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Master's Thesis of Education

Gist-based Design Strategies of Tutorial Video for Elderly Learners' Health-Care

노인학습자 건강관리를 위한 핵심정보기반
튜토리얼 비디오 디자인전략 개발

February 2020

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Submitting a master's thesis of
Education

February 2020

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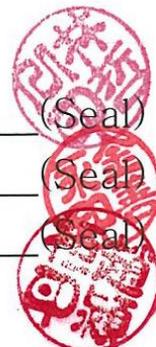
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ABSTRACT

Gist-based Design Strategies of Tutorial Video for Elderly Learners' Health-Care

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Among the various forms of tutorials, video tutorials have been widely used in senior care industry, most of which target on care-givers or care-giver trainers. However, as users devices, i.e. laptop, tablet, mobile phone, et cetera are being more accessible and comfortable for seniors to operate on, watching online videos is also no longer that complicated for the seniors. Despite the increasing needs of seniors for video tutorials on health-care, the quality of existing learning materials is still not high enough according to the research. Many elderly learners claimed that the medical related learning content is too hard for them to understand because of the medical terms and complex pathogenesis explained in the video (on-screen visuals or voice-over). Gatti et al. (2017) pointed out three viewpoints of learning difficulty experienced by the elderly: declining perceptual and motor skills, cognition, and psychosocial sense. Especially, they have difficulties in translating numbers (and other health-related information) into meaningful representations or gist, with reliably retrieving and implementing their values and knowledge, and with inherent complexities involved in processing ratio concepts, such as probabilities, among other factors (Fishbein M., 2008). The meaning of health-relevant information is seldom self-evident, and even health professionals have difficulty retrieving knowledge and processing nested or overlapping classes involved in probability

judgments.

This research works on tutorial video strategies that focus on how gist information is designed and presented for elderly people's learning on health-care. And perceptions of elderly learners on the gist-based tutorial video (text, visuals, numbers, etc.) are analyzed based on the prototype developed based on the strategies. The research questions are as follows. First, what are the design strategies of gist-based tutorial video for elderly learners health-care? Second, are the design strategies of gist-based tutorial video internally valid? Third, how do elderly learners perceive the prototype of gist-based tutorial video?

All three aspects of fuzzy-trace theory, characteristics of elderly learner, instructional video design strategies and guidelines have been reviewed separately and then synthesized in the design strategies. Fuzzy-trace theory that draws upon dual-trace conceptions were delved into to predict and explain cognitive phenomena, particularly in memory and reasoning. In order to help elderly learners have better memory on the health-care related learning content which includes critical medical decision making probability judgments and complex information, it is essential to summarize the cognitive phenomena or preference that could possibly reduce elderly learners false memory, strengthen their memorizing on the key information and have better risk perception and estimation. And cognitive phenomena were used as "a camera lens". Characteristics of elderly learners, including their disadvantages and preferences when it comes to learning was summarized. For example, elderly learners whose processing rate is relatively much lower than younger adult also appear to be more reliable on gist memory to judge things than younger adult, their attention orientation and maintenance declines significantly while imagination inflates prominently. Thus, additional and specialized facilitation such as situational cues and color choices is quite helpful for examples. The characteristics were added to the "camera lens" as a "lens filter" so that instructional video design strategies and

guidelines could be “shoot” from elderly learners` perspectives.

Through two rounds of expert review conducted by three experts in educational technology and one expert in cognitive psychology, the final strategies were verified internal validated for the content. Also, by working closely with the video designers and asking for their evaluation during the prototype development process, opinions on the usability of the strategies were collected and condensed to improve the final strategies in the aspects of working flow and job distribution for video production.

Lastly, the elderly learners showed a high accuracy rate on memorizing the gist messages in the video as well as high situational interest and focus during their watching the videos. Meanwhile, the elderly learner all expressed their knowledge and attitude changes on the ignorance of the disease by watching the videos.

This research has developed a series of meaningful strategies on gist-based tutorial video design for elderly learners health-care that could finally help promote a healthier and happier life of elderly people in the increasing aging society in this research.

Keywords : gist-based design, instructional video design strategies, elderly learners, e-learning, fuzzy-trace theory

Student Number : 2018-26505

TABLE OF CONTENTS

CHAPTER I. INTRODUCTION	1
1. Background of the Research	1
2. Significance of the Research	5
3. Purpose & Research Questions	6
CHAPTER II. LITERAURE REVIEW	8
1. Instructional Video Design Strategies and Guidelines.....	8
1.1. Design Strategy for MOOCs video	8
1.2. The Use of Cognitive Strategies in Instructional Video Design	10
2. Fuzzy Trace Theory	11
2.1. The Limited and Transient Nature of Immediate Memory.	12
3. Characteristics of Elderly Learner	17
3.1. Cognition (False Memory with Age)	17
3.2. Emotion.....	25
3.3. Decision–making.....	26
CHAPTER III. RESEARCH METHODOLOGY.....	31
1. Participants.....	31
2. Research Design.....	32
3. Data Collection and Analysis	39
3.1. Literature Review and Case Analysis.....	39
3.2. Internal Validation via Expert Review	51
3.3. In–Progress Project Data from Video Designers (Usability Test)	52
3.4. Field–Evaluation by Elderly Learners (Effectiveness of the Strategies)	53
4. Instruments	54
4.1. Instrument for Internal Validation.....	54
4.2. Instrument for Usability Test	55

4.3. Instrument for External Validation.....	56
CHAPTER IV. RESULTS.....	59
1. Results of Expert Review and Video Designers' Opinions	59
1.1. 1 st Round of Expert Review	59
1.2. 2 nd Round of Expert Review.....	65
1.3. Usability Test for Video Designers	70
2. Gist-based Tutorial Video Prototype.....	73
2.1. Summary on the Gist-based Tutorial Video Prototype	73
2.2. Development of the Gist-based Tutorial Video Prototype.....	74
3. Final Gist-based Design Strategies of Tutorial Video.....	86
4. Elderly Learners' Response to the Prototype.....	99
CHAPTER V. DISCUSSION AND CONCLUSION.....	102
1. Discussion	102
1.1. Significance of the Gist-based Video Design Strategies for Elderly Learners Health-Care.....	102
1.2. Effectiveness of the Gist-based Video Design Strategies for Elderly Learners Health-Care.....	104
1.3. Improvements on the Gist-based Video Design Strategies for Elderly Learners Health-Care.....	105
2. Conclusion and Recommendation	105
2.1. Summary and Conclusion	105
2.2. Limitations.....	106
2.3. Recommendation	107
REFERENCES.....	112
APPENDIXES	118
국문초록	150

