text structure transferred to later essays that Student Z wrote by hand. Text 3 (Figure 3) has a clear structure, with the information grouped under sub-topics. The numbering sequence is not ideal and the information is scattered through the text. The student knew what he wanted to say, but he was unable to cut/paste his sentences to bring related ideas close together.

Reasons for the change

The computer offered students two facilities: a readable display of text on the screen and editing facilities, such as delete, insert, and cut-paste. These facilities do not sound remarkable, but they offered students tools to (a) spot their errors, and (b) tools to fix these errors.

1. *Legible display*

From Text 1, we can see that Student Z clearly has problems even at the level of forming words. When an essay was composed on a computer, his attention was no longer focused on forming the letters, leaving him free to attend to other levels of writing.

Further, Student Z's handwriting was so illegible that he could not read even his own essay, and hence he could not revise it. Notice that in Text 1, the student deletes words as he writes and not later. Because the output displayed on the computer screen is readable, he was able to read his own texts. The teacher commented that the students had never tried editing their work before they came to the computer laboratory because they were unable to read their own handwriting.

2. *Easy Revision*

The ability to erase and move text allowed the students to change vocabulary, sentence structure and organization either while they were writing or when they had finished the essay. For example, Student Z typed 'how to say and do' and then changed it to the more complex structure--'how to speak or what to do'. He moved text around to bring related ideas together. This can be seen in the more complex structuring shown in Figures 2 and 3 that are discussed above.

Student E generated 200 words on *The Eagle*. She then edited each paragraph, deleting any repeated ideas. Finally, she read the entire essay and moved information across paragraphs so bring related information together.

For the students, it was a major struggle to produce even a 100-word essay, but on the word processor, they found that they could easily produce 200 words during the class. For the first time they found they could afford to delete words. The teacher pointed out that the students had never been taught to revise their essays; it surfaced because the students found they had sufficient time and text to work with.

3. Spelling & Vocabulary

Student Z had a range of 34 words in the essays he wrote by hand; this jumped to148 words for essays written on the computer. In his handwritten essays, Student Z used words like *sleep, slowly,* and *started,* but on the computer he generated words that are difficult to spell (*again, earn, night, organize, there, fellow, enough, show*), low frequency words (*punishment, condition*), polysyllabic words (*feeling, following, continue*), and words with -s morphemes that do not occur in Singlish (*matters, kinds, rules, sends, sons, wings*).

It turned out that students were using the spelling checker for a novel purpose; instead of using it to check their spelling, they used it to generate words that they could pronounce but not produce in writing. For example, Student M wanted to use the word *start* but was unsure of the spelling. So he sounded it out *[sta:],* tentatively typed in *stard,* used spell-check to get a long list of suggested words, and selected the right one, *start.* Students used this strategy to get the spelling checker to provide words that they would not normally use in their written work.

The students have a fairly large receptive vocabulary, but because of the teacher's emphasis on spelling accuracy, they played safe and used basic vocabulary. For example, two students wanted to write an essay on parrots, but because they could not spell the word, they switched to cats and dogs. This emphasis on the mechanical aspects (such as spelling) concealed student proficiency in vocabulary, and did not allow them to stretch their abilities. On the computer, when spelling was no longer an issue, these higher-level linguistic competencies surfaced.

Discussion

The findings of the study were in line with the research literature, namely, when student writers compose on the computer, their essays improve in terms of length, syntactic complexity, and organization. The essays show very clearly that students' writing ability improved in the short space of a month. Their essays were longer, better organized and used a wider range of vocabulary. These effects persisted even when students reverted to writing their essays by hand. The computer helped because it is a more forgiving tool than pen-and-paper. Since the computer allows students to erase words and move text around without leaving a trace, it made them more adventurous about writing. The neat text display gave them pride in their work; it also released them from the physical labor of forming letters and, because it was legible, allowed them to read their own text in order to revise.

Another visible change was in student motivation. While all of these tangible improvements impressed the teachers in the school, they were more impressed with less visible changes--an increased interest in and enthusiasm for writing, improved attendance and classroom discipline, and the lasting effects of these changes when the pupils

returned to handwritten compositions. Students in other classes wanted to use the computer lab for their writing class and, as a result, the computer lab was not available for the latter half of the study.

I would like to turn to two aspects of the study that emerged from observing students at work. First, although students had never been taught how to organize their essays, they spontaneously did so on the computer. Writing instruction consisted of giving students a topic and leaving them to generate text as best as they could; students were never taught how to generate ideas, expand them, organize points into clusters, and then write. Yet, when they used a computer this latent knowledge surfaced. Students started expanding points that were not clear, deleting repetitions, and re-arranging points.

