INTRODUCTION

Under continuous innovation of technological products, and development of information technology, touch screen has become an indispensable technology for tablet PC. Many products are using touch screen, such as: iPhone, iPad, iPan mini, padFone, Xperia and HTC. This trend also promotes rise of e-book industry. The report by the International Data Corporation (IDC) shows that the operating systems of tablet PC are mainly Apple iOS and Google Android, which occupy 90% of market [1]. In Q3 of 2013, Apple led the tablet market by holding 39.6% of the market share [2]. Thus, Apple iPad held the highest market share in tablet PC. This study discussed interactive interface design for tablet e-books. In the experimental operation, iPad that had the highest market share was treated as the main measure tool.

The ordinary e-book interface is focused on reading, and has fewer interactions. iPad newsstand store collects many international and local magazines. The magazines are combined with interactive multiple contents. Thus, magazines were treated as target of this study. The purpose of this study is to design novel and intuitive interactive interface patterns. Hsu (2010) proposed that different information is transmitted in life environment, and visual information affects behavior decision of users [3]. For contents of e-books, how to apply visualization for guiding operating interface is an important issue. Good patterns can help e-book create a user-friendly mobile device interface. This study intended to discuss visualized interactive interface design patterns. The purposes of this research are as follows:

1) Analyze interactive interface design patterns of mobile e-books users and conclude frequently-used user interface patterns;
2) Discuss application and design of mobile e-book interface visualization, and find important elements affecting visualization of user operation;
3) Find key factors that can promote interface visualization effect.

LITERATURE REVIEW

This study tested mobile e-books, and used interface design patterns and visualization features affecting user operation as basis for focus group method and research design. It discussed how mobile e-books give suitable visual guidance via interface design patterns and make users rapidly obtain the delivered contents through presentation of visualized information and visualization elements of interactive interface.

E-Books on mobile devices

Concise Oxford Dictionary defines e-books as contents of desktop or handheld readers or contents and reading device [4]. The e-books use technologies to digitalize...
knowledge and contents, which are displayed with words, pictures, audio and videos. It uses electronic media as carrier, and provides information and interactive contents after integration. E-books can be divided into 3 types [5], including: 1) born digital: published in a non-print form or other forms; 2) new edition: based on paper contents, the materials are published in electronic form after supplement, modification or deletion; 3) reproduction: the published paper contents are reproduced through mechanization and converted into a new edition, and the original images remain unchanged, such as PDF file.

Huang and Wang (2011) proposed that e-book contents published in iPad can be divided into 3 types [6]: 1) general e-books: the books contents are displayed by words, followed by images; the application programs provide basic reading functions, such as zoom new book marks, and links; 2) multimedia e-books: the contents include beautiful advertising and content menu links to facilitate reading, and the editorial design based on images is designed to combine with multimedia elements, such as video, music and animation; 3) game e-books: the illustrated game e-books have various screen sensors and multi-contact screen functions, creating interesting interactive environment.

Currently, the e-book readers on the market can be divided into two types. The first one is e-readers, such as Amazon Kindle, B&N Nook, Borders Kobo and Sony Reader Daily in which electronic stores, media and film programs and basic network programs are established. Users can use e-readers for reading or surfing Internet. The second one is tablet, such as Apple iPad, Kindle Fire, ASUS Fonepad that can download or purchase e-books App for reading from App Store or Google Play. iPad’s newsstands and magazines function collect the e-book application programs through which the users can enjoy reading and rich content service with iPad anywhere and anytime.

2.2 User interface design pattern for mobile e-Books

User interface design patterns are recurring solutions that solve particular design problems [7-9]. In recent years, e-Book technology offers a new way for book delivery to readers [10], and it catapulted to fame with user-friendly interface and multiple interaction. Publishing added a variety of materials to create interactive e-Books. These included images, videos, audios, menus and animation. Users require that the information be quickly located and effectively organized. Therefore, the page layouts need to reflect the mental models understood by users [11]. Design patterns are especially useful in turning an analysis model into an implementation model [7]. The first edition of iPad App and Website Usability proposed mental models are very powerful for immersive apps [12]. The App has a tab bar at the bottom allows users to swipe different sections or next article. Also, offers the affordance of vertically scrolling allow users to show more text.

