Paper

A Design and Implementation of Application S/W Based on a Quality Evaluation of S/W

Kyu-Boem Lee* Non-member
Jeong-Young Song* Member
Kageo Akizuki** Member

In general, most of koreans usually have used Hangul and MS-word as a Word Processor. We studied about the functional efficiency by comparing and analyzing Text Mode, Equation Mode, Table Mode, Frame Editor & OLE Mode, Chart Mode and the other Modes to evaluate the common utility used Hangul 97 and MS-word 97 as a Word Processor. As a result, File size, Drag & Drop, Compression and storage etc. have been recognized characters remarkably in each case. We studied about Hangul 97, MS-word 97 as a user for evaluation criteria items. As a matter of fact, we used Tool Book and Director. So, we designed, developed and materialized S/W "garbage generation, separation, and collection" and then we also compared and examined those Text Mode, Sound Mode, Summation Algorithm Mode and Moving image Mode. In consequence, a user's point of view, characters of Tool Book and Director are showed remarkably through the findings of the questionnaire.

Keywords : Word-processor, Application S/W, Hangul 97, MS-Word 97, Tool Book, Director

1. Preface

Generally, S/W may be largely classified into the system software, real-time software, business software, engineering and science software, saved software, PC software, and AI software. In order to understand such software, the characteristics of the software are investigated. Software is a logical element rather than a physical system element. Therefore, software has considerably different characteristics compared to those of hardware in that software is something to be developed and engineered. There may be a similarity between the manufacture of software and that of hardware, but their activities are different basically. Use of software is concentrated on its design. And software is not something disappeared if it is used but may be used continuously through modification and supplement if any defect is discovered after it is completed. Therefore, the correct criteria for evaluation of the quality of completed S/W are used as very important information in its modification and supplement. However, it is the present situation that not only such criteria for evaluation of the quality are significantly different in its degree of importance according to the viewpoint, but also its definition is unclear according to the quantitative and qualitative evaluation criteria. It is also necessary to review them sufficiently from the point of view of users in the design, development, and implementation of application S/W. (1~10)

1·1 Criteria for measuring the software quality The software quality is meaningful when there are users for the quality and the quality is used naturally as performance of the quality moves according to the natural tendency. But it is required to have accurate expression, technology, computation, and presumption although there exists no perfect quality. Specially, the software quality should be able to show clearly its functions, performance, matters requested by the users, etc., to document clearly the standard for development, and to suggest expected characteristics of the software developed professionally. For this, the requested matters of software should be the basis of measuring the quality; the specified standards should guide the method of engineering the software; and suggestive requests that are not mentioned frequently should be prepared for. Evaluation of the software quality may be defined separately in the quantitative aspect that may be measured directly and in the qualitative aspect that may be measured indirectly.

1·1·1 Qualitative criteria These are the criteria that can not evaluate a given software directly, which may be defined as follows:

Firstly, an important element of the entire software quality is the reliability of software. If it is failed to perform the software repetitively, the software quality must be in doubt. That is, it is of the degree that the intended functions are expected to be performed with the precision demanded by the user.

Secondly, another important element is the stability of software. The factors affecting the software negatively in view of the stability include potential dangers offering the cause of failure of the entire software system and identification evaluation. It is because the stability defect of a system controlling the safety precision process such as the weapon system, airline service control, atomic furnace, etc. may result in a tremendous economical loss, or the worst loss of human lives.

Thirdly, the software developed with accuracy should be operated accurately since it becomes of almost no value to the user otherwise. The accuracy is the degree of performing the demanded functions for the software. The most general measurement of accuracy is the degree of a defect, which refers to a case that is not consistent with the demanded matters.

* PaiChai University, Dept. of Computer Science.
439-6 Doma-2dong Seo-ku, Daejeon 302-735, Korea
** Waseda University.
2-2 Hibikino, Wakama Tsu-ku, Titakyushu, Fukuoka, 808-0135, Japan

Fourthly, the fourth important element is the maintenance and repair property. The maintenance and repair property from the point of view of software engineering requires for more efforts than any other engineering activities. The maintenance and repair property refers to the feasibility of software that may be modified if an error occurs to the software, may be adapted to a program environment if it is changed, and may be adjusted to demanded matters of the user if they are changed. However, there exists no method of direct measurement of the maintenance and repair property yet. An indirect method of measurement is MTTC (Mean-Time-To-Change), which is an average time taken to change. The time here means the time taken to change the request for change, to analyze, to design a proper modification, to implement and test the change, and to distribute the changed matters to all users.

Fifthly, a further important element is the integrity of software. This emerges as a more important element in this hacker and virus era. This attribute is the ability of a system to resist an attack in order to protect the system. Such attack may occur to all of the program, data, and document. In order to measure the integrity, the additional attributes, i.e., threat and security, should be defined firstly. The threat may be expressed in terms of a probability of occurring the attack of a specific type within a given time, and the security refers to a probability of ability to avoid the attack of a specific type, which may be measured to some degree.

Sixthly, a still further important element is the usability of software. A term that appears every time the software products are discussed is the "familiarity of the user," which means that a software is failed frequently if the software lacks familiarity although the function for performing that software is of value.

