

## **HOT METAL / HOT WORDS**

### **Event and Interpretation as Developmental Tools in Adolescent Self Concept**

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#### **ABSTRACT**

This paper analyzes the content of sixteen student journals written during a five day bronze-casting workshop in a high school art class setting. By assigning each sentence to appropriate descriptive categories of variables, patterns of task mastery and development of positive self concept are tracked. Suggestive correlations are identified between the physical experience of risk-taking in skill achievement, as stimulus, and increases in frequency of occurrence of the generation of ideas, statements of insight, and a particular problem-solving statement sequence that resolves in positive self perception. Vygotsky's theories of scaffolding in education and self-talk in skill mastery and Gardner's theory of multiple domains of intelligence are used as guidelines to the investigation. Implications in the area of experiential education are considered in conclusion.

#### **PREFACE**

I have taught metal casting and jewellery design workshops in the public school system for five years. Sponsored and financed by the Ontario Arts Council Artists-In-Education Program and the local Boards of Education, the program's stated purpose is to have professional artists facilitate enriched learning experiences using media and approaches not generally available to students.

In all these projects, my intention is two-fold: first, to pass on a set of technical skills, meanwhile developing the rudiments of the problem-solving loop in the design process; second, and more important if less obvious, to provide an emotionally "safe" environment for the students to test their limits and learn to trust their creative process. I use a Medieval guild workshop model, emphasizing craft history, cultural context, and collegiality. This positions the students as apprentices, rather than competitors as they would be in a waged industrial or graded curriculum context where motivation to learn is related to rewards. Thus the pressure and impetus come from the traditional sequential acquisition of a "holistic" technology, to use Ursula Franklin's term, rather than from each other or the imposed hierarchy of the school "system", leaving the students free to explore the expressive aspect of their work without turning it into a commodity. This viewpoint is influenced by the thinking of the Russian psychologist Lev Vygotsky. Further references cited in this paper are from *The Vygotsky Reader* (1994).

In the spring of 1996 I taught a metal casting workshop that differed in two ways from the usual format: the students cast their own pieces, a technique that was totally new to them, and they all wrote a daily journal at the beginning of each class. Though accustomed to seeing teenagers grow before my eyes during these workshops, the content of their journals was so striking that I wondered if they contained evidence that could be analysed, if not to explain, at

least to illuminate the nature of the transformation I had so often witnessed. From a preliminary reading, I could see what appeared to be patterns or rhythms across the days as well as a wild and poetic interpretation of the events of the workshop.

Howard Gardner writes of "the will [required] to withstand the enormous pressures towards uniformity and unidimensional assessments" in reference to a universal intelligence testing procedure based apparently on the idea that "if a capability or approach can't be tested it seems not worth paying attention to".<sup>1</sup> Imagination in our industrial society is a suspect function or ability or capacity, easily and constantly undermined in the drive to conform to whatever the current model of behaviour might be. From the professional artist's point of view, and perhaps the case in every creative endeavour<sup>2</sup>, the generation of a new idea, no matter what the medium, comes in two distinct stages: a powerful single image, often inchoate and emotionally profound, in the form of dream or flash of insight or even a voice; and the second stage where skills are brought to bear, or learned if necessary, in order to make the artefact real. Between these two stages the creator is in a vulnerable and tentative state, easily discouraged and sidetracked by their own or others' negativity. This is particularly so of high school students, trying to fit into both their peer groups and the school system, at the same time as individuating developmentally. Frank Barron's (1988) list of personality factors in creative people includes independence of judgment and courage, as well as a drive towards pattern and meaning.<sup>3</sup> Here the journal is a valuable tool, one might say a "place", to work through doubt as well as variations on the idea.

Journal use in schools is so widely practiced that "kids are journalled out",<sup>4</sup> according to Dr. Johan Aitken of the Ontario Institute for Studies in Education, Department of Curriculum. Indeed their journals are monitored for everything from progress in math to abuse at home. However, though such "policing" was an ethical concern, I believed that the benefits to the students of learning to use for their own purposes the American Buddhist writer Natalie Goldberg's "writing practice", a timed, unedited method, outweighed the possible damage of my invading their privacy. After introducing Goldberg's concept, I followed standard ethical procedure (explanation at the outset, debriefing afterwards), we made a poetry piece of excerpts for the final display, and the students signed release forms for publication in academic and artistic contexts. More than one student admitted to actually enjoying writing for the first time ever in school. I think this particular journal form may be qualitatively different from the previous examples, although that, as well as other aspects of my relationship with the students, could be due to the informal, short term, status I occupied in the school community.