In the field of user interface patterns, Tidwell (2005) demonstrated that the first group of patterns which includes six interactive tools can be applied to most varieties of interactive graphics[9], Hoober and Berkman (2011) revealed ten patterns have been developed and refined based on human mind processes patterns, objects, and information[11], Neil (2012) addressed that mobile design pattern involves ten separate categories [13]. In addition, many web site collected a list of design pattern with user interfaces, such as Martijn van Welie’s Interaction Design Pattern Library [14], and Anders Toxboe’s User Interface Design Pattern Library [15].

In recent years, many digital publishers create mobile e-books using Adobe Digital Publishing Suite (DPS), and edit interactive objects using Folio Overlays panel in InDesign, such as WIRED, Martha Stewart Living, GQ and VOGUE. Furthermore, folio overlays support several interactive objects, including hyperlink, slideshow, image sequence, audio & video, panorama, web content, pan & zoom, and scrollable frame.

In this phase, several apps are investigated, including several book-making apps: ELLE, WIRED, FHM, Martha Stewart Living, GQ and VOGUE. This paper extracts and renames the 5 popular interactive overlays for mobile e-books from the Folio Overlays of Adobe DPS, and from the integration by Wang and Huang (2012) who propose the resulting interaction patterns for mobile e-books [16], as illustrated in Figure 1. This paper extracts action pattern from audio & video of folio overlay by referring to the pattern proposed by Tidwell (2006) and Neil (2012), who use the pattern to handle the “verbs” of an interface. In this way, action pattern should support users’ behavior at the first time. This
paper extracts the tour pattern from hyperlink of folio overlay by referring to the user interface design pattern library, which proposes that this pattern could be used to explain the process. In this way, tour pattern should support a series of information. This paper extracts the carousel pattern from image sequence of folio overlay by referring to the above-mentioned investigators, who propose that this pattern could be used to browse through a set of items. In this way, carousel pattern should support more items available.

As mentioned above, the researchers defined 5 popular user interface design patterns for mobile e-books, as show in Figure 2:

1) Action: This is a type of action initiator and allows the user to submit information, or force a state change from within any context [11,13]. User can tap the play icon to watch a video or audio or open a small or medium amount of additional information.

2) Tour: This presents a product or service in terms of features, benefits [15]. User can tap the numbers or a list of screenshots to learn about an offered service or product.

3) Slideshow: This shows a set of images or similar pieces of information [11,15]. Users can use an interactive gesture to tap the thumbnails to see the different images and information.

4) Carousel: This displays a set of selectable images [11,13]. Users can flick the touch screen to switch images.

5) Scroll: This displays the additional information when content on a page exceeds the viewport [11]. User can swipe from top or bottom to view panorama.

2.3 Visualization

The field of information visualization is concerned with generating interactive, visual representations of information spaces to amplify users’ cognition [17]. Visualization is solely a human cognitive activity and has nothing to do with computer [18,19]. It allows the perception of emergent properties that were not anticipated. The perception of a pattern can often be the basis of a new insight [20]. Jennifer Tidwell (2006) suggested that any good static design better with interactivity [9]. Perceptual tasks that can be performed in less than this amount of time are called preattentive [21]. Preattentive processing that is central to understand visual distinctiveness. Christopher G. Healey et al. (1996) listed some of the visual features that have been used to perform preattentive tasks: line (blob) orientation, length, width, size, curvature, number, terminators, intersection, closure, colour(hue), intensity, flicker, direction of motion, binocular lustre, stereoscopic depth, 3-D depth cues and lighting direction [22]. Jennifer Tidwell (2006) describes the eight preattentive variables: color hue, position and alignment, color brightness, orientation, color saturation, size, texture and shape. Especially, color hue is the preattentive variable most frequently used for brushing [9]. Colin Ware (2012) describes the features of preattentively processed that can be organized into 4 categories: form, color, motion, and spatial position [20].

Object visibility indicates the mapping between intended actions and actual operations [23]. Examples include prompt and button. Prompt that shows the user what to do or type[9]. A single button click can often accomplish a series of actions in the real world [20]. Visual presentation indicates that data is usually presented to the user in view of limited display area [18]. Examples include material, layout and effect. Material means forms and types of the contents. Layout is the art of manipulating the user’s attention [9]. Effect is a very effective visual presentation. Thus, the data shall be transferred to the users after filtration, reorganization and screenshots of details.