1·1·2 Quantitative criteria The criteria for qualitative evaluation of the software developed should enable direct evaluation of a given software.

Firstly, the performance of software may be measured by measuring the processing speed, response time, and throughput. The processing speed may be measured in the integrated steps of software in the following four methods:

- Structure test measurement: This is the work related to the input class by using the processing flow diagram, which is composed of input processing and result display.
- Function test measurement: This is for measuring whether the matters that are shown in the demand analysis of the user are implemented normally. The entire system is regarded to be one black box.
- Performance test measurement: This is for measuring whether the time required for performing many functions is processed by the system in the normal status and is processed without too much self-control in case of overload.
- Stress test measurement: This is for measuring how an excessive input is processed by the system when it is given including checking of the system respond time.

Secondly, the quantitative criteria include whether it is possible to extend the software; whether it is possible to adapt immediately; whether it has the maintenance and repair property such as the practicality, etc.; whether the menu or window is constructed properly; whether the configuration is deployed easily for the user to view; etc.

Thirdly, as to the development expenses, proper expenses should have been computed compared to other related software or other similar software developed already. The elements to be taken into consideration in computing development expenses may include the human resources, hardware resources, software resources, development term, etc. The estimation equation of PERT (Project Evaluation and Review Technic) may be used for the method of computing the primitive code line in the software resource method.

Fourthly, the entire program length N and program volume V are defined in Equations 1.1 and 1.2, respectively, in that a specific algorithm should exist in the minimum size theoretically as follows.(11)

$$N = n_1 \log_2 n_1 + n_2 \log_2 n_2 \quad \cdots\cdots (1.1)$$

$$V = N \log_2 (n_1 + n_2) \quad \cdots\cdots (1.2)$$

where n1 is the number of mutually different operators, n2 is the number of mutually different operands, N1 is the total number of operators, and N2 is the total number of operands.

Fifthly, it is also possible to measure how complicatedly a given algorithm is designed in terms of a matrix. (12) The control flow of a program may be described in a graph. (13) The matrix expression that may be measured generally is as shown in Equation 1.3. The complexity of the Cyclomatic number V(G) of G is defined by McCabe on the mathematical basis of the program control flow.

$$V(G) = e - n + 2p \quad \cdots\cdots (1.3)$$

where e is the number of edges, n is the number of nodes, and p is the number of connection components. The greater the number of V(G), the more complicated the program control flow is.

This complexity is problematic in that it is irrelevant to the outward size of a program or the order of sentence arrangement, but is determined by the number of control flows simply.

2. Evaluation of the usability of Hangul 97 and MS-word 97

2·1 Characteristics of Hangul 97 and MS-word 97 Hangul 97 is characterized by that it is a Korean language word processor program for Windows 95, and the graphic user interface used by the application program for Windows may be used. A user can make the document editing work convenient since a new and flexible method that may be understood easily by the user has been adopted for the graphic user interface of Hangul 97. The Hangul method for DOS has been reflected to the maximum to the basic method of use so that the users who have used Hangul for DOS do not have to learn the method of use separately while using Hangul 97 for Windows. Therefore, a user who has used Hangul for DOS is able to use Hangul 97 immediately. Also, Hangul 97 may be used by the users who are familiar with the standard method of use of Windows by reflecting the general method of use of Windows as well. One of great advantages is that Hangul 97 may be used not only for the Korean/English Windows 95 but also for each foreign language Windows 95 and for higher than Hangul Window NT4.0 as the HNC library which is an independent input/output system and combination-type Hangul codes are used in Hangul 97.

Further, the internal functions extended in Hangul 97 include

the functions for preparation for simple documents using the document ground, the function for printing simple labels, the function for drawing simple labels, the function for printing colored separating panel, the function for outputting writing paper, the enforced function for on-paged drawings, the enforced function for reciprocating HTML documents, etc.

In the meantime, MS-word 97 is characterized by that the document utilization in Internet or Intranet such as making a home page in the information society and the earth village communication network world, etc. is easy and simple. And the connection documentation with the data file of other office products is simple, and the documentation may be done along with the Microsoft Outlook. It supports the functions for the automatic grammar checking and horizontal writing as well as the cubic screen by HELP in addition to the on-line document viewing. It is possible to confirm and modify a document written in a foreign language by changing the keyboard setup. Further, the drawing tool function is added, and it is possible to make a cubic-effect document by the three-dimensional effect.

