Edubba: MULTIMEDIA SOFTWARE TO SUPPORT ACADEMIC WRITING IN ENGLISH

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1. Introducing *Edubba*

Edubba is a CD-ROM based environment designed to support the development of academic writing and to a lesser extent, academic reading, for learners who are at an intermediate or higher level of English language development. It derives its title from the ancient Sumerian word for the tablets upon which cuneiform writings were inscribed, as well as the libraries in which those tablets were archived: in short, "a place to write." While *Edubba* was originally conceived of for use by Junior High school learners and beyond, it has been successfully tested both with slightly younger learners in senior elementary grades and with young adult learners in college labs in Canada.

Edubba is the first product developed by The Learning Engine project, a joint undertaking of the University of British Columbia and the Lunny Communications Group, a Vancouver-based multimedia communications production firm. At the University of B.C., the Centre for Intercultural Language Study and the Department of Language & Literacy Education jointly sponsored the work, which began in the fall of 1997 after several months of discussions. The first author of this report served as Project Director and Principal Investigator on The Learning Engine project, and as Senior Author of *Edubba*, while the second author conducted alpha research in schools, usability studies of the natural language interface, as well as thesis research on collaborative writing using the program.

The educational goals of the Learning Engine project and its prototype language learning program that was to eventually become *Edubba* are summarized in the following statement of our shared vision:

> "The Learning Engine prototype will support academic success for Junior Secondary learners who are at an intermediate level of English language proficiency. The products will have strong appeal to this user group, will incorporate current understandings of second language acquisition, best practices in ESL/EAL (English as a second language/English as an additional language) instruction, and innovative technology to support the development of English language and literacy for academic purposes."
>
> -*The Learning Engine Project Documentation*. The Lunny Communications Group and The University of British Columbia, June 1997.

Edubba embeds language learning activities in a 3D city setting. Its pedagogical content is delivered by means of a challenging interdisciplinary environmental problem--an impending water supply crisis--in which learners play the role of investigative reporters for a fictitious news organization. Natural language processing (NLP) is an integral feature of *Edubba*. Learners can explore the city's environs freely, or can complete sequenced training exercises as well as more extensive "feature story" research on several proposed approaches to the environmental crisis. To accomplish these tasks learners must interact with a variety of characters in the 3D world who answer the user's free-form typed English interview queries. Learners are also offered a variety of print and graphic documents in clickable form and are supported in the writing process with several help tools. The instructional design in the prototype as well as a subsequent school release emphasizes collaborative practice in the process of writing for academic success by means of engaging in content-based problems. Language learning tasks are referenced in a Teacher's Guide to the locally-authorized British Columbia Ministry of Education curriculum objectives as well as to TESOL International benchmark standards for ESL/EAL program design.

The project released the *Edubba* prototype in September 1998 for early product testing with teachers and learners. In 1999 extensive revisions were undertaken, and a beta version released to a limited number of local schools in the fall of 1999. A final round of fairly extensive revisions prepared the program for release to British Columbia's secondary schools by the end of 2000. The complete three and a half year product development schedule is represented in Appendix A.

The purpose of the present paper is to describe in further detail the characteristics of the *Edubba* program, including its instructional design, its assumptions about language learning and teaching and the background of theory and research from which it emerges, and its instructional approach to academic writing. In addition, the authors will report briefly upon recent research we have conducted with learners using *Edubba*, and indicate plans for further research and potential development.

2. A multiple educational environment.

Edubba was conceived, after extended discussion amongst members of the joint design and development teams, as a multiple educational environment. We chose to develop a multipurpose template for educational program development that we termed "The Learning Engine" from which individual applications such as the *Edubba* program could be developed. Consequently, the *Edubba* program design reflects the original conception of programs that emerge from a development template that can be repurposed for specific academic applications in a variety of

subject domains, not just the language development area. *Edubba* therefore is three things, as shown in Figure One.

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Figure One. The three faces of *Edubba*.

A Virtual City A Database

WHAT IS *EDUBBA*?