Second, students were clearly hampered by the teacher's emphasis on spelling accuracy. This constrained them in their choice of topics and limited the vocabulary they used in their essays. Through the spelling checker, they were able to produce words that they knew but hesitated to use because they did not know the spelling.

Both these effects emerged when students began to use the word processor. Neither the teacher nor I suggested these strategies; instead students spontaneously used the new tools to meet goals that they were unable to achieve through conventional pen and paper.

Implications for Teachers

When this study was conducted in the 1990s, there was considerable debate about the benefits and disadvantages of allowing students to compose essays on the computer. This discussion seems to have died down after 1998; instead, research journals such as CALICO and System take it for granted that students are using computers and have moved to a discussion of collaborative tools, such as the Internet and discussion forums. However, this seems to remain a concern in certain countries. In discussing the situation in Japan, Sugimoto (2006) points out that though the nation is technologically advanced, the government is encouraging the use of computers, and students are constantly on their computers, there is resistance to using them in classrooms.

Teachers who struggle to teach their students essay writing find that the computer helps. In hand-written compositions, teachers try to cope with virtually all areas of composition (such as penmanship, spelling and punctuation, vocabulary, idiom, grammar, word choice, style, cohesion, and organisation). In contrast, essay composition on the computer instantly eliminates several of these lower-order skills (e.g., spelling, punctuation and penmanship), leaving the teacher free to concentrate on higher-level skills, such as organisation, content, and style. Teacher feedback is simpler and more able to focus on specific skills. Writing is a difficult skill that needs to be taught, and the computer offers the student writer assistance at different levels. The computer makes the process of learning to write less painful and more interesting.

Because the written products can be saved on disk, students can revisit their essays later in the term. This not only gives them a chance to develop their ideas further but also makes them realize how much their writing ability has matured.

Computers also allow the teacher to show students how to edit their work. To do this, one computer has to be connected to an overhead projector so that the entire class can see the computer screen. The teacher can then display one student's work and ask the class for suggestions on improving it. The suggested changes can be typed in and students can see the effects of the change immediately instead of having to visualize it. In terms of process skills, this is particularly useful because students do not have to imagine what the revision process or the final version will look like--it is done in front of them.

Although the formal examination in India still requires students to write by hand, through the computer students can still learn how to organize and revise their essays. They learn the principles of good writing and, as our study shows, they transfer this learning to essays that they write by hand.

Teachers who want to use technology in the classroom often feel that they should use special software packages, such as multimedia lessons. We could make a start with what is at hand—a standalone computer with a word-processing package, such as Microsoft Word.