2·2 Environments for using Hangul 97 and MS-word 97

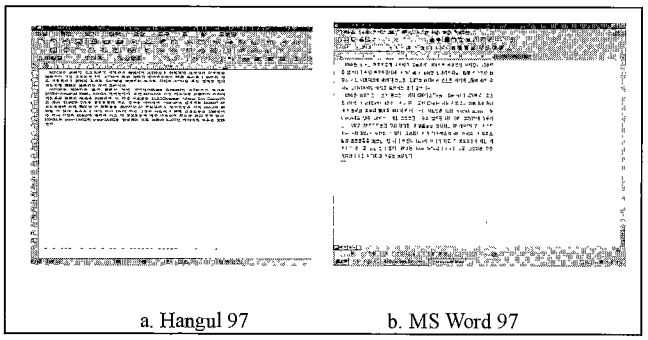
The minimum specification and recommended specification of the environments for using Hangul 97 and MS-word 97 are compared and reviewed in Table 2-1 as follows:

2·3 Usability evaluation In the evaluation of usability of Hangul 97 and MS-word 97, it is difficult to determine which application software is good from the point of view of a user. Therefore, the standard examples are selected, the same documents are made in Hangul 97 and MS-word 97, the application software is prepared for in Hangul 97 and MS-word 97 according to each function, and each function in the text mode, equation mode, table mode, column edition and OLD mode, chart mode, and other modes is compared and analyzed from the point of view of a user as shown on the following screen:

Table 2-1. Hangul 97 and MS-word 97 Us er Interface.

* / *	Hangul 97		MS-word 97		comment
	M/S	N/S	M/S	N/S	
CPU	486	586	486	586	user interface
Memory	8MB	32MB	8MB	32MB	〃
HDD	150MB or more	500MB or more	60MB or more	120MB or more	〃
CD-ROM	x4	x8 or more	x4	x8 or more	〃
Mouse	whole system		whole system	MS intelegence	〃
Keyboard	whole system		whole system	windows 95's 106	〃
Monitor	14″ color	15″ color	14″ color	15″ color	〃
Operating System	windows 95/98, windows NT 4 0 or higher		windows 95's ,windows NT 3.5 or higher		〃
Install Program	120MB	470MB	40MB	100MB	〃

cf) M/S: Minimal Spec., N/S: Normal Spec.



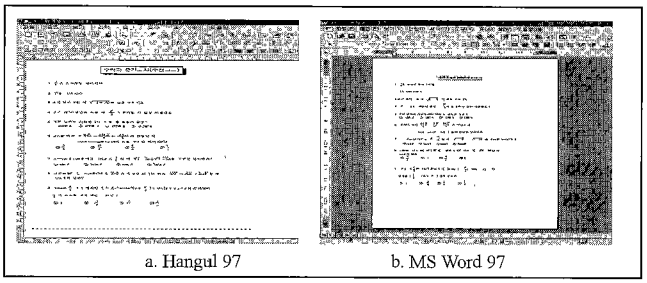
a. Hangul 97 b. MS Word 97

Figure 2-1. Comparison of Text mode.

2·3·1 Text Mode As shown in Figure 2-1, the same content is edited in Hangul, English, and Chinese in Hangul 97 and MS-word 97. It is shown that the file sizes are 24KB and 20KB, respectively, and the editing time is about 20 minutes similarly in both cases. However, there is a problem in compatibility in the conversion of Hangul 97 ↔ MS-word 97 (provided that it is a pure text document in which Hangul/Chinese and English are mixed). There occurs a phenomenon of overlapped characters if the Hangul document is converted into the MS-word 97 document. That is, it is necessary to change the font. On the other hand, no problem occurs if the MS-word 97 document is converted into the Hangul document.

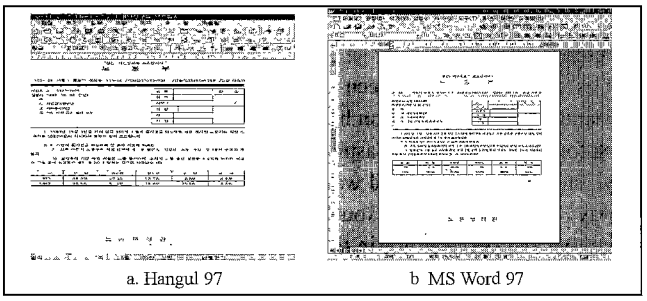
2·3·2 Equation Mode As to the equation mode, it is convenient to do a job since Hangul 97 has the equation input tool. On the other hand, in MS-word 97, it is seen that it takes a long time and the file size is increased since the job is done by calling in the equation input device through entity insertion every time an equation is inputted. As a result of edition, the file sizes are shown to be 26 KB and 162 KB which are greatly different, and the editing times are about 20 minutes and 40 minutes which are significantly different. There is no mutual compatibility in the conversion of Hangul 97 ↔ MS-word 97 (mathematical equation). The screen on which a part of an equation is created is shown in Figure 2-2:

2·3·3 Table Mode As to the table mode, in Hangul 97, the table editing tool box and material formatting function and the automatic formatting are not supported, the table caption may be designated, and the cells and tables may be protected. On the other hand, in MS-word 97, the table editing tool box, material formatting function, and automatic formatting are enabled, but the table caption and cell and table protection are not supported. As a result of edition, the file sizes are shown to be 26 KB and 37 KB which are a little different, and the editing time for both is about 20 minutes. And there is no mutual compatibility in the conversion of Hangul 97 ↔ MS-word 97 (picture letters, line, table). The content of an official document with the table, picture letters, and paragraph arrangement equipped is shown in Figure 2-3.



a. Hangul 97 b. MS Word 97

Figure 2-2. Comparison of Equation mode.