LIST OF TABLES

Table I-1. A pedagogic framework of narrative screenwriting principles.....	9
Table II-1. Learning Factors and Their Impact on Interactive Video Program Design (Russell Gazda, M.S. et al., 1998).....	10
Table II-2. Definitions and Examples of Some of the Effects in Judgment and Decision Research Explained by Fuzzy Trace Theory.....	17
Table II-3. The initial gist-based tutorial video design strategies for elderly learners via literature review.....	27
Table III-1. Profiles of Experts Attended in the Expert Review ...	31
Table III-2. Animated Video Production Participants Profiles	36
Table III-3. Process of Prototype Development	37
Table III-4. Summary of the Essential Findings from Fuzzy-trace theory	40
Table III-5. Critical Characteristics of Elderly Learners	43
Table III-6. The initial gist-based tutorial video design strategies for elderly learners via literature review and case analysis	49
Table III-7. Aspects of Internal Validation	54
Table III-8. Aspects of Usability Test	55
Table III-9. Aspects of Questionnaire for Elderly Learner Response	57
Table IV-1. Results of the 1st Round of Expert Review.....	60
Table IV-2. Results of the 1st Round of Expert Review (Guidelines)	61
Table IV-3. Revision after the 1st Round of Expert Review	64
Table IV-4. Results of the 2nd Round of Expert Review.....	65

Table IV–5. Results of the 2nd Round of Expert Review (Guidelines)	66
Table IV–6. Revision after the 2nd Round Expert Review (Guidelines)	69
Table IV–7. Results of Animated Video Designers’ Usability Test	71
Table IV–8. Revision based on the Video Designers’ Opinion.....	72
Table IV–9. Image Forming Steps for Materializing Visual Identity (Moon Chan et al., 2010)	77
Table IV–10. Gist–based Design Strategies of Tutorial Video for Elderly Learners Health–Care	90
Table IV–11. Descriptive Statistics Analysis on Accuracy of Elderly Learners' Memory and Understanding Level of the Video	99
Table IV–12. Descriptive Statistics Analysis on Elderly Learners' Oral Survey.....	99
Table IV–13. The Elderly Learners Response on Their Satisfaction on the tutorial video prototype	100
Figure II–1. Decision Making Processing Model based on Fuzzy Trace Theory (Li Bin et al., 2015)	14
Figure III–1. Phases of the Research	33
Figure III–2. Tutorial Video Design Principles and Key Elements.	44
Figure III–3. Literature Review Data Analysis Method Sketch	44
Figure III–4. Example	45
Figure III–5. Example	46
Figure III–6. Example	46
Figure III–7. Example	47
Figure III–8. Example	47
Figure III–9. Example	48
Figure III–10. Example	48

Figure III-11. Example	49
Figure III-12. Screen shot of the public broadcasting on Parkinson`s Disease where original content was from	75
Figure III-13. Example of the Narration Script	76
Figure III-14. Example of storyboards.....	77
Figure III-15. Concept images of visual identities	79
Figure III-16. A visual example from the prototype video	79
Figure III-17. A visual example from the prototype video	80
Figure III-18. A visual example from the prototype video	80
Figure III-19. A visual example from the prototype video.	81
Figure III-20. A visual example from the prototype video.	81
Figure III-21. A visual example from the prototype video	82
Figure III-22. A visual example from the prototype video.	82
Figure III-23. A visual example from the prototype video.	83
Figure III-24. A visual example from the prototype video	83
Figure III-25. Sound Track of sound effects	84
Figure III-26. An example of the gist timeline from the prototype	84
Figure III-27. Prototype Videos	85

CHAPTER I. INTRODUCTION

1. Background of the Research

As the "third age" of human life is becoming noticeably longer (Rowland, 2009), the opportunity for senior citizens to obtain new skills lowers the degree to which aging is considered as a period of life dominated by being disadvantaged in many ways.

The importance of flexible delivery modes, in which technology and pedagogy are well integrated and which bring a significant added value for this target group, is not being adequately highlighted yet. However, depending on their physical and mental condition, seniors can benefit most from technology-enhanced learning opportunities that cope with their highly diverse needs (Hetzner & Held, 2007).

If adequately designed, e-learning environments can best respond to these diverse needs, such as flexibility regarding learning time and place, integration of previous knowledge and adequate support for physical impairments, e.g. seeing and hearing disabilities or mobility disorders.

There are manifold reasons for the insufficient supply of e-learning opportunities for seniors, such as a lack of validated concepts, scarce relevant know-how and experiences. This study intends to contribute to the advancement of senior citizens friendly e-learning content by presenting strategies of gist-based tutorial video design.

There are numerous reasons that support the need for suitable e-learning offers for elderly people: E-learning comes to people and not vice-versa. This aspect addresses seniors' frequent mobility constraints due to physical impairments, domestic responsibilities (e.g. taking care of relatives) or living outside urban areas, where ICT-based training offers are not available.

E-learning works best for those with variable free timeslots. Post-professional life is often characterized by variable daily rhythms and plenty of leisure activities. For these cases, asynchronous e-learning offers are extremely adjustable.

Furthermore, it is a fact that, due to their life experience, many seniors are experienced in self-management and motivated to try something new, a fact that well supports the demands of e-learning. E-learning enables people to choose their own learning speed, as they are not driven by others, and it enables learners to repeat sequences as often as they wish. These aspects effectively make it possible to react to changes in memory processes that occur when getting older. For example: seniors have difficulty in novel situations in which they must react flexibly to memorizing tasks. In addition, it should be emphasized that mentoring and tutoring can be done much more individually in e-learning — a factor that, again, is adapted to the individual needs of older people. Competitiveness and the pressure to perform correctly in the presence Of Other course participants, which is often seen as a problem in face-to-face offers, is almost non-existent in e-learning. This aspect is of major importance since third-agers tend to have less self-confidence and are more afraid of making mistakes. In learning processes, fear leads to increased activity in the amygdaloidal nucleus, which impairs cognitive processes.