From the above, this study discussed how to apply object visibility include button and prompt, as well as visual presentation include material, effect and layout on 5 interactive interface patterns to attract users and focuses of interest of users, and guide deep involvement and focus of interests of users. Therefore, the research hypotheses are as follows:

H1: mobile e-books interactive interface design patterns uses “colour” as visualization effect of preattentive variables, which is better than “shape”.

Figure 2: User interface design pattern of mobile e-books:
(A) Action: Wired App; (B) Tour: FHM App; (C) Slideshow: Martha Stewart Living App; (D) Carousel: ELLE App; (E) Scroll: GQ App
H2: mobile e-book interactive interface design patterns are related to object visibility.

H3: mobile e-book interactive interface design patterns are related to visual presentation.

3. METHODS

In this study, visualization of interactive interface design patterns on mobile e-books, through the focus groups method will contribute to the summarized the influence elements of visualization relate to interface design. Focus groups are frequently used in social sciences research [24]. They are based on group discussion or interview exploring a specific set of issues. Many studies have pointed out that focus group approach is extremely useful for exploring the interactive interface design issues[25-28]. Focus groups aim to enable people to put forward their own opinions in a supportive environment, and can help researcher assess user needs and feelings [24, 29, 30]. Therefore, this study used focus group method to discuss effect of visualization on the e-book interactive interface design patterns.

3.1 Experimental design and procedure

This study used the focus group method to investigate participants’ perceptions, opinions and attitudes towards 5 interactive interface design patterns. First, it makes participants familiar with development forms of magazine in iPad. Before use of focus group method, the participants are asked to operate GQ magazines uploaded in the tablets, and discuss “GQ magazine” interactive interface design patterns. The experimental procedure is as follows:

1) Introduction: First, describe purpose, method and considerations of the interview. Second, introduce iPad e-books and multi-touch gesture. Third, describable 5 interactive interface design patterns and vision. Finally, describe GQ magazine App interface operation method.

2) Evaluation: make participants experience GQ magazine App and provide 5 types of typical work (see Table 1) to test usability.

3) Conducting the focus group: start focus group interview, and discuss effect of visualization of interactive interface design patterns.

3.2 Designing focus group questions

This study designed 3 open-ended questions to refer to Ben Shneiderman; he summarized as the Visual Information Seeking Mantra: overview first, zoom and filter, then details-on-demand [31]. The first question discusses preattentive variables of e-books to obtain preattentive attributes of mobile e-books, and the second question discusses e-book interface design patterns to obtain suggestion of button and prompt. The third question discusses e-book interface design patterns and involvement of users to find the key elements affecting visualization of user operations. In accordance with the research objective, the moderator asked some open-ended questions:

1) Discuss which visual attributes transmit information before attention when users read e-books?
2) Discuss how the 5 interactive interface design patterns of e-books trigger interesting points of users?
3) Discuss how visualization of interactive interface and details of e-books deepen interesting points of users?

3.3 Participants

This study invited seven interactive design personnel (digital media design, computer science, information engineering, electrical engineering, information communication, e-learning design and management). The personnel with experience of using iOS system products (iPhone and iPad) aged at 20-30 were selected to form the focus group for interview. The researchers act as moderator and record the interview. Table 2 shows the background information of the participants. It was found that they had a median age of 24 years. The data showed that all of the participants had experience with multi-touch and 4 males and 3 females; 6 participants had held the multi-touch for more than one year; 6 participants had master degree; 6 participants had digital media design background; 5 participants took average of 3-5 hours with using multi-touch every day.

Table 1: A sample of the typical tasks for user experience in the GQ

| Typical tasks | Step |
|---------------|------|
| Task1: Action | 1) Find any available “action button” which can be selected.  
2) Open and browse  
3) Close |
| Task2: Tour | 1) Find any available “number menu” which can be selected.  
2) Switch different menus in sequence to view different contents. |
| Task 3: Slideshow | 1) Find any available “thumbnail menu” which can be switched.  
2) Switch different thumbnails to view different photos and information contents. |
| Task 4: Carousel | 1) Find any available “carousel image” which can be switched.  
2) Click images to scroll a series of images. |
| Task5: Scroll | 1) Find any available “scroll” which can be dragged.  
2) Drag and drop words to activate scroll function and show more text contents. |
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3.4 Materials