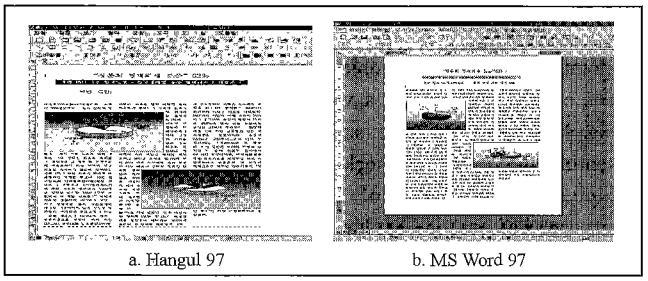


a. Hangul 97 b MS Word 97

Figure 2-3. Comparison of Table mode.

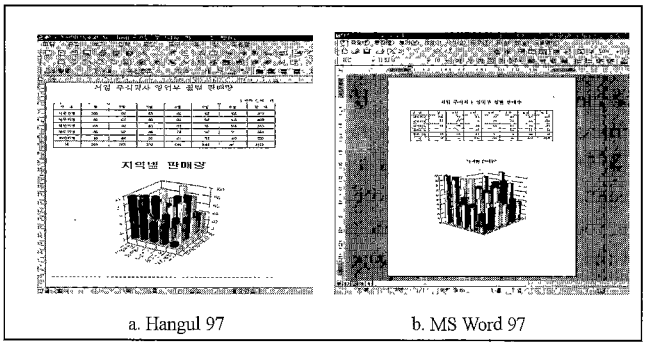
2·3·4 Frame Editor and OLE function Mode As to the OLE mode, neither DRAG & DROP nor OLE server role are supported in Hangul 97. On the other hand, in MS-word 97, DRAG & DROP are enabled and the OLE server role may be supported. As a result of edition, the file sizes are 39 KB and 69 KB which are different by about twice, and the editing times are both about 20 minutes which are not different. There is no mutual compatibility at all in the conversion of Hangul 97 ↔ MS-word 97 (letter box, multiple columns, OLE). A screen edited by using the multiple-column edition, letter box, and OLE is shown in Figure 2-4

2·3·5 Chart Mode As to the sheet/chart mode, the sheet, automatic re-computation, function, numerical format, equation correction, chart function, and table content are supported internally in the form of a chart. On the other hand, in MS-word 97, they should be called up and used since they are not supported internally. As a result of edition, the file sizes are 27 KB and 47 KB which are different by about twice, and the editing times are about 10 minutes for both which are not different. There is no mutual compatibility in the conversion of Hangul 97 ↔ MS-word 97 (letter box, multiple columns, OLE). The sample documents in which the content of data and chart of each business site are shown in Figure 2-5 as follows:



a. Hangul 97 b. MS Word 97

Figure 2-4. Comparison of OLE function mode.



a. Hangul 97 b. MS Word 97

Figure 2-5. Comparison of Chart mode.

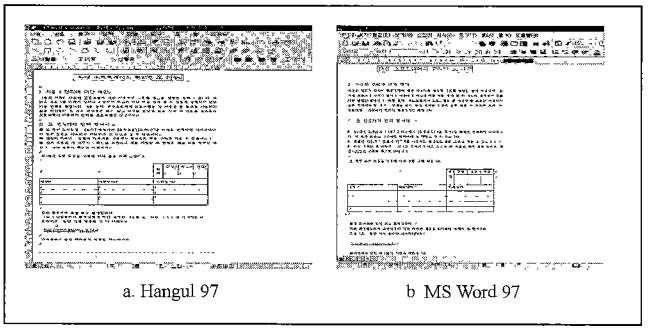
Described in the above are many functions, but other contents are compared below: In Hangul 97, 7 drawing entities, 8 entity linear shapes, 7 entity-patterned shapes, entity shadow effect, and three-dimensional entities are not supported.

But the picture insertion function in the file is supported, and the inserted pictures may be stored in a separate file. It is advantageous in that frame making is supported by dragging the mouse, and the file size is basically small since the compressed saving function is supported. The table, letter box, letter button, and figure caption may be designated, and 40 macros are supported.

On the other hand, in MS-word 97, 130 drawing entities, 5 entity linear shapes, 48 entity-patterned shapes, entity shadow effect, and three-dimensional entities are supported. The drawing insertion function in the file is supported, but the inserted pictures are not saved in a separate file. It is disadvantageous in that frame making is not supported by dragging the mouse, and the file size is greater than that in Hangul 97 as there is no compressed saving function. The table, letter box, letter button, and picture caption can not be designated, and one macro is supported. And the macro edition function is supported, and macro designation may be done in the format file.

2·3·6 The other Modes As a result of edition of the same sample documents, it is shown that the file sizes are 26 KB for Hangul 97 and 40 KB for MS-word 97 which are different, and the editing time for both is about 10 minutes.