Among the various forms of tutorials, video tutorials have been widely used in senior care industry, most of which target on the care-givers or care-giver trainers. However, as users devices, i.e. laptop, tablet, mobile phone, et cetera are being more accessible and comfortable for seniors to operate on, watching online videos is also no longer that complicated for the seniors. Despite the increasing needs of seniors for video tutorials on health-care, the quality of existing learning materials is still not high enough according to the research. Many elderly learners claimed that the medical related

learning content is too hard for them to understand because of the medical terms and complex pathogenesis explained in the video (on-screen visuals or voice-over). Gatti et al. (2017) pointed out three viewpoints of learning difficulty experienced by the elderly: declining perceptual and motor skills, cognition, and psychosocial sense. Especially, they have difficulties in translating numbers (and other health-related information) into meaningful representations or gist, with reliably retrieving and implementing their values and knowledge, and with inherent complexities involved in processing ratio concepts, such as probabilities, among other factors (Fishbein M., 2008). The meaning of health-relevant information is seldom self-evident, and even health professionals have difficulty retrieving knowledge and processing nested or overlapping classes involved in probability judgments. Thus, it is time that we look for standardized tutorial video design principles so that elderly learners are able to have a better understanding on the knowledge and skills which they may have higher possibilities to adopt it in their daily life.

Though it is natural that individual learners have different level of cognitive ability and prior knowledge level in their health-care study, the general characteristics of most elderly learners have been carefully taken into consideration when tutorial video design principles are being developed in this research. Elderly learners, featured memorization and cognition problem in their learning process which need to rely on the ‘gist representation’ more for their memorizing and understanding according to the fuzzy-trace theory (FTT), a theory of judgement and decision making that has been applied to medicine and health (Reyna, 2008). Dual-processing FTT theory proposes that information is encoded into memory in two parallel forms: a ‘gist’ representation and a verbatim representation. Gist representations are vague, qualitative concepts that capture the ‘bottom-line’ meaning of information. As such, they are subjective to the individual and affected by a range of

different core values, which themselves are influenced by factors such as emotional state, general world view and basic skill level. In contrast, verbatim representations are precise and quantitative, and capture the surface (or verbatim) form of information. Gist representations are formed along a continuum (analogous to scales of measurement), which range from the simplest to most complicated, i.e. categorical, ordinal and interval. Evidence shows that people (particularly older adults) have a consistent preference for using the simplest gist to make decisions (Reyna, 2012).

Despite this preference, most official health information is presented in a verbatim format (Reyna, 2012) and there is an increasing tendency to provide more information and choice to consumers in order to facilitate informed decision-making (Cressey, 2012). However, this tendency can have the unintended effect of interfering with decision-making processes; a so-called 'more is less' phenomenon (Peters E., et al., 2013) Information should not be so oversimplified that it no longer allows informed decisions to be made (Austoker et al., 2012) , but presenting it in a format that is more closely aligned with preferred processing styles (i.e. gist) can reduce its cognitive burden (Elwyn, et al., 2011), particularly for individuals with lower levels of literacy and numeracy (Elwyn, et al., 2011). This is because individuals with low basic skills often have difficulty in separating the relevant gist from non-essential information (Peters E., et al., 2007) It is therefore recommended that gist-based information is presented separately to more detailed (verbatim) information (Fisher, 2003) According to the recent research (Cho, 2018), gist-based design has been proved as effective when designing health-related messages, gist-based design method will be selected as the design method of tutorial video. However prior research has focused on the static health message design from the aspects of text and pictures (Choi, 2014).

Valeria de Palo et al. (2018) support the benefits of e-learning environments in facilitating learning processes and in encouraging older adults to engage in learning activities. The efficacy of adapting e-learning content to older adults' cognitive styles, as well as the role played by intrinsic motivation, metacognition and self-regulated learning, and learning strategies in determining learning outcomes are confirmed as well.

2. Significance of the Research

As for the potential application of the study, according to the research (X Bai, Y He, & Kohlbacher, 2018), the Third Age (U3A) were found to be more attractive for older Chinese. And if user-friendly design and stimulation from family are available, they would facilitate older people to adopt, which implicates that policymakers should consider investing more in education in later life and introducing e-learning services in public lectures and tutorials and that the age-related barrier should be taken into consideration in the design phase of e-learning services. U3As should consider integrating e-learning approaches and cooperating with the community. Thus, video tutorials developed by the strategies from this study for elderly learners' e-learning content could be adopted in both self-learning and blended learning context.

In addition, according to the research (X Bai, Y He, & Kohlbacher, 2018), age-related changes and cohort effects were found to be the internal barriers for the adoption of e-learning, it is meaningful to look at the differences between normal adult learners and older adult learners and develop a series of strategies that help create better e-learning content for senior learners. Below are the commonly seen changes that may affect the learning process in elderly people (Tabloski, 2010; Cornett, 2011).

Physical changes: The beginning, direction and order of the aging

process of elderly people depend physically and biologically on genetic and environmental factors. Degenerative changes may occur in hearing, seeing, feeling and responding skills. Spatial variability, mobility, and motor coordination may be spoilt. The working level may affect most body systems (Tabloski, 2010; Cornett, 2011).

Psychological changes: The psychological aspect of aging is related to a person's adaptation capacity. There might be changes in perception and memory, learning and problem solving, psychological state and attitude, sense of self and personality. Problems with memory in particular are common. The most declining cognitive skills are reported to be thinking with numbers and retention skills. The least decrease is seen in interpreting ideas and events, establishing relationships between events and ideas, generalizing, vocabulary and knowledge. Besides, regardless of a recession in their ability to learn, memory and intelligence, the rich life experience of elderly people makes their ideas valuable and health education should benefit from this experience. Another factor that can psychologically affect elderly people is losses. The loss of a former role and status, wife, friend, economical power and familiarity can be experienced. Due to these changes, self-respect diminishes and fulfillment decreases. Evaluating elderly people in terms of the losses they experience and the effects of these losses on their struggle is extremely important. Also, loss of confidence suppresses the ability or readiness to learn. However, preparing the person by strengthening self-esteem with personal achievements and skills is an important strategy. Safety and safety needs are major anxiety factors for the elderly in a crisis situation. Unless these needs are satisfied, an active elderly person cannot actively participate in health education (Cornett, 2011).

3. Purpose & Research Questions

One possible mechanism by which education could exert a direct effect on health is reading fluency. Individuals with low levels

of health literacy have less health knowledge, worse self-management of chronic disease, lower use of preventive services, and worse health in cross-sectional studies. And older patients may misunderstand the information they receive because of poor health literacy (Marks JR et al., 2010). Consider that inadequate health literacy may cause elderly people unable to read and comprehend basic health-related materials such as prescription bottles and appointment slips (Gazmararian, Williams, Peel, & Baker, 2003), it is essential to help elderly learners to understand the health care related information more easily with appropriate design approach.