This paper focuses on interactive e-books which are commercially available downloaded on App store of iPad. The wired magazine was the first of a series of steps for Adobe to enable magazine publishers and it had won two national magazine awards. This study used famous wired magazine in iPad, and selected international Chinese version of GQ magazines as research samples. GQ magazine departs from the paper mental model and allows the user to scroll vertically to read the entire article [12]. For example, users can slide and hold left and right or up and down to display hidden articles and images. GQ is international magazine and provides several languages (English, Chinese and Japanese). For readers, it symbolizes hi-quality life style. Thus, this study used GQ magazine as research samples. This interview provided one set of Apple iPad mini 2 with a size of 5.3 inches, and downloaded GQ magazine published in December 2013 from App Store. In the interview, the projector was used in discussion of interactive interface design patterns, and cameras and voice recorders were used for recording. The focus group was implemented in a quiet and closed meeting environment, and fluorescent lamps were used for the ambient lighting. The illumination for the general environment was suitable.

3.5 The focus group

In this study, the researchers acted as moderator, and guided the seven focus group members to express effect of visualization on interactive interface design patterns. Moderator control on the direction of the discussion, intended flow of the discussion, level of openness [30]. To prevent fatigue of the members due to long time of interview, the members had a rest 5 minutes every 30 minutes. The interview lasted 100 minutes. The focus group interview flow is shown in Figure 3. First, the moderator began by introducing himself and demonstration interactive interface design pattern. Second, focus groups discussed visualization interface of mobile e-book. Third, the data collection sessions were tape recorded for later analysis, coding, interpretation and conclusion.

3.6 Data collection and analysis

This study used focus group method to get insight into effect of vision on interactive interface design patterns. The focus group consisted of 7 persons. The interview process was recorded. The effect of visualization on mobile e-book interactive interface design patterns was analyzed through protocol recording. Protocol analysis is a psychological research method that can be used to gain information about the course of the cognitive processes [32]. In addition, the results were concluded by using Mind Map. The Mind Map proposed by Buzan (1974), which materializes the theme into a central concept [33, 34], is a powerful graphic technique and provides a universal key to connect all concepts. The links between the key concepts will be immediately recognizable because of their proximity and connection [33].

4. EXPERIMENTAL RESULTS AND ANALYSIS

First, this study converted video records and audio records in the focus group interview into oral data. Second, the activity list is used for verbal coding. Finally, Mind Map was used to obtain: 1) preattentive attributes of the e-books; 2) key elements of interface visualization to trigger and deepen their interesting points through analysis of 5 interactive interface design patterns.

Table 2: Basic information and background of participants

| Participant number | A | B | C | D | E | F | G |
|--------------------|---|---|---|---|---|---|---|
| Sex                | Female | Female | Male | Male | Male | Male | Female |
| Age                | 21 | 23 | 24 | 27 | 24 | 25 | 24 |
| Education level    | Bachelor | Master | Master | Master | Master | Master | Master |
| Background 1 | DMD, EE | DMD, CSIE | DMD, EE | DMD, CSIE | DMD, EE | DMD, CSIE | DMD, CSIE |
| Experience with multi-touch use every day | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Years of multi-touch use | >1 | >1 | >1 | >1 | >0.25 | >1 | >1 |

1 Background: DMD=Digital media design; CSIE=Computer science and information engineering; EE=Electrical engineering; IC=Information communication; ETECH=E-learning design and management

Figure 3: The focus group interview flow

Note: The focus group interview flow

- Start interview
- Demonstrate interactive interface design pattern
- Conclude consistent views on interactive interface design patterns
- Focus groups discuss e-book visualization interface
- Interpret visualized interface design patterns
- Confirm whether interview is ended
- Data analysis and coding
- Finish interview
4.1 Analysis of preattentive attributes

Table 3 shows excerpt and coding of verbal and written records of preattentive variables of mobile e-books. For example: “I think it is shape” is coded as “shape”, “it will be especially attractive if different shapes are added in the typesetting of the fixed format” is coded as “typesetting” and “an article can attract me if one circle is around it” is coded as “differentiation”.

This study concluded 4 preattentive attributes of users through Mind Map: 1) Shape: inserting special shape in the same main menu page can help users easily make a distinction; 2) Area: it can make content form focus; 3) Colour: eye-catching colour can quickly attract attention of users; 4) Number: number or arrows related to the daily life can easily attract attention of users, as shown in Figure 4.