In Hangul 97, 7 drawing entities, 8 entity linear shapes, 7 entity-patterned shapes, entity shadow effect, and three-dimensional entities are not supported. It is advantageous in that the picture insertion function in the file is supported, the inserted pictures may be saved in a separate file, frame making is supported by dragging the mouse, and the file size is basically small as the compressed saving function is supported. The table, letter box, letter button, and picture caption may be designated, and 40 macros are supported. On the other hand, in MS-word 97, 130 drawing entities, 5 entity linear shapes, entity shadow effect, and three-dimensional entities may be supported. The picture insertion function in the file is supported, and inserted pictures are not saved in a separate file. It is disadvantageous in that frame making by dragging the mouse is not supported, and the file size is grater than that of Hangul 97 basically as there is no compressed saving function. The table, letter box, letter button, and picture caption can not be designated, and one macro is supported. And the macro edition function is supported, and macro designation may be done in the format file as shown in Figure 2-6.



a. Hangul 97 b MS Word 97

Figure 2-6. Comparison of the others mode.

3. Development and Implementation of the Application Software

In order to evaluate the application S/W, the garbage generation, separation, and collection are developed and implemented in the present study. With respect to the implemented application S/W, in order to compare the tool book and the director from the point of view of the user, four items set in the present study are compared and analyzed through the source code and screen.

3·1 Garbage re-utilization flow Figure 3-1 shows the entire development process of the screen for garbage generation in the form of a flow. The content and method of re-utilization of the garbage are manufactured in the form of a game and search for learning. It is constructed in such a way that if an item to be sought for is selected in the main menu, the screen is changed to the corresponding item so that the learner selects and looks into it for himself/herself.

It is possible to view the amount of garbage generated that is enforced in Korea, the expenses that are necessary for processing this generated garbage, etc. by selecting the garbage generation, collection, and processing status in the main menu. It is possible to return to the first menu item after searching for this learning column is completed, and to move to re-utilization which is the next learning step by selecting the Next button.

If a game is selected, the content related to the garbage processing status, re-utilization, basic separation and collection system, and waste material decomposition term are spread randomly to enable selective learning, and various examples are presented so that the garbage collection cart may be obtained along with ICON if a sample is solved or the garbage collection cart is lost along with the distorted ICON if the sample is missed. It is also constructed in such a way that the content enabling search for the corresponding item is presented and searched for if HELP is selected while playing a GAME by offering HELP of the corresponding content.

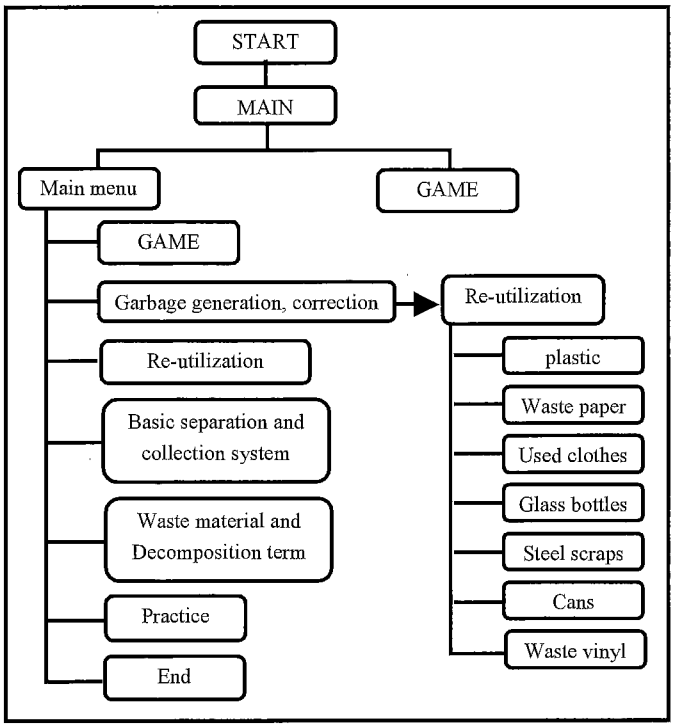


Figure 3-1. Garbage re-utilization system of full screen configuration.

It is moved to the screen for selecting the content of re-utilization if the re-utilization button is selected. This screen has items for re-utilization of plastic, used clothes, glass bottles, waste vinyl, steel scraps, cans, and waste paper. It is constructed in such a way that the method, outcome, etc. of re-utilization are illustrated and searched for in the form of moving images, various images, voice, or sound along with the re-utilization technique if any of the above items is selected. Each screen has the First, Next, Problem Solving, etc. buttons. It is constructed to return to the main menu if First button is selected, to learn the net if Next button is selected, and to move to the practice screen for solving the problem if Problem Solving button is selected.

If the basic separation and collection system of the main menu is selected, a screen showing in order the processing steps from generation and collection of waste materials to re-utilization at home or in a factory is presented, and problem solving of this processing step by the learner is presented if Next is selected on this screen. It is constructed in such a way that a problem may be solved if only the process conforming to the corresponding position is placed through DRAG & DROP, and it may not be solved otherwise.

If the waste material decomposition term of the main menu is selected, the decomposition term of each kind of waste materials is shown in the form of a graph. And if Next button is pressed, a problem for connecting to this waste material decomposition term is presented. This problem is implemented in such a way that a button for viewing the correct answer is shown to check its own score after four or more attempts.

If the practice item of the main menu is selected, 10 practice problems are presented. There are two opportunities for solving one problem. If the problem is solved, the screen is moved to the next screen automatically. And if the problem is not solved, two opportunities are given. If the problem is not solved by attempting twice, the next problem is presented automatically. Also, if Help is selected by giving Help of the corresponding item, the points for solving the problem are presented in the text.