An environment for academic writing and thinking

First, it is a *virtual, 3D city*, navigable either by mouse clicks on a city guide on the user-reporter's desktop, or as part of a preliminary "taxi tour" of the city. It is a city set slightly in the future, perhaps on the west coast of North America, but not localized in any particular way beyond several "back story" references to an earlier fishing village on the site that had been mainly populated by pioneer Japanese immigrants. The team's thinking was that the vast majority of students using *Edubba* were urban learners even if they were not recent immigrants, the majority of whom originated and were destined to live and work in cities in the coming decade. Moreover, the virtual city allowed the development team a bit more scope in terms of added story or graphic elements if we wished to extend the program beyond its current bounds: one 're/develops' the virtual city. *Edubba*'s cityscape is peopled with characters with whom the learner can interact using the natural language processing capacity designed into the program. The city, like any city of course has many stories to tell, and Edubba is no exception. Edubba's main "back story" is one of impending environmental crisis, for it can grow no further without a decisive solution to its water supply problems, possibly the most pressing of environmental challenges along with climate change, facing most 21st century communities whether urban or rural. Moreover, an animated sequence at the beginning of the program shows a dam site under construction which is suffering a devastating explosion and collapse, bringing to a halt the most obvious of

solutions to stabilizing the local water supply. Part of the learner's task is then to take the role of student intern reporter for a city news organization, and to investigate not only the recent disaster but also the background of political and technical concerns surrounding the problem of providing a sustainable water supply for the city.

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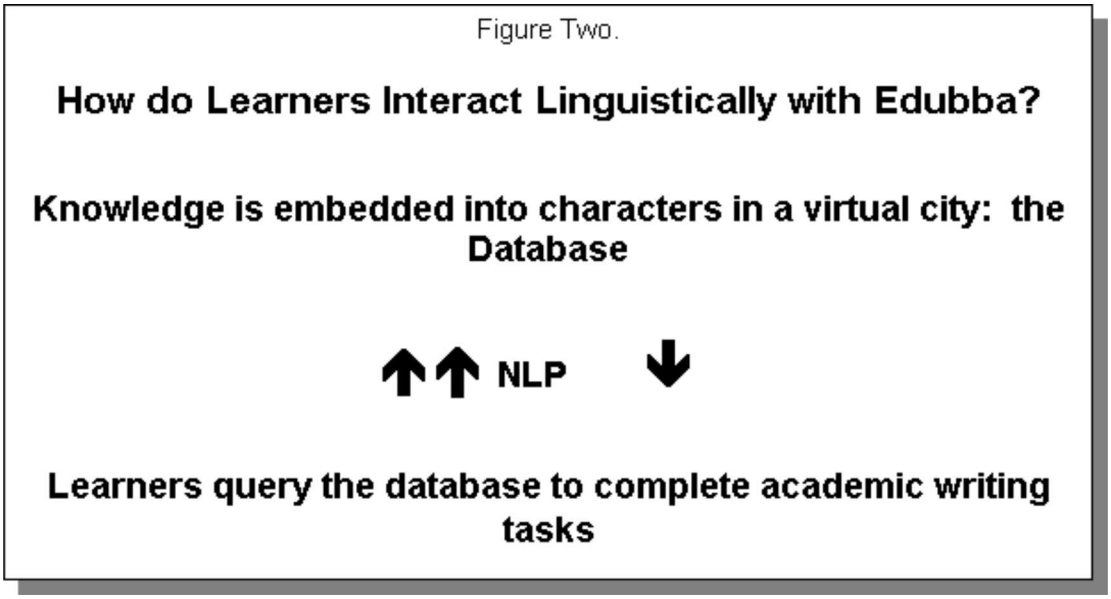
Second, therefore, *Edubba* is a *database,* specialized in its current embodiment to contain knowledge of two general sorts: social information about the characters and their backgrounds, and academic knowledge about water supply, environmental issues such as water conservation and land use, and some technical information about dam construction, desalination, artesian wells, conservation education, and other approaches to developing and conserving water supplies. In effect, *Edubba* constitutes a small but expandable ('scalable') encyclopedia whose records are stored in the form of English sentences and are distributed amongst virtual characters and objects in the city environment. The database can be queried superficially by clicking on graphic objects in the usual manner and revealing prepared texts and graphic documents of potential use to the student. More interestingly, we believe, learners can query the database in a manner unique to the Learning Engine project, by writing in ordinary language to the characters in the city and receiving relevant responses in writing from the characters by means of the program's proprietary natural language processing (NLP) capacity. The design team believed very strongly that only by means of tools that permitted a high degree of authentic-feeling language interaction, albeit in the written rather than spoken medium, would the program be distinguished from, and perhaps improve upon other efforts to embed reasonably authentic language activities into CALL software. This is notwithstanding the fact that interacting with virtual characters, no matter how intelligent, is not authentic language interaction but a simulation thereof.