This research works on tutorial video strategies that focus on how gist information is designed and presented for elderly people`s learning on health-care. And perceptions of elderly learners on the gist-based tutorial video (text, visuals, numbers, etc.) are analyzed based on the prototype made based on the strategies. The study is based upon the following research questions:

1. What are the design strategies of gist-based tutorial video for elderly learners` health-care?
2. Are the design strategies of gist-based tutorial video internally valid?
3. How do elderly learners perceive the prototype of gist-based tutorial video?

CHAPTER II. LITERAURE REVIEW

1. Instructional Video Design Strategies and Guidelines

1.1. Design Strategy for MOOCs video

MOOCs as one of the most popular forms of online course. Choi (2018) has developed a general, systematic design guideline for the development of refined high-quality MOOCs` video. As a result of the study, 16 strategies were developed including 6 strategies in the Pre-Production stage, 4 strategies in the Production stage, and 6 strategies in the Post Production stage. 1-4 detailed guidelines have been developed for each strategy and in total 40 detailed guidelines have been developed.

The Pre-Production stage, which is the first stage, focused on strategies necessary for design planning. The objectives at this stage are to communicate the intimacy and interest to the learners through logo animation, which reveals the personality of the lecture. In addition, it aims to convey accurate information to learners through a simple and unified visual identity design. The Production stage, which is the second stage, consists of the strategies necessary for filming. At this stage, the aim is to make learners feel intimacy through stable camera shots, natural voice tone and gestures of the lecturer. The Post Production stage, the third stage, consists of strategies for video editing based on video shots and the visual identity prepared at the Pre-Production stage. At this stage, the goal is to enable learners to perceive the individual video components within an integrated frame and engage them in learning. The design strategy for MOOCs presented in this study is structured as a step by step procedure, considering the contextual characteristics of online learning. In addition, the study has practical meaning as well as theoretical significance as it provides a specific guideline with

practical examples. This study is based on the undemanding of visual design field of Design and the instructional design of Educational Technology, and has a scholarly and convergent nature, linking two disciplines.

Guidelines for Pedagogic Video Design and Production (Koumi, J, 2006)

Table I–1. A pedagogic framework of narrative screenwriting principles

(a) How will the video be used?

By whom	A. TARGET AUDIENCE	Year 5
In what context	B. LEARNING CONTEXT AND COMPLEMENTARY LEARNING	Supplementary video notes
For what purpose	C. TEACHING INTENTIONS 1 Cognitive Learning Outcomes 2 Provision of Experiences 3 Nurturing (motivations, feelings)	1. Apply a scientific theory 2. Take viewers on a virtual field trip 3. Influence attitudes

(b) Pedagogic screenwriting structure

Make them want to know	1. HOOK (capture attention and sustain interest)	Shock close-up of moist human brain. Narration: <i>This is a real human brain</i>
Tell them what you will do	2. SIGNPOST (information about what's coming)	Scene: four monkeys eating. Narration: <i>let's concentrate on social behaviour</i>
Do it, pedagogically	3. ENCOURAGE ATTENTIVE VIEWING (CONCENTRATION)	Presenter says: <i>helium in this balloon, carbon dioxide in this one. What will happen when I release the balloons?</i>
	4. ENABLE INDIVIDUAL CONSTRUCTION OF KNOWLEDGE	e.g. don't blanket shots with narration: leave slack for contemplation.
	5. SENSITIZE	e.g. timely occurrence of music
	6. ELUCIDATE	e.g. uncluttered, simplifying graphics
	7. REINFORCE	e.g. repetition from a different angle
Tell them what you have done	8. CONSOLIDATE / CONCLUDE	e.g. summarize key features, helping viewers to stand back from the story

1.2. The Use of Cognitive Strategies in Instructional Video Design

The four psychological aspects of learning relevant to the design of educational television as outlined by Kozma and applied to interactive video relate to the structures and processes of the information processing model.

However, there are other factors associated with the four factors cited previously that relate to interactive video production. See Table II–1 for a summary of four learning factors and their impact on video production.

Table II–1. Learning Factors and Their Impact on Interactive Video Program Design (Russell Gazda, M.S. et al., 1998)

Factors	Impact
Pacing	Offer the learner some form of control over the level of difficulty of the instructional material.
Cueing	Inform the learner that the task at hand requires the investment of mental effort. Include previews of the information that is to be presented. Keep navigation simple and straightforward.
Modeling	Stimulate attention and enhance the processing of information by paralleling the functions of the human eye. Use cinematic techniques to provide patterns for cognitive functions. Consider using "phantom feedback."
Transformation	Provide a link between visual and verbal storage. Create "hot words" to play narratives or video clips.

2. Fuzzy Trace Theory

FTT posits that, when an individual is exposed to any meaningful stimulus (e.g., a graph describing treatment risks), two types of representations of the stimulus are encoded in memory, a verbatim representation and one or more gist representations. Verbatim representations capture the exact words, numbers, or images included in the stimulus, whereas gist representations capture the essential, bottom-line meaning of the stimulus to the person, including its emotional meaning. These representations are initially encoded, roughly in parallel, into working memory (e.g., as a patient hears and thinks about the information provided) and ultimately transferred to long-term memory, although verbatim representations generally become rapidly inaccessible.

Evidence from many experiments on memory supports the FTT hypothesis that people generally encode multiple representations of a single stimulus varying in level of specificity (e.g., Reyna & Brainerd, 1995). In particular, people encode both categorical and (more precise) ordinal gist representations of quantities. For example, told that there is a 2% risk of stroke associated with a particular type of surgery, a person might simultaneously encode the gist that: (a) the surgery has some risk of causing a stroke and (b) the risk of surgery causing a stroke is low. The first example illustrates a categorical gist representation (i.e., some vs. no risk), whereas the second example illustrates an ordinal gist representation (i.e., low vs. high risk). Further, although different gist representations may be consistent with the information provided in a given situation (e.g., some people may consider the 2% risk described above as high rather than low), individuals can also fail to understand the information—leading to the formation of inaccurate gist representations. For example, if the individual described above did not understand that the surgery could cause a stroke and formed

the gist representation that there was no risk of stroke during surgery, this gist representation would be inaccurate in a fundamental way—patients who think surgery has no risks are not able to give truly informed consent because they do not understand that they are accepting a risk (Reyna & Hamilton, 2001). In contrast, patients who misremember the risk as 5% rather than 2%, although inaccurate from a verbatim perspective, still understand the essential gist that the surgery has some risk.