It is constructed in such a way to search for the next item by giving Next button if the score is 60 points or higher after presenting the score by checking only the correct answers and multiplying by 10 if all of 10 practice problems are solved. Otherwise, the practice problem is to be solved once more by returning to the beginning of the practice problem again. It is implemented in such a way that two opportunities are given for this process, and if the score is lower than 60 points in two attempts, it may return to the main menu as looking into again is allowed. If End button is selected in the main menu, whether to end the program is asked. If it is desired to end, the program is terminated, or is returned to the initial screen otherwise.

3·1·1 Comparison as a Authoring tool The content of design and implementation of an application software in terms of the Took Book and Director is compared and analyzed as shown on the following screen along with illustration of the text mode, sound mode, summation algorithm, and moving image mode from the point of view of the user.

(1) Text Mode A general commonsense story about the

garbage separation and collection status is expressed in terms of a text, and a text called "abc" is prepared for in the editor and is shown on the screen as in Figure 3-2:

In Figure 3-2 (a), the content on the screen is zoomed in and outputted. It is acceptable to write a text on the screen in terms of a TEXT EDITOR. The entire process is worked and processed in the form of an image for more perfect processing in the present study.

As shown in Figure 3-2(b)(c), the screen is viewed in the unit of a page in the Tool book, and is viewed in the form of a Frame in the Director.

The TEXT "abc" is shown and completed if this screen is entered.Also, TEXT may be viewed in the form of a Field or a direct command called TEXT in the Tool Book, but all contents are shown in Sprite in the Director. Particularly, whereas TEXT is converted freely after it is performed in the Tool Book, it is not possible to modify after the material is inputted in the Director.

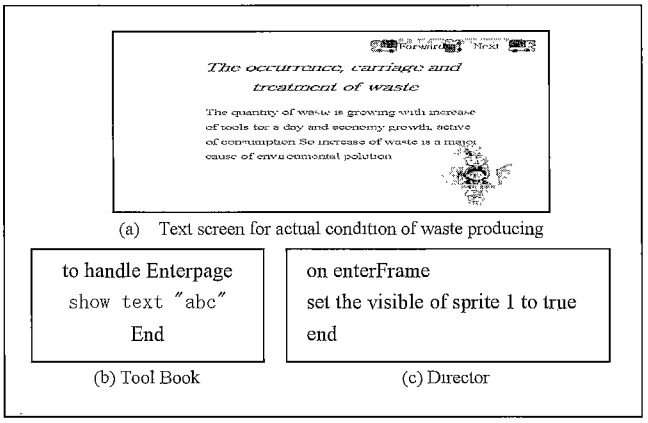


Figure 3-2. The garbage generation status screen and script.

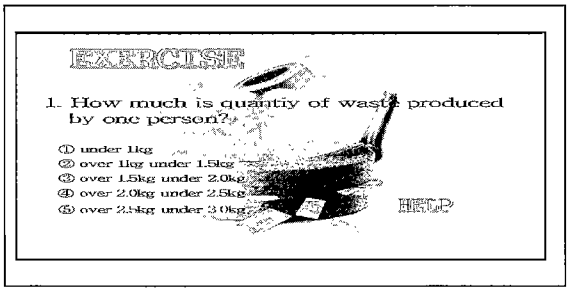


Figure 3-3. Practice screen.

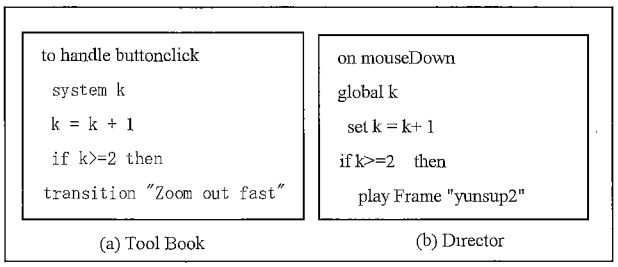


Figure 3-4. Wrong Answer Script.

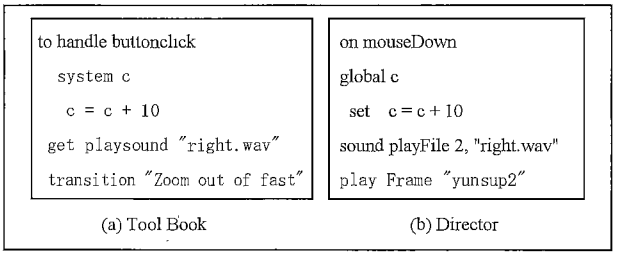


Figure 3-5. Correct Answer Script.

(2) Sound Mode Ten questions are presented. If a question is solved by the user, the process of change of the sound in cases of a correct answer and a wrong answer is shown on the screen as in Figure 3-3. A question is presented if this screen is entered, and "right.wav" is performed and an opportunity to select once again is given. If a wrong answer is selected in the second selection, "wrong.wav" is performed and the next question is presented automatically. Figure 3-5 shows an example of Script in case of a correct answer. A variable for counting the score is declared, and 10 is added to C since the total number of questions is 10. If it is answered correctly, "right.wav" is performed to effect moving to the next screen.