Interaction is achieved therefore by learners either in an exploratory mode or 'in role' as intern or junior reporters, interviewing characters to reveal background information on the water supply crisis, personal background about the characters themselves, and their attitudes toward not only one another, but also to the various proposed solutions to the water supply that are being discussed by citizens in Edubba. A natural language string typed to a character represents in effect a query to the *Edubba* database that has been distributed amongst the program's characters, as summarized in Figure Two:



Such a linguistic interface was designed deliberately to provide extensive practice in the use of academic English, because written queries would often require repetition in modified form to be effective. An example of such a string of a typical user's queries and responses from the program's NLP engine follows. In this case, the NLP engine is being accessed through a "conversation" with a character named Janet Singh, a local civil engineer whose firm held the major contract to design and build the ill-fated dam project for Edubba:

> User: Hi, what's your name?
> Janet: I'm Janet Singh.
> User: What do you do?
> Janet: I'm not sure I understand. Can you say that again in a different way?
> User: What is your job?
> Janet: I'm an engineer specializing in the design of dams.
> User: Tell me about this water crisis.
> Janet: There definitely is a water crisis. We could actually run out of water in two years.
> User: Why we run out of water?
> Janet: The city of Edubba is growing and needs to find at least 50 million cubic feet or 40,000 acre-feet of water. You can look in my briefcase to see how much water that is. (The user can click on a graphic in Janet's briefcase that illustrates this concept, or can continue the dialogue.) …

Note that the user's last query is not completely grammatical English, illustrating one advantage of using an approach to NLP that does not entail parsing of input strings and subsequent synthesis of English responses. Because *Edubba*'s NLP approach employs a search strategy for lexical items (using networks of recent queries to resolve potential ambiguities), the input can be grammatically deficient in some of the same ways in which a second language learner's input might also be. The database will return a null response when there is no potential match between items in an input query (e.g., the lexically vague idiom "What do you do?") and a candidate response. The system of course is scalable, and the response database can be built up indefinitely based upon logged records of learners' queries that receive such null responses, but address legitimate learning needs of the users. Note also that the null response itself is designed to be generative, requesting a paraphrase from the learner, in itself a useful interactive language learning strategy, as any international traveler has discovered.

Third, *Edubba is an environment for academic writing and thinking*. Because of its educational goal of promoting practice and development in academic literacy, primarily writing, in English, the program features are designed for the purpose of promoting such practice wherever possible. Because of the assumptions about language learning that were adopted, the language learning tasks look less like language learning activities or exercises, and more like academic writing tasks found in subjects other than English or language classes in schools, for example environmental studies, geography or science. We tried to deal with the sorts of academic challenges faced daily by learners who must sooner or later apply their developing English writing and reading skills to a variety of problems *across the curriculum*, not just in their English or other language skills classes.

We turn below to a closer description of the assumptions our development team made about language learning and the background of theory and research that led us to those assumptions, and then to a description of the approach we took to promoting the development of academic writing in particular.

3. Language learning and teaching: Immersion in context and content.

3.1 A functional approach to language learning

The development team decided to take seriously the major claim of current theory and research in language development that language is learned in context by means of dealing with problems in the world, not by completing language exercises divorced from contexts in the world. In effect, we decided to test the main claims of immersion language education that suggests that *language is caught as much as it is taught*. The attested success of French immersion education in Canada, for example, supports this claim not only for language learning results (Lambert & Tucker, 1972; Swain & Lapkin, 1982) but also for the academic content learning undertaken in a second language immersion settings (Bournot-Trites & Reeder, in press). Studies in first language development (Halliday 1975; Slobin 1972) have long indicated that children acquire new language *forms* in the service of various *functions* which language can perform: making requests for help, seeking information about one's world, getting one's way, making distinctions, and so on. Such functions are often encapsulated by speakers of a language into what are usually termed language *genres* (Martin, 1997).