2.1. The Limited and Transient Nature of Immediate Memory

The first stage of information processing involves the senses (visual, auditory, etc.). Sensory memory holds the information for less than a second, enabling the learner to handle, and the large amount of information that passes through the environment at high rates of speed. The short-term memory functions to process the information to make it ready for long term storage or a response by the person receiving it. The capacity of short-term memory versus sensory memory is quite limited but more durable.

Most people have the capacity to hold approximately seven 'pieces' of information in their mind at a given time. This number can be increased effectively by chunking, or grouping, the information in some meaningful way. Unless the information is rehearsed within a very short period, it will be forgotten, and not passed on to long-term memory. As a result, information in short-term memory is often lost or misinterpreted. More effective processing in short-term memory can lead to greater retention in long-term memory.

The implication for production based on these concepts is to allow for repeated playback of the video by the learner. The learner can "rehearse" the new information and link it to previous knowledge as it is stored in long-term memory. Another indication for production design is to keep segments concise, and not too closely

packed together. It is preferable to break large segments of instruction into smaller, more manageable ones. This will help to avoid overwhelming the processing capacity of the learner.

2.2. Fuzzy-processing Preference

In the field of behavioral decision making, Reyna and Brainerd (1991) first explained the frame effect using fuzzy trace theory and verified it through empirical research. However, they only analyze and answer some specific problems in the framework effect, and do not form a complete interpretation system. Since then, the fuzzy trace theory has further explored the framework effect (Kühberger & Tanner, 2010), and made a major breakthrough in the research of risk perception based on medical decision-making (Reyna & Adam, 2003; Feldman-Stewart, Brundage, & Zotov, 2007). In addition, the individual differences in decision-making are also important areas of interpretation of fuzzy trace theory, which adopts new ideas and creatively interprets individual differences in decision-making by individual differences in processing methods (Reyna & Lloyd, 2006; Jansen, Van Duijvenvoorde, & Huizenga, 2012).

2.3. The Framing Effect

The framing effect is a cognitive bias where people decide on options based on if the options are presented with positive or negative semantics; e.g. as a loss or as a gain. People tend to avoid risk when a positive frame is presented but seek risks when a negative frame is presented. Gain and loss are defined in the scenario as descriptions of outcomes (e.g., lives lost or saved, disease patients treated and not treated, etc.).

In addition to the internal knowledge background, external

related content and the effect of the titer shown in Figure II–1, the fuzzy trace theory holds that emotion can also affect the processing of the frame effect. Some researchers believe that the stronger the emotional connection of decision information, the stronger the relative influence of the semantic coding compared with the verbatim coding (Levine, 2012), and the belief system driven by miscalibrated emotions can lead individuals to perceive behavior choices. Misrepresentation of opportunities and potential outcomes (Paulus & Yu, 2012). Inferred from this point of view, the strengthening of emotions or emotions may lead to an increase in the frame effect.

2.4. Risk Perception

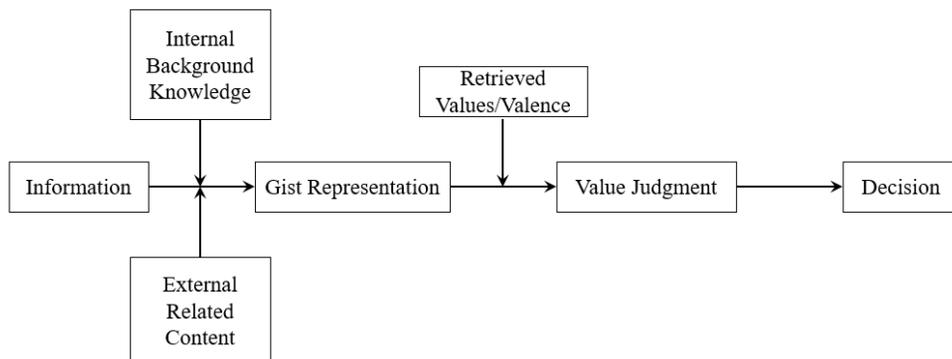


Figure II– 1. Decision Making Processing Model based on Fuzzy Trace Theory (Li Bin et. al., 2015)

Risk perception refers to the subjective assessment of risks in the environment. The fuzzy trace theory holds that people generally characterize the meaning of information as a category or a sequence (Reyna & Lloyd, 2006). According to Figure II–1, when people make a critical representation of decision information, they first need to use their internal knowledge background. To understand the meaning of the information presented, especially in the more professional decision–making; when people lack relevant knowledge

background, they will judge the presented information according to the relevant content from the outside, that is, the external content can be the essential meaning of the current information provides a reference and basis. Because of the level of knowledge and the content of the reference, the decision maker may represent the presented information as a certain category or order, or may be characterized as another category or order, which will directly affect people's judgment on the degree of risk of the information. Consistent with this, Peters et al. (2009) argue that people usually do not use numerical information directly until they have the data to compare and contrast to determine the emotional meaning of the option, or until they are obtained by other means (such as assessment categories). The meaning is that they will use numbers; and no matter how the information is presented, it will affect the decision-maker's search for numerical meaning and the choice of construction in unfamiliar areas.

However, when it comes to non-numerical information, its representation should be slightly different with the numerical one. For example, Reyna and Adam (2003) found that subjects underestimated the risk of human papillomavirus, a sexually transmitted disease virus that spreads through skin contact, and thought they might characterize sexually transmitted diseases as similar to AIDS and gonorrhea. Fluid-borne diseases that overestimate the effectiveness of condoms in preventing such diseases, and skin contact transmission may be an inconspicuous mode of transmission. This suggests that people often characterize disease as a prototype that is an inaccurate representation of the baseline of the category (Reyna, 2008), and the prototype representation of the disease sometimes causes risk to the disease and a wrong assessment of the effectiveness of its preventive measures. Here, the essential representation of sexually transmitted diseases is not based on specific numerical information, but on the

understanding of the superficial meaning of the term “sexually transmitted diseases”, replacing them with similar and well-known diseases, in order to complete the processing of the risk perception of the disease. Compared with numerical information, the representation of non-numerical information is more complicated, and the processing of decision-making is relatively difficult to interpret. Therefore, there are few relevant empirical studies, and future research should be widely explored in other application fields.