I was particularly interested in studying the connection between written language of a specific, journalistic, stream of consciousness type, and the acquisition of a technical skill in a workshop setting. Writing is reflective, investigative and documentary, and among teenagers, lyrical, passionate, and poetic<sup>5</sup>. Metal working is deliberate, sometimes frustrating, satisfying in a primeval way, but most significant in this context, learning to cast bronze is an initiation process of the most terrifying sort ("Fire Good!"). In my classes I keep a twelfth century portrait of St. Eligius, patron saint of metal workers, and I always pray out loud for mindfulness to

assorted relevant saints and deities before lighting the torch. By the second day, the students are praying too, which I find remarkable and indicative of heightened consciousness rare in a Virtual Reality society.<sup>6</sup> So in my analysis I suspected there would be evidence of the impact of such an experience. Given, then, that two processes were going on, writing in a certain format, and learning a new technique, the challenge was to analyse the journals in a way that revealed a pattern to the development of the individuals: a portrait of the class, in a sense.

## METHOD

Each day's class was preceded by a two minute reading from Natalie Goldberg's book *Writing Down The Bones*. The readings, and my directions, reiterated the writing method rules: keep the pen moving, don't edit, stay loose. The students were asked to fill a loose leaf page in fifteen minutes. While I wasn't concerned with content, a list of topic sentence openings, cited below, was kept posted on a bulletin board to serve as both springboard and anchor for the process. The students were not obliged to use them. Each day's writing was photocopied and returned. I highlighted passages that seemed particularly powerful, and these we used in the final display.

The next task was to transcribe the journals, all fifteen thousand words, distinguish the sentences within run-on teenage scrawl style, and number them. In figuring out a system for categorizing variables, I erred on the side of complexity, both to make the data accessible for different applications, and to clarify the subtleties of relationship among variables while accounting for stylistic variations. I wanted to account for physical factors such as time of day, alertness, hunger, and involvement in activities such as varsity sports; to note associations of ideas, the emotional impact of events in and outside of class, memories of people or objects, anything that could possibly relate to issues of self-esteem, development, and creativity. The idea was to "read" the tally sheet of a particular student on a given day like a musical score, the topic, tone, and narrative unfolding through the combination of variables. The five resulting classes of variables, Subject, Intention, Physical, Topic, and Structure, are elaborated as follows:

### Subject

This section describes the subject matter of the sentences, as opposed to opinions or emotional qualities expressed.

Process/Language	concerned with language, writing <i>([Writing] allows you to flow and carry thoughts and ideas to different worlds beyond this one )</i>
Process/Technique	process other than language, including computer use, metal work, painting or other applied technique <i>(I wanted to make it more permanent than just something pressed into a chunk of clay or carved into a dead mollusc )</i>
Relates to	connection made by association to another area, stimulus, expertise <i>(That would be cool, because I am into Dungeons and Dragons, and Medieval stuff )</i>

Memory (object)	some object they remembered that they'd seen or owned or had made
Memory (person)	
Artist ancestor	parents, grandparents, often role models as practising musicians and artists, though not necessarily supportive
Generation 1	first mention of a new idea
Generation 2	Development or evolution of "new idea", rather than a separate new idea
Observation	neutral statement, sometimes qualified in other categories
Narrative	part of story line, "I did this, we did that"
Jokes	relates internal "self-talk" to outside reader
Exclamation	e.g. "Yeah", "crazy"; a "self talk" grounding device, possibly

### Intention

This section refers to wishes and goals, the process of reflection and evaluation of themselves, their abilities, their situations, and how they perceive challenges.

Assessment +	I do this, have this ability, skill, now. Relates to gap between ability and goal in <u>I'm 80</u> topic. (... <i>I have come up with numerous ideas...</i> vs. <i>Now that I'm 80 I'm glad I learnt how to read saxophone music cause back when I was young I couldn't</i> )
Assessment -	I can not do this, now ( <i>I don't know what to say, I'm not good with writing things like this</i> )
Support	This person, situation is/was supportive, encouraging (Vygotsky's "scaffolding") ( <i>The only person that I can remember who didn't criticize me a cow blue or coloured outside the lines was my grandma</i> )
Barrier	This is an obstacle for me ( <i>I have found that even when I have ideas I can't even write them down very fast</i> )
Aspire	I wish, I want to
Curiosity	Why is this? What would happen if..? ( <i>Does[silver] react differently, does it cringe from the torch...?</i> )
Dilemma	I don't know why this is so/confusion ( <i>Would discovering who I really am be a mistake?</i> )
Declaration	I like this, I believe this, I'm going to do this ( <i>I am a visual learner and I'd rather express myself through painting rather than words</i> )
Declaration	I don't like this, I don't agree, it's wrong, I'm not going to do this ( <i>Writing things down bothers me</i> )
Insight	I know why this is/was so - comprehension, closure ( <i>I guess that's why I rarely try new things</i> )
Individuation	I believe this, in spite of opposition/ in contradistinction to/ vs. the world