4.2 Analysis of 5 interactive interface design patterns

This study discussed how 5 interactive design patterns of e-books guide users to trigger and deepen interesting points, so as to find the key factors of interface visualization. At this phase, 5 types are summarized through visualization in the section 2.3: prompt (Pr), button (Bu), material (Ma), layout (La), and effect (Ef) are coded, and the results are as follows:

4.2.1 Action pattern

Table 4 lists excerpt and coding of verbal and written records of action pattern. For example: “Dark” that is coded as “Ma” is extracted from “attract users to watch video because images become darker”. “Poster” that is coded as “Ef” is extracted from “I feel the greatest effect is darkness of video”. Figure 5 shows key elements of action patterns is design application of button, material and effect. The key factor to trigger interesting point of users is dark-colored film poster plus the visible play button in the middle, and the key factor to deepen interesting point of users is presence of film atmosphere.

4.2.2 Tour pattern

Table 5 lists excerpt and coding of verbal and written records of tour pattern. For example: “Sequence” that is coded as “Bu” is extracted from “tour pattern hopes users to click contents in sequence”. “Scenario” that is coded as “Ma” is extracted from “just like the left contents, users want to click them in sequence due to scenario”. Figure 6 shows key elements of tour pattern is design application of button, material and effect. The key element to trigger interesting point of users is universal digital mark button, and the key element to deepen interesting point of users is descriptive photos and obvious dynamic feedback.
4.2.3 Slideshow pattern

Table 6 lists excerpt and coding of verbal and written records of slideshow pattern. For example: “Menu bars” that is coded as “Bu” is extracted from “the mode of presenting the menu is the most common”. “Thumbnail”, “disclosure” and “less” that are coded as “Bu” are extracted from “the thumbnails on the right example may confuse users”.

Slideshow pattern mainly uses menu to switch over contents. The disclosed information in the menu is soul role of the pattern. Figure 7 shows key elements of slideshow pattern is design application of button. The key element to trigger interesting point of users is graphic patterns on thumbnail, and the key element to deepen interesting point of users is resonance effect between thumbnail and user.

Table 7: An example of the coding scheme for carousel pattern

Table 5: An example of the coding scheme for tour pattern

4.2.4 Carousel pattern

Table 7 lists excerpt and coding of verbal and written records of carousel pattern. For example: “Page indicator” that is coded as “Pr” is extracted from “I feel page indicator is easily found”. “Position” and “bottom-centered” that are coded as “Pr” are extracted as “it is placed on the lower middle position”.

Table 7: An example of the coding scheme for carousel pattern
Carousel pattern often transmits quantity and location of contents through page indicator. Figure 8 shows key elements of carousel pattern is design application of prompt and material. This pattern is used to switch image contents in the mobile e-books. Thus, the key element to trigger and deepen interesting points of users is page indicator mark.

4.2.5 Scroll pattern

Table 8 lists excerpt and coding of verbal and written records of carousel pattern. For example: “Photograph” that is coded as “Ma” is extracted from “is scroll bar suitable for images”. “Article” that is coded as “Ma” is extracted from “is scroll bar suitable for texts”.

Scroll pattern is applied to many area types. Figure 9 shows visual key elements of scroll pattern are design application of prompt, material and layout. This pattern is used in reading of the e-book contents. Thus, the key element to trigger interesting point of users is area layout, and the key element to deepen interesting point of users is proper quantity of content materials.

4.3 Discussion of research questions

H1: mobile e-books interactive interface design patterns uses “colour” as visualization effect of preattentive variables, which is better than “shape”.

This study concludes 4 preattentive attributes of users through Mind Map: shape, area, colour and number. By analysis of verbal records, we found that elements related to daily life can easily attract attention of users. Furthermore, the results show that “number” is the most attractive attributes on mobile e-books.

H2: mobile e-book interactive interface design patterns are related to object visibility.

H3: mobile e-book interactive interface design patterns are related to visual presentation.

Table 9 shows visualization elements of 5 interactive interface design patterns. This study found the key visualization elements, which can trigger and deepen interesting points of users through focus group interview. By using Mind Map, 5 interactive interface design patterns were summarized. The findings are as follows:

1) Suggestions on button and prompt of interface design
   Any button or prompt shall be prevented from arrangement at the right side or lower right corner; carousel pattern is more suitable for the image contents; scroll pattern is more suitable for verbal contents.