In general, people faced with the same information may form different essential representations (Blalock et al., 2014), which are also influenced by other relevant information in the context during the formation process, indicating that the essential representation has individual differences and contexts dependence. Therefore, decision makers need help in interpreting information in unfamiliar areas, especially numerical information, not only to understand what they are, but also to understand their meaning; information providers also need to determine the meaning of information and be responsible for it (Peters et al., 2009). Moreover, the retrieved values that guides decision-making is not all correct, and may be affected by other factors when extracting (Pieterse et al., 2013). Therefore, when using valence to guide decision-making, attention should be paid to the correctness of valence, in addition, whether it is disturbed during the extraction process.

Table II–2. Definitions and Examples of Some of the Effects in Judgment and Decision Research Explained by Fuzzy Trace Theory

Phenomenon	Example	Illustrative Source
Base rate neglect: posttest probability estimates do not adequately reflect prior probabilities	10% prevalence rate and 80% sensitivity, 80% specificity; given a positive test, is probability of disease closer to 30% or 70%?	Reyna and Adam, 2003 ⁷
Conjunction fallacy: conjunction is ranked as more probable than constituent of conjunction	What is the probability that Linda (who seems likely to be a feminist but unlikely to be a bank teller) is a feminist bank teller?	Reyna, 1991 ⁸
Disjunction fallacy: disjunction is ranked as less probable than constituent of disjunction	What is the probability that this patient has clinically significant coronary artery disease or is at imminent risk of a myocardial infarction (heart attack)?	Reyna and others, 2003 ⁹
Framing effect: risk aversion for gains and risk seeking for losses	Choose between save 200 people or 1/3 probability that 600 will be saved and 2/3 probability that none will be saved (v. 400 die or 2/3 probability 600 die and 1/3 probability that none will die)	Reyna and Brainerd, 1991 ¹
Frequency effect: frequencies rated as more probable than equivalent percentages	20 out of 100 patients become violent (v. 20% of patients become violent)	Reyna and Brainerd, 2008 ¹⁰
Hindsight bias: memories for earlier predictions are distorted in the direction of later outcomes	Verbatim memory for initial predictions (team A likely to win) is independent of reconstructed gist memory for those predictions once outcomes are known (team B won, so remember predicting team B was likely to win).	Reyna, 2005 ¹¹
Overestimating small risks: rare events are perceived as more likely than they actually are	Risk of smallpox vaccination is overestimated, if subjective estimates are compared with observed adverse events.	Reyna, 2004 ¹²
Ratio/numerosity bias: focus on relative magnitude of numerators	9 out of 100 seems more probable than 1 out of 10 because the numerator is larger	Reyna and Brainerd, 1994 ¹³

3. Characteristics of Elderly Learner

The definition of the senior learner is as much cultural as it is chronological. In medical research, those over 65 are aged (www.ncbi.nlm.nih.gov). The research object in this paper focuses not on chronological age, but on the physical and functional changes that ensue over time – changes that prompt individuals’ reassessment of their capabilities and of the ways in which they learn. Thus, age–related changes that occur in sensing and perceiving information, processing that information are reviewed.

3.1. Cognition (False Memory with Age)

Memory is a multifaceted construct; only some aspects show age-related declines:

- Working memory (i.e., the ability to hold and manipulate information) declines with age.
- Semantic memory (i.e., acquired knowledge) shows minimal decline with age although the ability to access information may be slower and less reliable.
- Prospective memory is remembering to do something in the future. Age-related declines are less evident if people have strong cues available as reminders (e.g., take medication with dinner).
- Procedural memory is knowledge about how to do something. Well-learned procedures are maintained into old age and, in fact, are difficult to inhibit. Older adults are slower and less successful at acquiring new procedures, relative to younger adults.

Attention is a multifaceted construct; only some aspects show age-related declines:

- Selective attention (i.e., searching a visual display) and dynamic attention (reorientation of attentional focus) both show age-related declines.
- Older adults can benefit from cues to orient and capture their attention.
- Age-related differences in rate of information processing increase with task complexity (i.e., attentional demands).
- Older adults perform less well than younger adults when required to coordinate multiple tasks, either by dividing attention or switching attention. (Fisk, et al., 2018).

Overall, older adults are very heterogeneous in their cognitive abilities, and activity might preserve cognitive ability with aging (Sproten, et al., 2010).

The Cognitive Mechanisms of False Memory with Age

Elderly people's declining function of brains leads to deficient or overfull binding in information encoding, reliance on gist information in information encoding and retrieval monitoring, and over reliance on familiarity in memory judgement.

1) Insufficient information in the encoding stage

The source detection framework theory believes that people judge whether an experience is actually experienced or imagined, mainly based on the specific characteristics of memory events, that is, information from different sources has different characteristics (Johnson, Hastroudi, & Lindsay, 1993). For example, events that have actually been experienced often have rich perceptual, emotional, and spatial details, while imaginary events contain more cognitive operation information generated by imagination. In order to effectively judge the source of an experience, the diagnostic information about the information source must be combined with relevant information at the time of coding, and must be obtained from the corresponding

The memory path for information extraction. The above process becomes more and more inefficient with age, so source detection errors are likely to occur. Healey, Campbell, and Hasher (2008) proposed that the decline in attention orientation and retention ability of the elderly will lead to insufficient connection of information content and information sources and difficulty in recalling.

Research by Lyle, Bloise, and Johnson (2006) shows that the ability to connect information sources with information content decreases with age. In their research, the elderly and young people perceive and imagine objects, and then judge the information source and location of learned (such as magnifying glass) and unlearned

objects (such as lollipop). The results show that older people are more likely to make false judgments based on perceived similarities of objects (such as mistakenly thinking that lollipops have been seen before). With the aging, the lack of connection between information sources and information content makes older people more prone to false positives. When the inaccurate information of a related event is incorporated into the original memory of the event, a false information error occurs. For example, in a study by Dodson, Powers, and Lytel (2015), the subjects were asked to watch a video about robbery, and then incorrectly informed that the stolen items were rings rather than necklaces. It turned out that the elderly subjects were younger than the young ones in the recall phase. Participants were more likely to believe that they saw the ring in the original video. A reduction in the level of connection between information content and information sources will lead to similar psychological representations of experience from different sources. The similarity between the psychological representations of the first-hand experience and the imaginary event leads to the older people being more likely to have imaginary inflation (McDanelle, et al., 2008). For example, an imaginary behavior has been imagined before, and then people may mistakenly believe that they did perform the behavior, and this false memory is imaginary inflation. Imagination inflation is more pronounced in older people (Gerlach, Donblaser, & Schachter, 2014). With the aging, the information content and the information source are insufficiently connected during the coding stage, resulting in very little special perception and situational information related to memory information, as well as very little cognitive operation information of imagination process. Therefore, the difference between the internally generated imaginary event representation and the externally generated real event psychological representation is very low, which is prone to false memory.