Goal	( <i>Maybe this time I'll live my own life not the life society has got for me. </i> ) I want to have done this in the topic <u>I'm 80</u> ; intention of achievement as opposed to wishing for an outcome as in "Aspire"
Achievement	I did this—positive ( <i>I never took it off and I never did end up losing it.</i> )

### Physical

Excitement	Strong positive feeling
Unhappiness	Strong negative feeling
Anger	"
Fear	About a process (writing, metal, other)
Tactile	description involving senses
Hunger	
Tired	

### Use of given topic sentence

This was a list of opening lines presented at the beginning of the workshop:

Now I'm 80 I'm glad that I...  
 Melting Metal is ...  
 Writing is...  
 The metal piece I remember...  
 I was walking.. and I found a...  
 I remember making..  
 I want to tell you about..  
 Once I saw a...  
 I have this idea..  
 I wish I could make..  
 If I were an artist..  
 If I were an art teacher...

### Structural

This section records physical transformations in handwriting, the idea being that a looser hand might be related to less self-consciousness and self-censoring in thinking and content.

handwriting change within a day  
 handwriting change over days  
 new page  
 graphic

I then tallied the sentences as exhaustively as possible, given the divergent stated purposes of description and mutual exclusion. Sentences were tallied so that subject, content, form, and emotional tone could be accounted for. Thus sentences could fall into several categories apart from those which were mutually exclusive, like topic choice. Run-on sentences were divided up if it was logical to do so, but what was one to make of the following, for example?

JV1/12 : *I think I would like to be an artist but my mom says its not a good idea to go to university to be one cause I won't make very much money, but I don't really like anything else, so I don't know.*

This I categorised under Process/Technical, Barrier, Dilemma, and Goal, given the context of the journal entry, which for J.V. that day was a portrait of herself, her activities and achievements, and how she felt about them. Most sentences were not so complex, but here the problem of variation among individual writing styles is apparent. What in one laconic student would be a triumphant breakthrough of Individuation, in a more expressive student might be Assessment +. Similarly, Generation of New Ideas could be identified as Insight. I made a lot of judgement calls, based on context and preserving the phenomena, the spirit of the day's journal entries.

Once the tally sheets were completed, I created tables based on the four days' collection of journals. The first day's writing constituted what would have to suffice as a baseline: the students had just met me, heard briefly about the project and quite a bit about writing, and were full of anticipation of the unknown, as well as their plans for designs. By the second day, they had observed the casting process but had not yet experienced more than an introduction to inert mould material. By the third day most of them had cast metal or had stood by as their classmates performed the procedure, and by the fourth day they had all experienced it at least once and were preparing to do so again, or were working on the metal objects they had cast. Regrettably I did not collect a fifth day's writing due to schedule pressure, though I did make observations.

## **HYPOTHESIS**

A senior level art class of sixteen student test subjects aged fifteen to eighteen (M= 3, F= 13) participated in a hot metal bronze-casting technical process for three hour blocks of time over five consecutive days, and was directed to write a stream-of-consciousness journal for fifteen minutes at the beginning of each daily session.

It was anticipated that as learning progressed in the technical skill of metalworking, the experience would result in measurable changes over the days of the workshop as recorded in particular areas of the journals. Suggestive correlations in frequency of occurrence in the following variable categories were predicted: choice of topic as a vehicle of expression, statements concerning fear, excitement, and insight, and the occurrence of a pattern of statements related to problem-solving.