3.2 Genres and tasks

The specific written genres emphasized in *Edubba* are relevant to academic success, and consist of *description, analysis, evaluation, persuasion* and *argument.* Following Mohan's theoretical work (Mohan, 1986) on the relationships between language use and thinking processes, we reasoned that many useful academic habits of thought would have to be exercised in order for *Edubba*'s users to be successful in these selected language genres. For example, we predicted that for successful written *descriptions*, users would need to exercise observational skills and attend to specific detail; for effective written *analyses*, users would need to undertake some thinking about classification or taxonomy; for written *evaluations*, users would need to compare and contrast elements on some equivalent criteria that they had constructed or developed; for good *persuasive* or *argumentative* writing in *Edubba*, users would need probably to marshall all

or most of the preceding thinking and writing skills as well as learning to develop and weigh evidence in support of claims. In summary, for most written language genres, we felt we could point to an underlying set of academic thinking skills that were prerequisite for success in the written task. It was these underlying thinking skills as much as the more observable writing tasks that helped us organize and develop the detailed tasks that we assigned the users of *Edubba*. It was only by linking in some systematicand theory-based way the language tasks and the underlying thinking tasks that we could support our claim that *Edubba*'s learning tasks would support not only the development of written English, but also that it would promote academic success across the curriculum. For more extensive background on what is termed the "content based instruction (or CBI) approach" to second language teaching and learning, the reader is referred to Snow & Brinton (1997) and Brinton, Snow, & Wesche (1989). The counterpart of CBI thought in first-language pedagogy is the "Language Across the Curriculum" research and practice based upon the pioneering classroom based research of Barnes (1976) and the seminal curricular thought of James Moffett (1972), *inter alia*.

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Finally, our design and development group looked at the extensive research on successful second language teaching approaches and determined that the overwhelming majority of these successes bore many characteristics of *communicative language teaching* (CLT) approaches with its emphases upon contextualized language use, extensive, purposeful interaction, and opportunity for production. Consequently, we felt justified in our conviction that an engaging simulated social context - in our case, a city - was justified in language teaching research as well as practice. Moreover, we used CLT's dictum of purposeful language interaction in realistic contexts as a guideline when we constructed our virtual language learning world, peopling it with characters who could simulate to some extent the sorts of expert informants an investigative reporter would need to turn to if faced with a broad assignment of making sense of a major environmental crisis facing the city. Finally, we made certain that sufficient opportunities were built into *Edubba* not only for language interaction by means of the NLP queries and responses, but also for extensive production and not just comprehension of written academic English. A summary of the three major characteristics of *Edubba's* instructional design appears in Table One:

Table One. Instructional design characteristics of *Edubba*.

COMMUNICATIVE	CONTENT-BASED	GENRE-FOCUSSED
Simulation & role play is used to provide many contexts for	Immersion in a multidisciplinary problem	Writing tasks: description, analysis, evaluation,

language use.	space.	persuasion and argument.
Purposeful language interaction with characters in contexts.	Graphic organizers and objects.	Academic writing linked to underlying thinking processes.
Extensive language production is possible.	Non-didactic approach: free exploration is possible.	Models provided in Help system.