Figure 3-4 shows an example of Script in case of a wrong answer. The variable k that allows two selections is declared, and the k value is increased by 1 when the click is generated. If k is 2 or greater, it is moved to the next screen, or "wrong.wav" is performed otherwise.

There is no big difference in sound performance, but the file types such as wav, midi, mp3, etc. may be used in the Tool Book. In contrast, only wav or midi type may be used in the Director.

(3) Summation algorithm mode When ten questions are completed, the result of the sum total is shown on the screen as in Figure 3-6(a).

Figure 3-6(b)(c) show an example of Script in case of a sum. The extensive variable c counted is called, the content in c is displayed where jumsu is shown, and the "f1" button is shown and the "f2" button is hidden if c is 60 or greater. Otherwise, it is shown contrarily to the above.

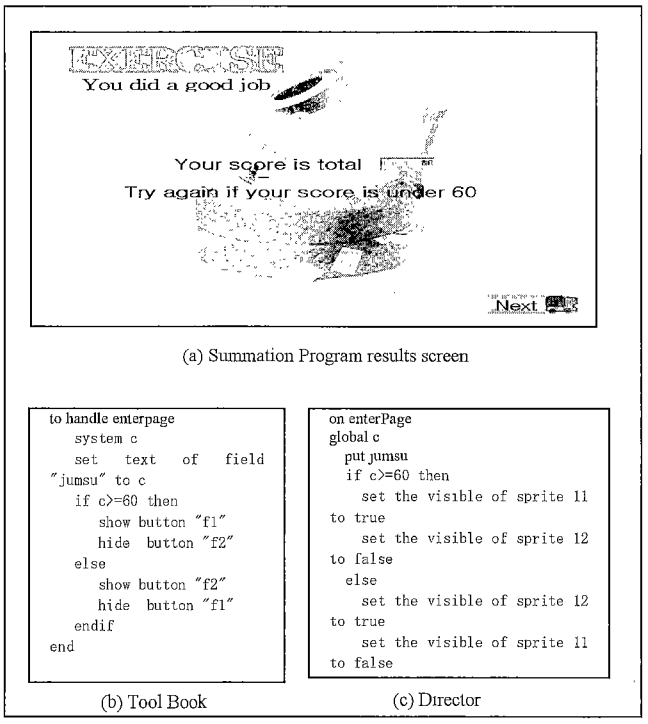


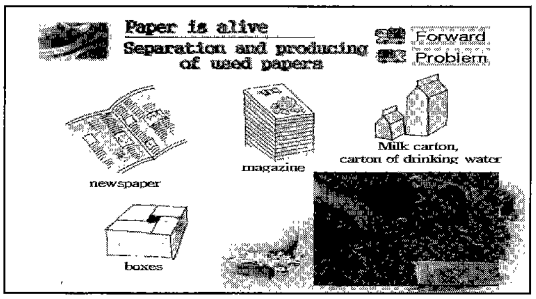
Figure 3-6. Summation Algorithm screen and Script.

```
on mouseDown
 set the movierate of sprite "newpaper" to 1
end
on mouseDown
      set the movierate of sprite "magazines"
     to 1
end
on mouseDown
```

(a) Tool Book

```
to handle buttonclick
  mmplay clip "newpaper" in stage "separation of used
papers"
end
to handle buttonclick
  mmplay clip "magazines" in stage "separation of
used papers"
end
to handle buttonclick
```

(b) Director



(C) Waste papers separation discharge screen

Figure 3-7. Waste paper separation discharge screen and script.

(4) Moving image mode If the corresponding newspaper, magazine, milk pack, box item is selected, the moving image for the newspaper, magazine, milk pack, and box is shown as in Figure 3-7(c).

Figure 3-7(a)(b) show an example of Script in case of a waste paper separation discharge screen. If the newspaper button is clicked, the moving image named a newspaper is performed in the "waste paper separation" state. Also, the magazine, milk pack, and box are performed in the same way. All moving images (MOV, AVI, MPG) used in Window may be used for the moving image type in the Tool Book, but only MOV may be used in the Director.

3·1·2 Analysis and review of the application software garbage re-utilization system The content of design and implementation of an application software in the text, sound, summation algorithm, and moving image modes compared and analyzed in the previous section in terms of the Tool Book and Director is summarized in Table 3-1 as follows:

3·1·3 Verification of reasonability of an application S/W In order to verify reasonability of the present application S/W, the questionnaire as shown in Figure 3-8 is prepared for to obtain opinions of 520 freshman students majoring in information and communication engineering:

(1) Results of survey on the application S/W As shown in Figure 3-9, ① 50% of students answer "Yes" for the question

Table 3-1. Compare the Tool Book to Director Apllication S/W.