## OBSERVATIONS

### 1] Choice of topic

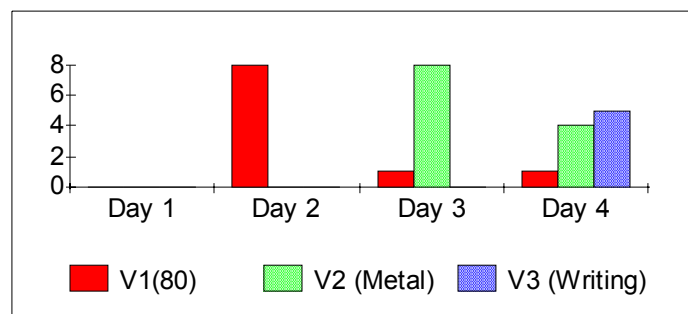
Given the option of writing about anything or choosing from a list of topics, most students used the topic sentences somewhere in their writing. Of a possible fifty eight entries entirely devoted to a particular topic, forty four were produced. The topics which occurring most frequently on particular days, Now I am 80, Melting Metal, and Writing, are represented in Figure 1. (See Appendix 1, Table 1 for fuller discussion of occurrence of all topics across days.)

A) Ten students (62%) wrote on the topic Now I am 80 Years Old (Variable 1). Eight students (50%) did so on Day Two.

B) Twelve students (75%) wrote on the topic Melting Metal. (Variable 2). Eight students (50%) did so on Day Three, four students (25%) did so on Day Four.

C) Five students (31.5%) wrote on the topic of Writing, all of them doing so on Day Four (Variable 3).

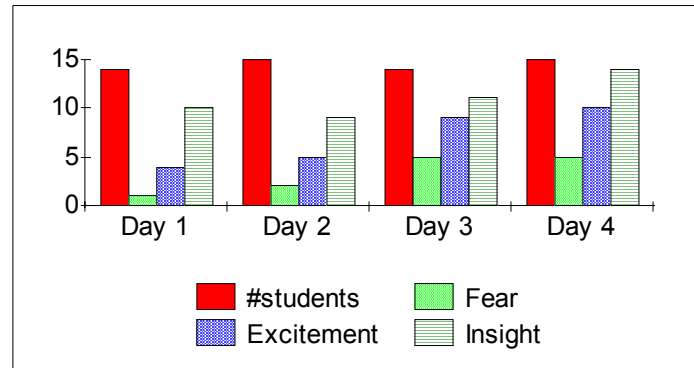
Figure 1: Frequency of occurrence of V1, V2, V3 across days



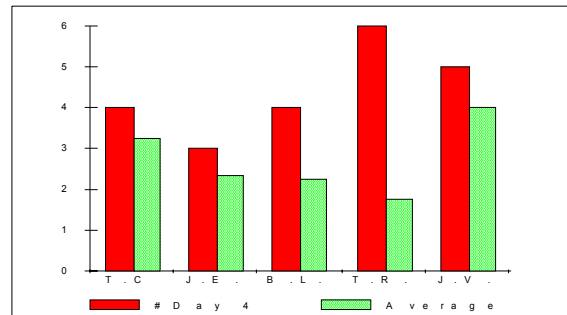
### 2] Occurrences of statements of fear, excitement, and insight

Statements occurred with the following frequency: (See Appendix 1, Table 2 : Students making statements in these categories; Table 3 : Total number of statements in these categories; Table 4 : Mean number of statements per student; Tables 5 and 6 : Frequency of occurrences of fear, excitement, insight, and topic on Days Three and Four; Table 7 : Writing topic correlated with insight frequency)

- A) Ten students in total (62%) made **fear** statements.
- B) Fourteen students (87.5%) made statements indicating **excitement**.
- C) All students made statements indicating **insight**. Average number of statements per student fluctuated from 2 to 2.8 to 2.45 before jumping to 3.28 on Day Four.

**Figure 2:** Number of students making statements

While some connections were predictable, for example a rise in excitement and fear statements in Melting Metal entries, others were less so. Fear was expressed in I'm 80 entries, and on Day Four by people not writing about Metal. What were they so excited about on Day Four, if eleven of the fifteen present were not writing about Melting Metal? Eight students (Table 1) wrote sustained entries on other topics that day, five of them about Writing, in which much Excitement was expressed, but no Fear. The group showed a substantial rise on Day Four in both numbers of students making statements of insights and the numbers of statements themselves. This rise could be related to the number of students writing about Writing, reflecting on a reflective medium, and indeed we see in Figure 3 that those students do show a higher incidence that day than their average frequency of insight statements over the four days. (Compare Tables 4 and 7)

**Figure 3:** Correlation of Writing to Insight statements

Here we may be seeing a response to the experience of mastering a dangerous skill: an exuberance expressed in the excitement and perhaps a disinhibition to expressing fear. I find it interesting that fear was mentioned outside the context of the technical event. Data from Day Three shows eight students writing about metal, six making fear statements, but only four doing both. On Day Four, four students wrote about metal, five made fear statements, three did both. Is the genuine physical fear they all felt during the learning process being transferred to other areas of their lives? It may well be connected to the increase in insights: having been challenged and frightened, they can now ride on their success to address more private struggles.