4.0 Academic writing as collaborative creation

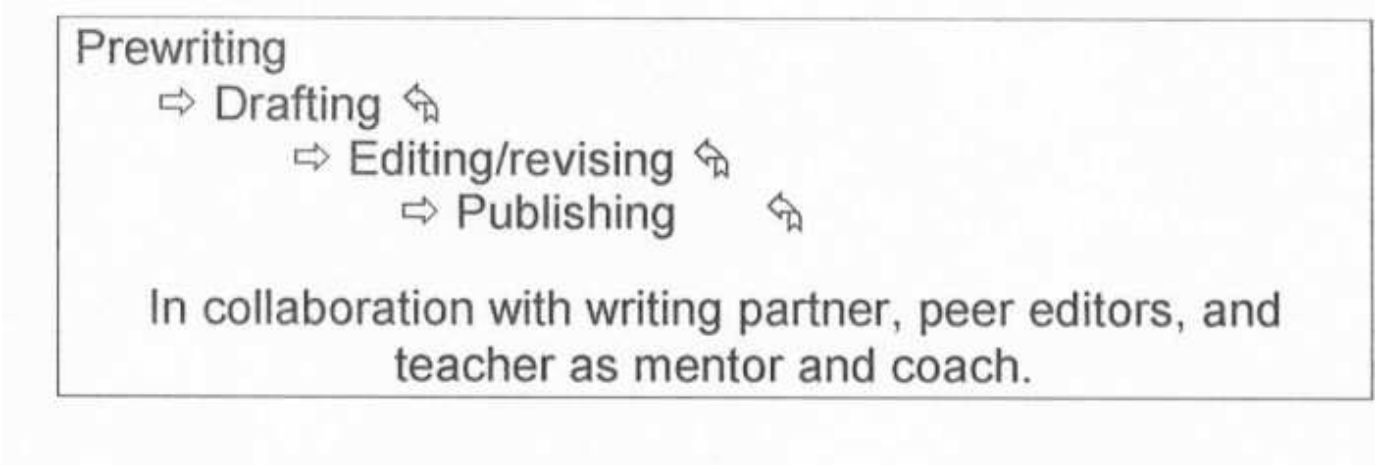
The teaching of writing in schools, colleges and universities has undergone a revolution over the past two decades, primarily as a result of pioneering observational research into the processes that both expert and novice writers actually use when they engage in the various steps that go into a finished piece of written work. The research of Graves (1983) in particular allowed us to conceive of writing as a process with discernible steps and different demands at each step of the work. Furthermore, our development team was influenced strongly by the pedagogical work of Calkins on teaching younger children to write, and that of Atwell (1998) on helping adolescent writers. In particular, their proposal that writing was as much a social process as an isolated intellectual act seemed compatible with our social constructivist philosophy of learning and teaching that we wished to incorporate into our work on *Edubba*. Consequently, two main features of this research and pedagogical thought emerged in the instructional and program design of *Edubba*:

1. The provision of writing tasks in a rough developmental sequence following the various steps of the process of writing, from exploratory pre-writing experience and thinking, through drafting, revision, and polishing for publication for realistic audiences.

2. The incorporation of a design that encourages composing in partners and editing in small groups and in conference with instructors.

Figure Four illustrates our understanding of the processes of writing as revealed in the basic research by Graves and others over the past decade. The arrow to the right of the second and subsequent phases of the process is intended to convey Graves' finding that writers treat these phases as iterative, and often revisit earlier phases until they are satisfied with their work. Our hope was that *Edubba*'s program design would not be so strictly linear so as to preclude such features of a realistic model of writing.

Figure Four. The pedagogical model of the writing process adopted for *Edubba*.



A typical example of a *prewriting* task was the newpaper's editor's invitation to the new student intern to jump into a taxi and meet a few characters in Edubba, not only to become familiar with the city and how to navigate, but to become oriented to the issues that people were concerned about. A follow-up assignment invited users to *draft* a few notes using various editing tools provided on the young reporter's virtual desktop (illustrated) that included a full-featured word processor, on the people they had met and what they had to say about current issues in Edubba, or about each other. A typical *editing or revision* task was implicit in the editor's constant reminder to share an emerging story with either the user's writing partner or with the instructor/teacher. Finally, *publishing and polishing* skills were encouraged by reminders in the Help system about considering one's audience of potential readers and what they expect in the way of professional presentation and format. These considerations were also built into the editor character's reminders and "To Do" lists left for the user from time to time.

Collaboration was built into the prototype's structure by allowing for a double log-in and a series of reminders about working with one's partner at all stages of the process of reporting on the water supply story in *Edubba*. Such a partnership arrangement was not just based upon best practices in the teaching of writing: it was also based upon pragmatic observation of students' typical levels of access to computers in schools and colleges. A partnering arrangement would also offset in a constructive way the shortage of workstations usually available to learners. While a double log-in was eventually abandoned as technically too difficult to design into the program and sustain in a thorough way, partnering was assumed not only in the Teacher's Guide but was also incorporated into the Editor character's informal reminders and various tasks assigned by his "To Do" notes and "Story Leads" for the users.

The role of the teacher-instructor and the organization of instruction were both reconceptualized along the lines of best practices in the teaching of writing, in which the teacher serves not only as the organizer of the learning activities but also as a resource to writers in the form of a senior editor, coach and mentor.

Instruction was designed to proceed along "writer's workshop" lines, though not strictly along the lines of the standard classrooms described by Atwell (1998) but adapted for computer-supported instruction. Hart's research (2000) into the ways in which the partners actually collaborated using *Edubba's* resources is described briefly below.