2) Encoding and Extraction Phases Rely on Semantic Information

Studies have found that older subjects are more likely to have erroneous memories based on point processing than younger subjects (Gallo, 2006). For example, in the DRM paradigm, all words presented in the learning stage have a strong semantic relationship with a key temptation. In subsequent tests, participants are likely to mistakenly believe that they have learned the key temptation. Words have not appeared before, and the appearance of such false memories is mainly the result of relying on the processing of semantic points.

Fuzzy traces theory believes that when people code learning programs, there are two kinds of representations: verbatim representations and gist representations. The verbatim representation emphasizes the detailed perceptual information of the item, while the gist representation highlights the generalized semantic information of the item, but lacks specific detailed information. These two representations are coded in parallel and extracted independently. For key words that have not been learned, relying on verbatim representations for extraction will reduce false memory, while relying on essential traces for extracting false memories will increase. According to the fuzzy trace theory, with the aging of the age, the ability to encode discriminative information decreases, and it is easier to encode and extract generalized semantic information, while fewer items encode and extract discriminative detailed information (perception information). A study by Kensinger and Schacter (1999) found that young people seldom have misremembered memories by repeatedly learning vocabularies. The elderly's false memory has not decreased, indicating that it is difficult for elderly subjects to resist semantic point processing by recalling specific learning items. In addition, Pidgeon and Morcom (2014) research also found that increasing the familiarity of key words (i.e., increasing the number of items included in the learning category at

the learning stage) has a greater negative impact on older people's memory accuracy than younger ones. These results indicate that the elderly may lack the encoding of project-specific detailed information when encoding information, or the lack of extraction of such information during the extraction stage, leading to the elderly relying more on semantic key information when encoding and extracting information. This affects the accurate encoding and extraction of stimulus information, leading to an increase in false memory.

The results of brain imaging studies also support this view. Studies have found that when coding (Denise et al., 2007) and extracting false-recognized semantically related temptations (Denis, Kim, & Cabeja, 2008b), the brain area responsible for semantic and essential processing (i.e., lateral temporal area, lateral temporal regions) The activation degree is higher than that of young people, indicating that older people are more dependent on semantic key information in the process of information coding and extraction than young people.

3) Obstacles on Extracting Monitoring

Although the information about the source of information is fully encoded during the encoding stage, the elderly may not effectively use the information to monitor memory decisions during extraction, which may still lead to incorrect memory. Koutstal (2003) proposed that the elderly can encode source-rich clues in the encoding stage, but there are difficulties in spontaneously extracting or effectively using these clues in the recall stage. Many studies have proven that the elderly have shortcomings in successfully extracting autobiographical information, but few studies have attempted to distinguish this deficiency from age-related obstacles to extracting and monitoring (such as using event source information to monitor

memory source judgment). The research by McDonough and Gallo (2013) explored the impact of retrieval monitoring disorders on memory accuracy in the elderly. Their experiment is divided into two stages. The first stage presents clue words, allowing young and old subjects to generate real autobiographical events based on past experiences and imagine possible events in the future. Two conditions were set to instruct subjects to imagine possible future events: fine imaging conditions and non-fine imaging conditions. Under the condition of fine imagination, more cognitive operations are included, which adds more information about the source of the event to the memory representation of the event. In the second stage, participants were required to distinguish between real past events and imaginary future events. If it was a future event, they needed to assess the amount of perceptual details and cognitive operation information related to the event. The results show that although the participants successfully coded and extracted more information about the source of the event under the condition of fine imagination, the elderly subjects could not use the information to reduce the source confusion error like the young subjects. It shows that the increase of confusion errors of age-related sources cannot be all attributed to the lack of coding and extraction of cognitive operation information, at least in part due to extraction monitoring obstacles, that is, the information about event sources cannot be used to monitor the memory decision process. Therefore, the aging damage to the extraction monitoring ability is greater than the encoding and extraction process. The study also found that reminding elderly subjects to pay attention to misleading information during the extraction phase (Dodson, Powers, & Lytl, 2015) or reminding the elderly to pay attention to perception and contextual cues (Healey, 2008) to facilitate the extraction monitoring process, which can reduce the elderly's false memory. It indicates that the obstacle of retrieval and monitoring should be one of the reasons that lead to the

increase of false memory in the elderly.

4) Elderly's Judgment of Memory Depends Largely on the Degree of Familiarity

Declining levels of age-related memory encoding and retrieval have led older people to rely more on automatic processing. The dual processing theory states that there are two independent processes in identifying items: recognition based on familiarity and identification based on recall (Jacoby, 1991). Recall is consciously controlled, and it takes a lot of effort to extract specific memory details. Familiarity-based recognition is a fast, automated process that does not require conscious extraction of relevant contextual information. As the age increases, the hippocampal function of the elderly decreases, and the memory function regulated by the hippocampus also decreases accordingly, which causes the elderly to rely more on familiarity for identification. However, recognition based on familiarity lacks the extraction of scene details, which leads to increased false memory in the elderly. As older people's memory skills decline, it is difficult to reject key temptations that are related to the semantics of learning items but have not appeared before memory. Fandakova et al. (2013a) found that older people with weak associative memory and executive function rely on familiarity when making recognition judgments. A study by Light, Chung, Pendergrass and Van Oker (2006) found that older people rely on familiarity to make judgments under time pressure. However, only under the pressure of time, young subjects will rely on familiarity to make recognition judgments. Judgment based on familiar memory can make older people prone to memory association errors. If the temptation is a combination of certain characteristics of different learning items presented during the learning phase, the participant will incorrectly determine that a connection temptation that did not occur during the

learning phase has occurred. These items are: phone, desk lamp; connection tips are: electric lamp). It can be seen that the elderly make recognition decisions based on their familiarity with the stimulus components, which leads to association errors.

3.2. Emotion

Research on neuroscience reveals that the emotional brain and the cognitive brain are linked to each other in that a person cannot memorize, reason, judge, learn, and act without a working emotional brain; thus, an integrated view of emotion and cognition is needed. (LeDoux 1998; Sparrow and Knight, 2006).