Class / Obtain	Tool Book	Director	Comment
Text Mode	· Representation to field · Representation to sequential. · text format for executable · possible of modify	· Control in Text window. · image format changed for executable. · impossible of modify	
Sound Mode	· Control to MCI. · get play sound "Sound name". · sound implementation more then two	· control to channel. · sound playfile channel number, "Sound name". · impossible sound implementation more then two	·Media Command Interface
Summation Algorithm Mode	· Control to sequential variable assigned · implementation such as C, VB, VC	· Control to random, sequential Global, Local variable to assigned	
Moving Image Mode	· Control to clip. · MMplay Clip "Clip Name", in stage "stage name"	· Control to sprite. · Set the movierate of Sprite "moving image name" to channel number	

Application Program garbage re-utilization system of the questionnaire

Major : information and Communication Engineering

Student No : **Name** :

1. The entire configuration is constructed ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
2. The each item is illustrated easily?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
3. The screen configuration of each item may be viewed readily ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
4. what is the score of the result of practice question ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
5. The sound functions are satisfied ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
6. It is easy to understand in learning through the Drag & Drop function ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
7. The overall configuration through the Text and Image functions is well harmonized?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
8. The functions of moving image are satisfied ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never
9. Animation functions are satisfied ?
   ① Very good ② Yes ③ Average ④ No ⑤ Never

Figure 3-8. Garbage re-utilization system of the questionnaire.

if the entire configuration is well constructed; ② 47% of students answer "Yes" for the question if each item is illustrated easily; ③ 57% of students answer "Yes" for the question if the screen configuration of each item may be viewed readily; ④ 45% of students obtain "60 points" for the question what is the score of the result of practice questions; ⑤ 55% of students answer "Yes" for the question if sound functions are satisfied; ⑥ 45% of students answer "Average" for the question if it is easy to understand in learning through the Drag & Drop function; ⑦

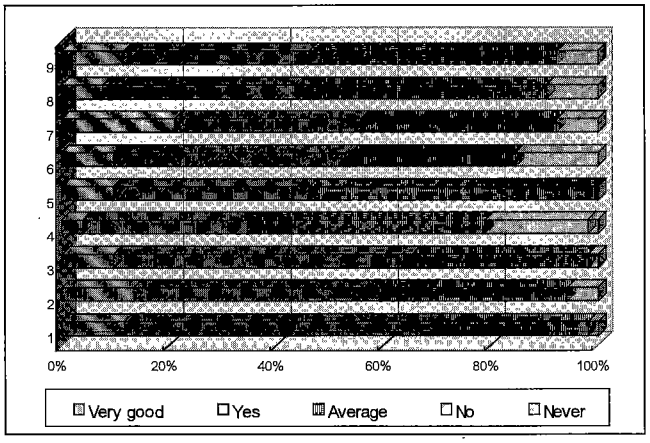


Figure 3-9. Garbage re-utilization system result of the questionnaire.

47% of students answer "Average" for the question if the overall configuration through the Text and Image functions is well harmonized; ⑧ 47% of students answer "Average" for the question if the functions of moving image are satisfied; and ⑨ 45% of students answer "Average" for the question if animation functions are satisfied. As to the question if there are things to be improved, many students are of opinion of "harmoniziaton of image colors," "non-obviousness of the main screen from the beginning to the end," etc., but the general opinion is that they are acceptable.

4. Conclusion

In the present study, the content of design and implementation of an application S/W based on the software quality evaluation criteria is reviewed.

Firstly, the quality evaluation criteria of S/W are established through comparison and analysis of application S/W from the point of view of users for MS-word 97 and Hangul 97 which are used widely in Korea. The main points are established to be the Text Mode, Equation Mode, Table Mode, Multi-Frame Editor and OLE function Mode, Chart Mode, The others Mode, etc. for evaluation items, where it is confirmed that each has significant characteristics.

The "garbage generation, separation, and collection" which is an application S/W is developed and implemented by using each of the Tool Book and Director actually, and is compared and analyzed based on the Text, sound, summation algorithm, and moving image modes. In order to confirm reasonability of the implemented application S/W, a questionnaire with nine questions is prepared for and 520 freshman student majoring in information and communication engineering are investigated and confirmed. The results show a satisfactory reliability.

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Kyu-Boem Lee (Non-member) was born in Daejeon, Korea, on August 7, 1961. He received a M.E. degree in Department of computer science from HanNam university, in 1999. He is currently a graduate student for Ph. D. degree in computer science, PaiChai university. He is current research interests include Human-interface, program complexity, software engineering. He is a member of Korea Information Science Society, Korean Society for Internet Information.

Jeong-Young Song (Member) was born in Daejeon, Korea, on April 13, 1960. He received a Ph. D. degree in Electronic Engineering from Waseda university, in 1995, and is presently an assistant professor at PaiChai university, Daejeon, Korea. He has worked on the recognition of Hand-Written Character, Speech and Image. His current research interests include Human-interface, program complexity. He is a member of Japan Society for Fuzzy Theory and Systems, Acoustical Society of Korea, Korean Society for Internet Information, Korea Information Science Society.

Kageo Akizuki

(Member) He received the B.E., M.E. and Dr. of Engineering from Waseda University, Tokyo, Japan, in 1958, 1960 and 1965, respectively. Since 1963, he has been with Waseda University, where he is now a professor and engages in research of system control and signal processing. He was the president of the IEE of Japan in 1999.