5. Research with users

Three main lines of research have been undertaken in connection with *Edubba*: alpha research into specific program elements as an integral part of product development; informal user surveys conducted by the client's own staff, the local ministry of education, on beta and prerelease versions of the program; and basic research into the interaction of users engaged in writing tasks in a beta version of *Edubba*. We describe the first and last of these phases of research in the present report, as there was no documentation undertaken by the Ministry of Education of its informal user group surveys, nor were any reports of its work made available to the development team. The section concludes with a review of planned or needed research and development with this software and similar programs.

5.1 Alpha research: from basic program elements to intercultural risks

The purpose of this research was to refine basic elements of the program, including graphic representations of characters who would populate the city's environment, and to determine the usability of the graphic interface as well as the natural language processing interface. A team of university graduate students who were experienced in teaching second language learners, under the senior author's direction, met three classes of junior secondary students who were receiving instruction for ESL/EAL support while they began the transition to the full academic curriculum: in short, the precise target audience we had planned for *Edubba* eventually. Informal interviews were conducted in the context of observing groups of users working in three main areas of an early alpha version of the software, incomplete in most respects: the graphic interface; the look of characters; and the natural language interface. The researchers tape recorded and made notes on each learner's response to the material.

As a result of the earliest research, the original graphic interface was abandoned entirely as too complex and busy. Further, many characters were redrawn entirely, based upon the students' strong and clear advice about their appearance and manner. For example, a young coffee shop 'barista' was, the students told us, much too informally dressed in his jeans and T-shirt and needed to dress more professionally in his job. We discovered that many of our young student informants worked part-time in the food services industry themselves and knew what they spoke about. Finally, many gaps showed up in the existing version of the natural language processing interface, and the researchers made careful notes of the sorts of questions that interested students since the user's queries were not being logged automatically at that stage. In general, the team found that the graphic interface was not well designed for these users, that characters

needed to be more realistic and "socially appropriate" in look and manner, and that the natural language interface was well on its way to becoming a most engaging and useful element of the program which the students appreciated and found fascinating. In particular, they enjoyed the combination of social, personal background and academic information which they could draw out of most characters with a fair degree of success.

Of some interest to the development team was the intercultural advice we received from learners in the alpha research phase. The most striking cases involved gender and ethnic stereotyping. There was a serious effort to represent both genders in the program in positions of power. For this reason, a young woman was the mayor of Edubba. However, as the students immediately pointed out to us, the mayor was initially depicted in a somewhat 'Japanimation' derived rendering and costumed more for a social evening than a workday. The students advised us to draw and dress her more conservatively: The end result is illustrated here. Similarly, despite the authors' efforts to depict in our script a local fruit orchardist as an exiled Chilean professional with a strong educational background, the team of young graphic artists decided to add what they felt was a humorous twist and to depict him as a comic Latino figure lounging in the shade of a fruit truck, plucking his guitar singing Mexican folksongs. Not surprisingly, the students saw no reason for this, and it was clear to our researchers that the producers ran the serious risk of promoting an ethnically-based myth and damaging their educational reputation at the same time. The Mexican image disappeared, to be replaced by a more credible looking character, not so much politically correct as plausible in the context of the contemporary community which we were trying to develop.

Acceptance of the students' and researchers' advice by the program developers and artists was by no means immediate, and such was the "issue" surrounding gender and ethnic stereotyping within the university-industry joint development team that we found it worth conducting a full analysis of the conflict in retrospect. The full account of the alpha research method and how this conflict was successfully resolved appears in Beckett, McGivern, Reeder & Semenov (1999) in which the values of cultural and gender diversity come up against "edutainment" values so critical to rendering a program attractive and engaging to its intended users. In the end, the issues were resolved through extensive discussion of long term goals, social values and the sensibilities of our intended audiences, including both multiethnic student users and socially conscious teachers.

One of the benefits of bringing the instructional design and program development and engineering teams together right from the outset and running instructional design and program development in tandem was that alpha stage research could help us identify social and educational issues such as gender and cultural diversity, as well as engagement-involvement dimensions in the program's elements before they could pose more serious problems that were locked into a finished product.

5.2 Collaboration in the writing process: how did students work together to use *Edubba*?

The second author (Hart 2000) focussed on the various collaborative writing strategies used by

four dyads of intermediate level English learners during a five-week case study at a university language teaching centre. The aims of the study were 1) to describe the composing strategies of a small number of international students engaged in collaborative composition tasks using multi-media software; 2) to establish how their processes and products varied from group to group and from week to week; and 3) to elicit information from the writers' point of view about their experiences with the writing tasks, and their history of writing instruction, collaborative writing experience and computer skills.