### 3] Problem solving sequence

This refers to the occurrence of a pattern of statements about the sequence: aspiration, perception of barrier, generation of ideas, and resolution in terms of positive statements reflecting self-esteem and closure. These have been grouped as follows :

Group A: Aspiration, Topic: Wish I could make... whole/part

Group B: Negative assessment, Barrier, Dilemma

Group C: Generation of ideas

Group D: Declaration positive, Insight, Individuation

The statements occurred sequentially, though not contiguously, unless noted \* — when they were present but out of sequence. Here writing style was a significant factor, and classification, of necessity, subjective. ( Appendix 1, Table 8 )

I saw this pattern as a problem solving loop. Here, for example, is K.M. dealing with her obligations to a friend whose young aunt had just been killed in a car accident:

3/8 *I want to help her but the only thing I can think of is just to leave her to her emotions. Right now.*

3/9 *She is coming to Europe with me on the March break and we are going to be rooming together everywhere.*

3/10 *I think then I will ask her to talk to me about it.*

3/11 *// What do you do when someone close to you dies??*

3/12 *Who really knows // except I feel the best way to deal with it is to cry and cry and cry !!*

This passage I classified as 3/8 = A+B (Aspire, Dilemma), 3/9 = Narrative, 3/10 = A+C (Aspire, Generate), 3/11 = B (Dilemma), 3/12 =B + D (Dilemma, Declaration +). Not all such problem solving loops ended up going from the particular to the general so dramatically, but the insights and resolutions in D category often showed reflection and breakthroughs into self-awareness. Here is T.R. on Melting Metal :

3/3 *You can be successful like I was but maybe when your done you don't like the finished product.*

3/4 *I hate the Mouse ears but it's okay because I have a better idea.*

3/6 *The metal is really hot and I was scared that I was going to spill it and hurt myself or someone else but after I did it and it stayed in the cast that was pretty cool.*

3/8 *My new idea is going to be a ring*

3/9 *a silver one, I'm making for somebody very special.*

3/10 *The picture is of a sun sort of. it has squiggly lines and a few straight lines.*

3/12 *I don't know what it says about me but it would be neat to find out.*

3/13 *Maybe I'll take it to someone who analyses them.*

3/15 *I like to make things for people.*

3/16 *I rarely make them for myself because they don't do anything for me.*

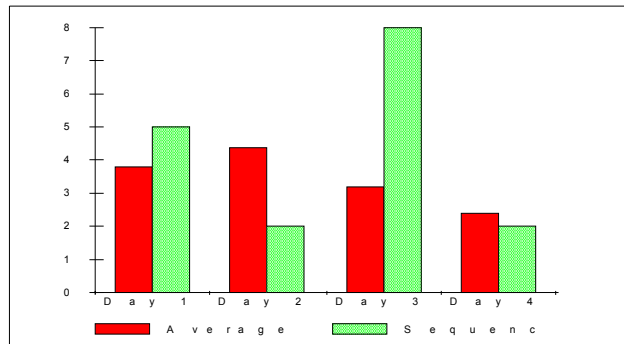
3/17 *I'd much rather that somebody important has it.*

I classified 3/17 as Barrier and Insight, in that T.R. states that she prefers to give her work away

to others who are "important", implying that she herself is not. Sentence 3/6 was classified as Declaration +, (as well as Fear, Excitement, Achievement, and Process/Tech) and I think it significant that such a whirlwind of event, success, and feeling should appear here in the midst of coming to terms with a design she's completed but hates, and the idea for a new one, planned for a special person, and so resonant with symbolism that perhaps an expert needs consulting. I see parallels between this movement into unknown design/symbolism terrain and the insights, however self-effacing they may be, in 3/15-17.

In comparison to the frequency of Generation of Ideas (Appendix 1, Table 9) the rise in occurrence of the "sequence" (Figure 4) on Day 3 suggests that idea generation has been integrated within the problem-solving loop. That is, the students are developing and addressing situations in their writing by framing them as challenges.