2) Visualization elements for interactive interface design patterns
   A. Key elements of action pattern are design application of button, material and effect.
   B. Key elements of tour pattern are design application of button and effect.
   C. Key elements of slideshow pattern are design application of button.
   D. Key elements of carousel pattern are design application of prompt, material and layout.
   E. Key elements of scroll pattern are design application of prompt, material and layout.

Table 8: An example of the coding scheme for scroll pattern

| Dialogue Time | Conversation | Type | Technique |
|---------------|--------------|------|-----------|
| 01:06:47      | Is scroll bar suitable for images? | Ma   | Photograph |
| 01:07:01      | Is scroll bar suitable for texts? | Ma   | Article   |
| 01:07:30      | The scroll bar is more suitable for images. | Ma   | Continuity |
| 01:07:36      | If scroll bar is used for images, the images seem to be cut. | Ma   | Discontinuity |
| 01:08:05      | Arrow is very obvious. | Pr   | Arrow     |
| 01:09:17      | If users see long texts in some area, they may scroll down. | La   | Area      |
| 01:10:25      | Scroll the contents down after finding amount of contents. | Ma   | Quantity  |
| 01:11:15      | I agree the prompt position shall be placed on the bottom center. | Pr   | Bottom-centered |
| 01:11:26      | The right position may block hand, and people are used to use right hand, and the right position may block hand. | Pr   | Position   |
| 01:12:29      | This pattern only requires prompt, and display of scroll bar is not necessary. | Pr   | Arrow     |

Table 9: Visualization elements of interactive interface design patterns

| Pattern | Object visibility | Visual presentation |
|---------|-------------------|---------------------|
|         | Button | Prompt | Material | Effect | Layout |
| Action  | X      | X      | X        |        |        |
| Tour    | X      |        | X        |        |        |
| Slideshow | X   |        | X        |        |        |
| Carousel | X    | X      |          |        |        |
| Scroll  | X      | X      |          |        | X      |

Note: X significant
3) Key elements to promote interface visualization effect
   A. Object visibility can affect action, tour, slideshow, carousel and scroll pattern.
   B. Visual presentation can affect action, tour, carousel and scroll pattern.
   C. Visual presentation cannot affect slideshow pattern.

5. CONCLUSIONS

The mobile e-books break through passive use and limitations of time and space of traditional books, providing interactive experience for users. Diversified content information has an effect on user operation behaviors. The mobile e-books provide suitable visual guidance for interactive interface through visualization, so as to improve satisfaction of users.

This study summarized 5 common mobile e-book interactive interface design patterns: action, tour, slideshow, carousel and scroll. This study used the focus group method to collect visualization elements of interactive interface design patterns of mobile e-books. Before this experiment, 5 typical tasks were designed to let participants experience GQ magazine App, so as to make experiment results meet needs.

This study concluded 5 key elements to promote visualization effect through Mind Map in terms of the results obtained from focus group interview:
1) Create visual atmosphere for action pattern: the button is arranged in central position of films, and black translucent color blocks are added on the film posters which can foil film atmosphere to increase satisfaction of users.
2) Select views or create scenario images for tour pattern: The scenario photos can guide users to further know operation, and in button switchover, the dynamic feedback shall be displayed for users.
3) Create decisive thumbnail menus for slideshow pattern: thumbnails can affect touch rate of users, and metaphorical image menu can arouse interest of users. Different users have subjective evaluation for obvious image menu design.
4) Provide obvious page indicator for carousel pattern: Give users clear total page number and indicator position. It is suggested the model component elements shall be established and indicated in the bottom center of the area.
5) Provide suitable direction guidance for scroll pattern: Use visual layout and establish scroll bar prompt on bottom center of scroll bar area.

In terms of results and findings, users can make operation through gesture and interactive interface of mobile e-books in terms of visual attributes of interface patterns. The button or prompt provided by the mobile e-books is key to communication with users. Any interface design pattern needs to indicate the data types the users want through visualization, enabling users to scroll towards more accurate direction. Perhaps future research could examine the interaction between visual communications and symbols on interactive interface design patterns in mobile e-books. The researchers are hopeful that future research will provide more detailed results, which may differentiate these views from one another.

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