Case study data consisted of student profiles, assessments of their weekly compositions, descriptions of the dyads' collaborative composing processes, transcripts of oral exchanges, and field notes. The learners' experience demonstrated that using technology to provide students with an immersive setting can help them to approach the writing process effectively from research to production. Results also showed that there were more differences than similarities in how dyads approached and completed their writing tasks.

Hart developed a descriptive taxonomy in order to categorize the approaches to collaborative writing that the dyads demonstrated in the study. The taxonomy was developed inductively from observations on site of learners and their products as well as from the spoken exchanges taped at each shared workstation. The categories were adapted from those developed from 700 interviews conducted by Posner & Baecker (1992, pp. 239-250), builders of groupware writing technologies, and by Sharples (1993, pp. 51-67), who devised an informal taxonomy of collaborative writing styles found in a small case study. While the present study had the distinct advantage of having been developed inductively from direct observations of learners, their written output and their talk about the tasks at hand, a variety of surveys using this taxonomy would be required to validate its categories, and inter-rater reliability assessments undertaken. We describe the four main collaborative styles and subcategories that Hart constructed to characterize her observational data. The collaboration styles are illustrated in Figures 4 through 7.

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1) The UnPartners was a typical scenario that saw two students working side by side, contributing separately to the research and writing. One pair of students even wrote two separate conclusions to a composition!

Figure 4. The UnPartners.

2) The Scales are Tipped. Since writers were paired intentionally with unlike cultural background and language proficiencies, some pairs at the outset had trouble communicating or even grasping the task. Until one or

both students had developed more rapport or gained sufficient background regarding the *Edubba* program and the writing tasks, some pairs of students were quite unequal participants in their joint writing assignments.

Figure 5. The Scales are Tipped.

3) The Boss and the Executive Assistant. Only one pair of writers worked in this way, in which one member took overall leadership but appeared to know, respect and utilize the other's strengths. Although the "Boss" would do most of the proposing, the "Executive Assistant" would not merely support those ideas but would also provide input on grammatical or technical points or errors.

Figure 6. The Boss and Executive Assistant.

4) Budding or Instant Collaborators. Budding collaborators took some weeks to overcome some of the difficulties noted in 2) above, while the Instant Collaborators appeared to begin their work with a positive attitude and equal contributions to the work.

Figure 7. The Collaborators.

Most of the groups passed through most of these approaches in stages, and overall, it appeared that they all moved toward more collaboration, as Table Three illustrates(1). (Occasionally the developmental progress was interrupted by the absence of one member of the dyad, a factor beyond the researcher's control.) Obvious factors which seemed to play a part in explaining the diversity of the four writing teams' approaches included language level, attitude toward writing and/or the partner, background knowledge of the subject, gender, culture and personality. Pennington (1993, 1996a) also mentions the experience and proficiency of teachers with computers, writing and language as key factors in promoting effective writing with computers. Pennington (1996b) notes that it is not the computer alone that helps students write more easily, write more, write differently or ultimately, write more successfully.

Areas for further research and development indicated by this study include creating a more open work space for collaborating writers which may or may not include more than one keyboard and mouse (Inkpen et al., 1995), providing a longer time frame for brainstorming and other prewriting discussion (Shi, 1998) as well as the drafting component of the writing process, providing students with collaborative oral expressions called gambits and other collaborative training activities, and providing more intelligent help directly in the multi-media software.

Table Three. How students collaborated as their writing developed.(2)

Week	*Marina & Sakiko*	*Pablo & Joe*	*Rodolpho & Etsuko*	*Christoph & Lee*
1	The scales are tipped	Unpartners	Boss & Executive Assistant	Instant Collaborators
2	The scales are tipped	UnPartners	Boss & Executive Assistant	Instant Collaborators
3	Collaborators	Singleton	Collaborators	UnPartners
4	Singleton	Budding Collaborators	Collaborators	The scales are tipped

6.0 Further research needed!

In addition to the research and development work suggested by the Hart case study, several additional lines of research are indicated on the basis of our experience with *Edubba* to date. Proposed studies and development work fall into two main categories: formative and summative evaluations of field implementation of the program, and a more general program of evaluation of multimedia language learning software.