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Appendix

Figure 1. Structure of Essay Written by Hand in January

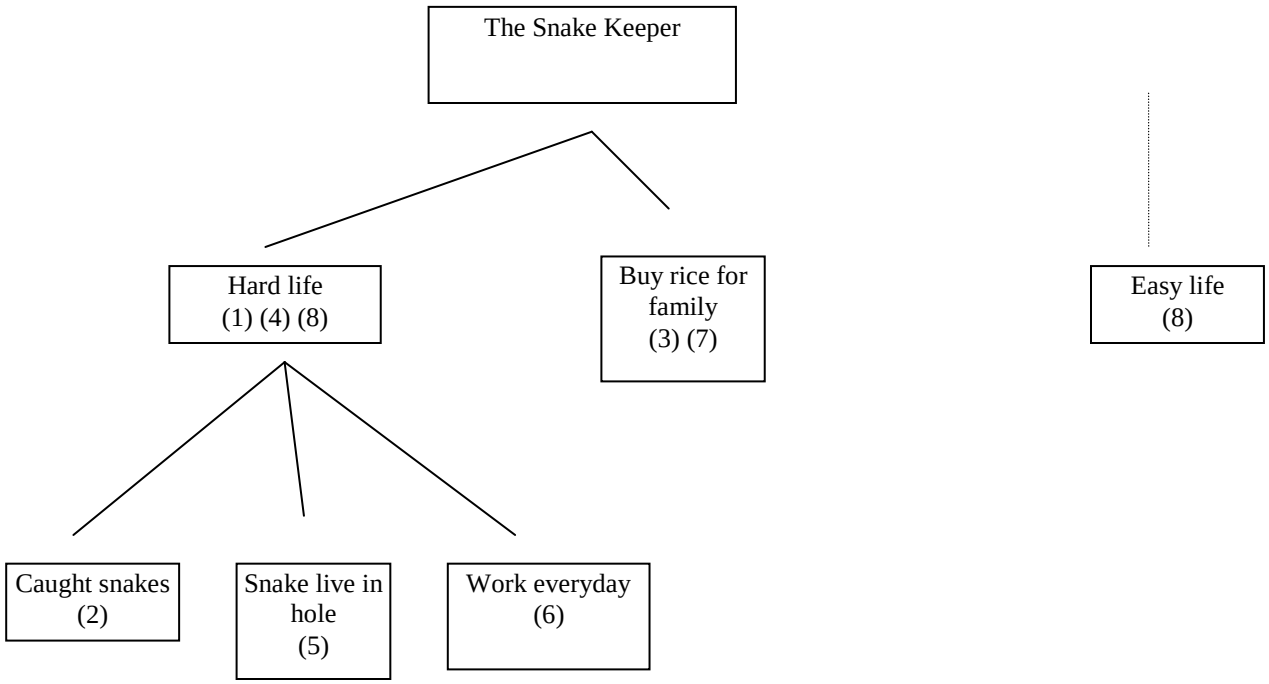

Figure 2. Structure of Essay Composed on the Computer in February

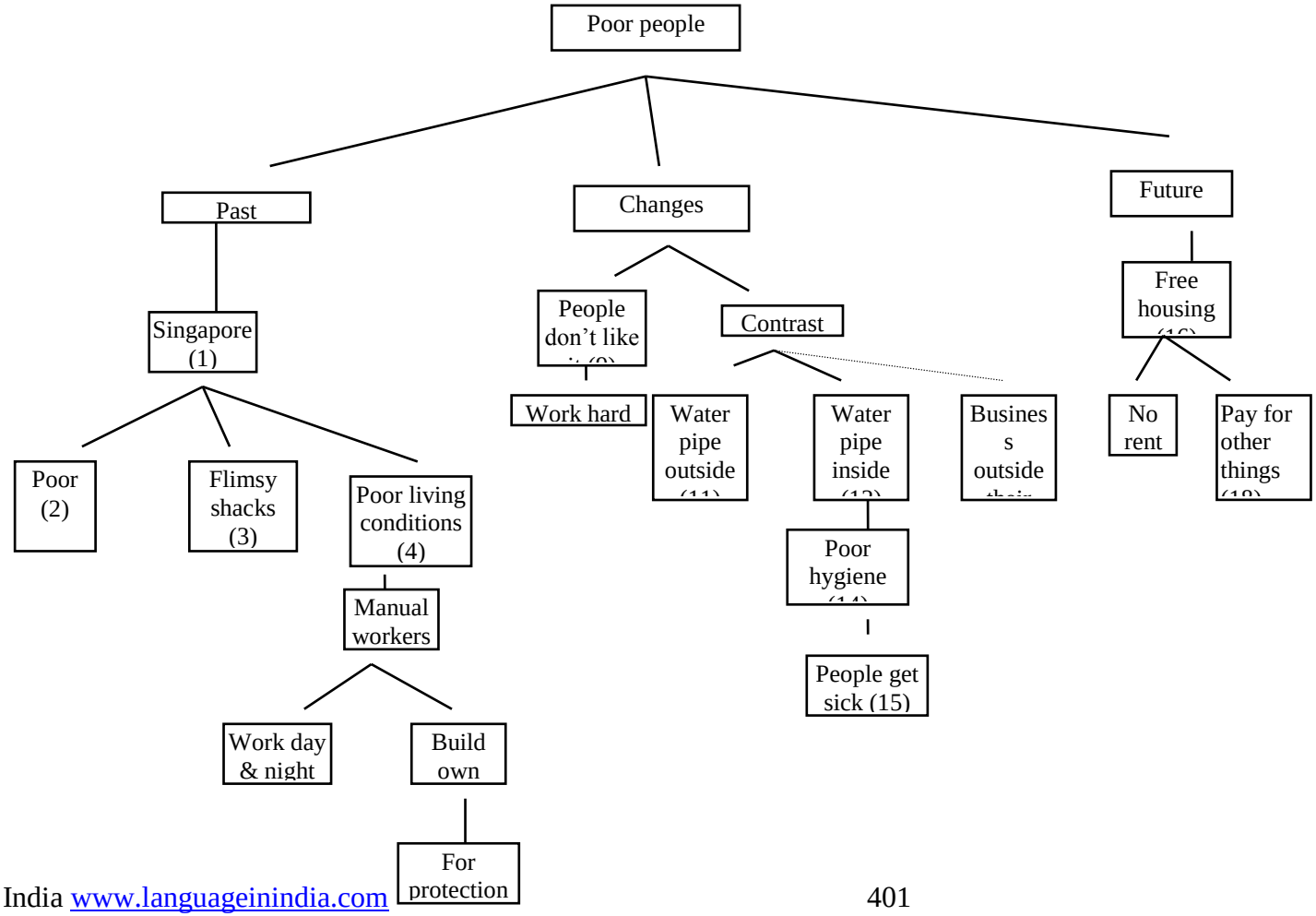

Figure 3. Structure of Essay Written by Hand in March