**Figure 4 :** Average of "Generation" statements per student compared with students showing "sequence"



## FINDINGS

Although the method of data collection and analysis in this quasi-experiment make it difficult to test conclusively, I suggest that we are seeing a shift in the concept of self as agent in a perceived situation, parallel to the learning process. The activity in the three areas of topic choice, affect and insight, and problem solving is intriguing given Vygotsky's views on the relationship between Word and Action as discussed in *Tool and Symbol*. He writes of "the inner re-organisation of action by means of the word"<sup>7</sup> and "the new relation of action to personality which arises thanks to the word and leads to the mastering of action", as well as the "spontaneous application of the auxiliary method",<sup>8</sup> (in this case, the journal) to accomplishment of the task. In *Thinking and Concept Formation in the Adolescent*<sup>9</sup> he writes of the process of finding a solution to some problem as giving rise to the conceptual<sup>9</sup>, and goes on to say, in *Imagination and Creativity in the Adolescent*, that imagination is indispensable in moving from one form of the concrete through abstraction to the construction of a new form of the concrete, and indispensable also for the processes of understanding and of practical activity.<sup>10</sup>

Thus the temporal factor is critical. The topics chosen on Day One ranged between two poles, the establishment of "turf" and individuality in the autobiographical and memory based

statements, and the wishful thinking of Ideas and Wish I Could Make. The frequency of Now I'm 80 on Day Two suggests that the students were tentatively gearing themselves up for transformation. The anticipation and anxiety about the coming technical challenge surfaced in the goal-setting (which had a different tone than the earlier fantasies of wishing), as if by envisioning long term outcomes of a commitment to the activities in which they were already engaged (music, art, studies, applying to college, negotiating family dynamics) they might feel more comfortable facing the immediate challenge. Here they were writing entirely in the realm of fantasy, trying on possible futures for themselves from the point of view of having already done so.

The increase in the problem solving "sequence" on Day Three suggests that the fright and excitement of the immediate risk involved in skill mastery (indicated by the correlation between that topic and those two variables ) has been transformed imaginably into the confidence to face other problems. Here the content of the journals is powerfully illustrative, as the students writing on the topic describe how afraid they were of spilling the metal and burning themselves, how quick it all was, and how great they felt having the ability to blow up the school and yet not doing so! (Appendix 2, Journals) This is supported by the substantial rise on Day Four in numbers of students making statements of insights and the numbers of statements themselves, as well as in Category D statements generally, accompanied by a decline in "wishful thinking". The problem-solving and excitement of Day Three appear to have resolved into an enthusiastic commitment to a variety of topics, in which a heightened level of reflective insight and self-confidence prevails, rather than the insubstantial fantasy of unfulfilled desires. Relevant here is Janet Davidson emphasis on the importance of insight abilities in the identification of the gifted child (1986) in Sternberg's discussion of creativity.<sup>11</sup> Melting Metal entries were so vibrant and specific in detail that they could be called "de-briefing" in the conventional sense of recounting an event, identifying affective states, and re-evaluating their impressions, while Writing entries demonstrated an entirely different level of awareness, engaging in a process about a technique inherent to the process. The self-referential quality was not lost on them. Coming at the end of the workshop, it may have served as a form of closure.

My conclusion then is that the act of journal writing consolidates task mastery through cognitive awareness of what is learned somatically, by generating linguistic images that enable the translation of concrete achievements from the physical realm to a level of conceptual understanding and broader application. Indications are that a resolution is formed of the new self concept based on self-awareness gained through the linguistic filtering of task mastery.

## **DISCUSSION**

Among many others, Vygotsky and Gardner point out that adolescence is a time of development of the conceptual in the thinking process and the functional application of fantasy. Eidetic imagery moves from the realm of concrete memory characteristic of childhood, to conjoin in the imaginal realm with intellectual reasoning in supporting objective fantasy, as well as the

subjective emotionally based fantasy used in compensating for unsatisfactory external situations (Teenage Wasteland?). Vygotsky identifies the increasing use of language to form the conceptual as the reason for the migration of eidetic imagery from the sphere of memory to that of imagination in the adolescent,<sup>12</sup> yet the powerful tactile imagery in the Melting Metal entries on Days Three and Four seemed as raw and unfiltered, unmediated, as his description of young children's fantasies. Could this experience be blasting through the students' constructs of themselves and hitting them at some profound imaginal level? If so, it is significant for a generation thinking about who they are and planning their lives, yet accustomed to constant pre-digested video entertainment (and "educational" technology) and what appears to be a parallel need either for violent kicks like raves and psychotropic drugs and ritual self-mutilation, or a numbed and compulsive consumerism. It is in the linking of the subjective emotional fantasy with the objective intellectual imagination that the adolescent finds the means to develop a sense of self in the world, and it is in support of this act of creativity that I see the present piece of research most usefully applied.