In addition to continuing the careful case studies initiated by Hart (2000), it would be most useful to conduct larger scale studies in which some of the potential sources of variability in engagement with the collaborative learning elements of the program could be observed more clearly.

Questions of *gender, ethnicity, language proficiency,* and *attitudinal variables* could be treated as learner variables in a more controlled set of studies, and would put us in a position to determine more confidently the specific usefulness and limitations of programs such as *Edubba* for different sorts of learners. Just as with any instructional method or materials, one size definitely does not fit all.

The *role of the teacher and teaching* should be studied, asking such questions as "What are effective practices in the introduction of multimedia language learning software into the language classroom? What support do teachers need to be successful in such introduction and integration of technology into their teaching repertoires? Are there new ways of thinking needed about 'the teacher' or 'the language classroom' when one introduces multimedia language software?"

Field studies could involve groups of teaching professionals clustered either in regular face-to-face professional development sessions, or online, or a combination of the two, in order to support collaborative teacher research into practices surrounding the integration of multimedia software into teaching.

Edubba itself lends itself to distribution by means of the Internet. That in turn opens up the possibility of a "community of writers" emerging who can be supported not only by online tutors but also by one another, as writers themselves explore aspects of the virtual city, post questions of one another, share their written work in virtual editing circles, and generally test the limits of the software and electronic communities to support their academic writing.

More general studies are needed of the genre of software to which *Edubba* aspires to belong - what Reeder et al. (this volume) have termed "multimedia language learning (MMLL) software". In that paper, the authors argue that there is now a qualitatively new genre of language software, and that new media for language learning require new modes of assessment of its success with learners. Hence that group proposes a more widespread, international effort to promote the development of theory and best practices in what they term "E/Valuation" in order to approach more confidently the important questions of the relative merit and educational worth of the software.

7.0 Conclusion

Edubba and programs of its general type (MMLL programs) undoubtedly attempt to set the pace in the application of current knowledge about language learning and teaching to the development of new media for language learning. Still, the shortcomings of such programs demonstrate that a great deal needs to be done in terms of promoting the "R" side of the "R & D" equation. Without a significant effort in the direction of formative program evaluation, for example, little progress can be made in the direction of improving the educational effectiveness of these programs. Our development team learned that our private sector partners have a primary and entirely legitimate mandate to commercialize their product and yield fairly rapid returns on investment, but not a mandate to fund or promote research. However, in the long term, only programs of long-term development of knowledge about these programs will provide the necessary conditions for the application of that knowledge and the development of the best possible educational products. And this does not even begin to address the weightier question of assessing the educational merit of MMLL software. In short, we suggest that only a patient, long-term approach to the generation and application of scholarly knowledge can yield exemplary results for language learning materials, be they new media or old.

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Appendix A

The Design and Development Process for *Edubba*

April 1997	Sept 1997	Sept 1998	Sept 1999	April 2000	Dec 2000
Build Team	Research and	Research and	Test and	Revise Beta and	

and Establish Vision (5 mo)	Development for Prototype (12 mo)	Development for Beta Release (12 mo)	Demonstrate Beta Release (8 mo)	Design Release for Schools (6 mo.)
State Vision Establish Audience / Market Developer assigns staff to project University technical and instructional design panels formed	Educational Design and Program Concept Field research in schools with elements of prototype: characters, tasks, settings, NLP, interface Show proof of concept to secure financing of project from Provincial Ministry of Education	R & D with teachers R & D with users Revise educational design Revise program design Provincial Ministry of Education assigns staff to facilitate revisions and release to schools	Ministry demonstrates program to groups of teachers and students, collects responses informally. Development team assists in demonstrations to professional groups.	Revision of beta version for release to schools by end of year, 2000.

Notes

1. An informal analysis of Table Three's observations can yield a sequence of development if one constructs a scale of collaborativeness from lower to higher values as follows: UnPartners < Scales are Tipped < Boss and Executive Assistant < Collaborators. If these scale points are scored 1 through 4, it appears that there are generally lower collaboration scored achieved in observations 1 and 2 (the group score is 20 over 8 dyads observed, for a mean score of 2.5 per observation) and higher scores achieved overall in observations 3 and 4 (the group score is 21 over 6 dyads observed, for a mean score of 3.5 per observation), for example.

2. Students' names have been changed in Table 3 to maintain confidentiality.

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