Because this system of categorising journal statements is both subjective and susceptible to other factors such as personal writing style, control testing for reliability and validity is essential. On a cautionary note the question of privacy must be raised. As educators we hope that the evolution of positive self-esteem will arise from such transference of skills from the technical and particular to the metaphysical, but my comment to T.R. that she was important resulted on Day Four in her furious writing about Writing and what an invasion of privacy it was. Here the roles of supportive teacher and objective researcher clashed, underlining how careful one must be in this most personal of data formats.

Many questions arise. Would the process be the same in an individual one-on-one learning experience, or does it require the solidarity and comparing of notes and experiences of the group context? Would similar effects be seen learning other techniques, is it limited to intense experiential media, or necessarily connected to tool use? Must an object result, could that be an event, such as a drama or dance performance, does it even have to be art-related, or could casting engine-blocks have the same effect? In light of Gardner's assertion that no intelligence is inherently artistic or non-artistic but rather exercised in a particular discipline on the basis of a cultural value judgment<sup>13</sup> and that intelligences operate in conjunction with one another, and given that the computer environment in no way engages the physiological aspects of human experience that provide the images our imagination requires for concept development and psychic integration, then I would think that such a developmental tool as linguistic reflection on an experiential event would be a timely and necessary part of the education of adolescents. I look forward to the refinement of this method and some answers eventually to the questions this preliminary effort has raised.

**ENDNOTES**

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- <sup>1</sup> Gardner, p.11-12
  - <sup>2</sup> Gardner,1988; Langley & Jones, 1988; Sternberg 1988; Torrance, 1988; quoted in Sternberg, p.364-365
  - <sup>3</sup> Sternberg, p. 361
  - <sup>4</sup> Interview, Spring 1996
  - <sup>5</sup> Simonton, 1975, quoted in Sternberg, p.361; Bühler, 1929, quoted in Vygotsky
  - <sup>6</sup> Gardner suggests an eighth intelligence encompassing the moral or spiritual domain, which may be "an amalgam of inter- and intra-personal intelligences with an added value component" and depends for mobilization on cultural context. Gardner, p.46
  - <sup>7</sup> Vygotsky, p. 168
  - <sup>8</sup> Vygotsky, p. 159
  - <sup>9</sup> Vygotsky, p. 257
  - <sup>10</sup> Vygotsky, p. 282
  - <sup>11</sup> Sternberg, p. 397
  - <sup>12</sup> Vygotsky, p. 273
  - <sup>13</sup> Gardner p. 46

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**APPENDIX 1: Tables**

**Table 1:** Total number of students writing each day, and the number choosing to write a sustained piece on a particular topic.

	Day 1	Day 2	Day 3	Day 4	Total
V1(80)	0	8	1	1	10
V2 (Metal)	0	0	8	4	12
V3 (Writing)	0	0	0	5	5
V4 (Idea)	0	2	0	0	2
V5 (TellYou)	3	0	1	0	4
V6 (MemMak)	2	0	0	1	3
V7 (WishMak)	2	2	1	0	5
V8 (Saw S.T.)	0	0	0	1	1
V9 (MemMet)	1	1	0	0	2
Total	8	13	11	12	44
#students	14	15	14	15	

- A) Ten students (62%) wrote on the topic Now I am 80 Years Old (V1).  
Eight students (50%) did so on Day Two.
- B) Twelve students (75%) wrote on the topic Melting Metal (V2).  
Eight students (50%) did so on Day Three.  
Four students (25%) did so on Day Four.
- C) Five students (31.5%) wrote on the topic of Writing (V3), all of them doing so on Day Four.

- D) The two students (12.5%) writing about an Idea on Day Two (V4) wrote respectively of visions of a future lifestyle and of making a talisman that would transform their luck, but not in a format that allowed them inclusion in the V1 or V7 (I Wish I could make) categories.
- E) The four students (25%) writing in the I Want to Tell You category (V5) wrote autobiographical essays about themselves and their family members, pets, and interests. Three of them (18.75%) did so on Day One.
- F) Three students (18.75%) wrote about their memories of things they had made (V6). Two of them (12.5%) did so on Day One.
- G) Five students (31.5%) wrote about something they wish they could make (V7).
- H) One student wrote about something she'd seen that affected her (V8).
- I) Two students wrote about metal objects they remembered (V9).

**Table 2** : Number making statements.

	Day 1	Day 2	Day 3	Day 4
#students	14	15	14	15
Fear	1	2	5	5
Excitement	4	5	9	10
Insight	10	9	11	14

**Table 3** : Total number of statements

	Day 1	Day 2	Day 3	Day 4
# Fear	1	2	12	11
# Excitement	10	8	46	33
# Insight	20	26	27	46

**Table 4** : Average of statements per student

	Day 1	Day 2	Day 3	Day 4
Fear	1	1	2.4	2.2
Excitement	2.5	1.6	5.1	3.3
Insight	2	2.8	2.45	3.28

**Table 5** shows occurrence of topic choice and occurrence of variables on Day Three.

Student	Metal	I'm 80	Writing	Fear	Excite	Insight
D.B.	A	A	A	A	A	A
E.B.	0	0	0	2	6	0
S.C.	1	0	0	3	8	0
T.C.	1	0	0	0	7	5
J.E.	1	0	0	1	3	1
Z.K.	A	A	A	A	A	A
B.L.	0	0	0	0	0	1
H.M.	0	1	0	1	0	3
J.M.	0	0	0	0	0	1
K.M.	0	0	0	0	0	1
K.O.	1	0	0	4	0	2
S.O.	1	0	0	0	2	2
M.P.	1	0	0	0	7	0
T.R.	1	0	0	1	5	1
J.V.	1	0	0	0	4	5
M.W.	0	0	0	0	4	5
Total	8	1	0			

**Table 6** shows occurrence of topic choice and occurrence of variables on Day Four.

Student	Metal	I'm 80	Writing	Fear	Excite	Insight
D.B.	1	0	0	0	6	2
E.B.	0	0	0	1	3	3
S.C.	0	0	0	0	1	1
T.C.	0	0	1	0	1	4
J.E.	0	0	1	0	2	3
Z.K.	1	0	0	4	6	5
B.L.	0	0	1	0	0	4
H.M.	0	0	0	0	0	1
J.M.	0	0	0	3	2	2
K.M.	1	0	0	1	5	3
K.O.	0	1	0	0	0	0
S.O.	0	0	0	0	1	3
M.P.	A	A	A	A	A	A
T.R.	0	0	1	0	0	6
J.V.	0	0	1	0	0	5
M.W.	1	0	0	2	6	4
Total	4	1	5			

**Table 7:** Number of insight statements for students writing about Writing compared with average number of such statements across days for these students.

	#Day 4	Average
T.C	4	3.25
J.E.	3	2.33
B.L.	4	2.25
T.R.	6	1.75
J.V.	5	4

**Table 8:** Frequency of occurrence of Pattern of Statements expressing Aspiration, Barrier, Generation of Ideas, and Positive Self-Esteem, across days

Student	Day 1	Day 2	Day 3	Day 4	Total
D.B.	ACD	ABD	Absent	D	0
E.B.	ABCD*	BD*	ABCD*	ABCD	3
S.C.	ABCD	ABD	CD	D	1
T.C.	ABCD	ACD	ABCD	BCD	2
J.E.	Absent	ABCD	ABD	ABD	1
Z.K.	ACD	CD	Absent	CD	0
B.L.	ABD	AD	BD	D	0
H.M.	CD	ABD	ABCD	CD	1
J.M.	Absent	ACD	ABCD	ABD	1
K.M.	BD*	ABD*	ABCD	ABCD*	2
K.O.	ABC	BD*	ABD*	BCD	0
S.O.	ABCD*	ACD	ABCD*	BD	2
M.P.	ABCD	ABCD	ABCD	Absent	3
T.R.	ABC	BCD*	ABCD*	BCD	1
J.V.	ABD*	Absent	BCD	BCD	0
M.W.	ABD	BCD	ACD	CD	0
Total	5	2	8	2	

**Table 9:** Number of Ideas Generated, Students making statements, mean per student, students showing "sequence"

	Day 1	Day 2	Day 3	Day 4
#Gen state	38	35	35	36
#StuMakGeSt	10	8	11	9
AveGenStPe	3.8	4.37	3.18	2.4
Sequence	5	2	8	2