For learners to achieve meaningful and successful online learning, emotional support should be provided (Park, T., & Lim, C., 2019). Following the positivity effect (Mather & Carstensen, 2005), older adults are more optimistic than young adults (Borges & Dutton, 1976; Lennings, 2000). Older adults focus more on regulating emotion than young adults do, and this improves their overall emotional experience. Some researchers suggest that in the aging process, an increased focus on emotion regulation influences attention and memory (e.g. Mather, 2004). This positivity effect of emotions is also salient when it comes to memory: older adults are likely to show a memory distortion that prefers chosen options over rejected options (Mather and Johnson, 2000). This implies that older adults sometimes are more likely to repeatedly choose the same options because their memories are biased in favor of positive outcomes of their past choices. The tendency to focus on positive emotions leads to changes in decision making abilities (Sproten, A., et al., 2010).

3.3. Decision-making

Mata et al. (2007). In their study, they found a difference in strategies used by young and older adults to make a decision: older adults look up less information and take more time to process it, but overall decision making of older and young adults seems to be equivalent.

In conclusion, older adult's decision-making behavior effectively differs from that of younger adults. In risky situations, they behave such as young adults would behave, and in ambiguous situations, they are less ambiguity averse (Sproten, A., et al., 2010).

Based on evidence within the literature and the criteria of the review as described in Chapter Three, these results were then further analyzed and synthesized to produce the initial design strategies presented as follows:

Table II-3. The initial gist-based tutorial video design strategies for elderly learners via literature review

Strategies	Key Attributes	Research Reference
<p>1. Clarify gist messages.</p> <p>1-1. Presentation rate should be relatively slow.</p> <p>1-2. Use several short sentences to specify one gist messages.</p> <p>1-3. Provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors` own probability judgments many of which are not objective enough (the framing effect).</p>	<p>Use of language</p> <hr/> <p>Additional clarification (the framing effect & risk perception).</p>	<p>● Salthouse, 1996</p> <p>● Fuzzy-processing preferences (Reyna & Kiernan, 1994)</p>
<p>2. Help the formation of learners` gist memory</p> <p>2-1. Present the formation process of the gist messages.</p> <p>2-2. Show the text-based gist representations with reminding of the former information just taught. One approach could be a background image of the former scene.</p> <p>2-3. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.</p>	<p>Formation of gist messages</p> <hr/> <p>Visual reminders (related background information)</p>	<p>● Reyna & Lloyd, 2006</p>
<p>3. Emphasize gist messages to gain learner`s enough</p>	<p>Order of information</p>	<p>● Choi, 2018</p>

<p>attention.</p> <p>3-1. Show gist messages at the beginning and the end. Or always on-display on the left side.</p> <p>3-2. Use animation effect to highlight the key point.</p> <p>3-3. Visualize the feelings to connect the tactual sensation with visions.</p> <p>3-4. Show the visuals slightly after the narrations and pause at least 5 seconds for gist messages on screen (turn down the background music during that time if necessary).</p> <p>3-5. Differentiate information by appropriately using colors to mark different gist information.</p>	<p>Screen layout</p> <hr/> <p>Pauses</p> <ul style="list-style-type: none"> ● More processing time (Mata et al., 2007)
<p>4. Provide appropriate gist when presenting verbatim messages. (fuzzy trace preference)</p> <p>4-1. Present information in a manner that facilitates direct comparison</p> <p>4-2. Present similar information in close temporal proximity</p> <p>4-3. Interpret numerical information by comparing and contrasting with other data to create gist memory (e.g. risks).</p> <p>4-4. According to the optimization model, for those gist information that is hard to be confused should be</p>	<p>Comparison & Contrast</p> <p>(Qualitative Processing)</p> <hr/> <p>Special effects</p> <hr/> <p>Order of information decided by the difficulty</p> <p>(optimization model)</p> <ul style="list-style-type: none"> ● Peters et al., 2019 ● Flores, C. C., et al., 2017 ● Reyna, V.F, & C. J. Brainerd., 1995 ● Reyna, V.F, & C. J. Brainerd., 1995

reviewed first to avoid later interference to the information that is hard to understand.

5. Add emotional impact on gist for elderly learners.	Affinity	● Levine, 2012
5-1. Provide an emotional impact to elderly learners with a real-life related environment or situations (Levine, 2012)		● Morie et al., 2005
5-2. Use visuals to remind elderly learner to avoid risky choice frame effect	Intimacy	● LeDoux, 1998; Sparrow and Knight, 2006
5-3. Emphasize elderly learners` real gain to create their priority processing of the information		● Park, T., & Lim, C., 2019
	Avoidance of frame effect	● Fagley & Miller, 1997
	Real gains (e.g. save of money)	● Castel et al., 2016
6. Minimize output interference when presenting gist messages.	Output interference	● Reyna, V.F., & C. J. Brainerd., 1995
6-1. One piece of gist information a time		● Reyna, V.F., & C. J. Brainerd., 1995
6-2. Keep animation effect simple and do not provide unnecessary detailed motions or graphics – Segment the tutorial videos into more than 2 minutes but less than 5 minutes` video clips.	Simplicity	● Reyna, V.F., & C. J. Brainerd., 1995
	Segmentation	● Hong, W., Lim, C., & Park, T., 2013

		● Fisk, A. D. et al., 2018
7. Provide gist messages in an engaging way.	Storytelling	● Caminotti, E., & Gray, J., 2012
7-1. Use storytelling to form better gist memory.		
7-2. Use daily vocabulary and sentence patterns to deliver gist messages.		

CHAPTER III. RESEARCH METHODOLOGY

1. Participants

Subject matter experts and elderly learners participated in the response assessment field application and to justify the internal validity of the strategies developed. First, four experts participated in the expert review for the internal validation. A master's or doctorate degree in the field or extensive field experience in relevant fields was required to be held referring to the criteria for expert selection presented by Grant and Davis (1997). Also, as 3 to 10 experts' opinions are recommended as valid data size by Rubio, Ber- Weger, Tebb, Lee, & Rauch, 2004; Ericsson & Charness, 1994; Lynn, 1986, three educational experts, and one cognitive psychology expert are included in both the 1st and the 2nd expert review processes.

Table III–1. Profiles of Experts Attended in the Expert Review

Profiles of Experts					Around of Expert Review	
Expert	Occupation	Experien ce in the field	Academic Background	Field	1 ^s t	2 ⁿ d
A	Professor	9 Years	Doctoral` Degree	Educational Technology	√	√
B	Researcher	7 Years	Doctoral` Degree	Educational Technology	√	√
C	Graduate School Student	5 Years	Master` Degree	Educational Technology	√	√

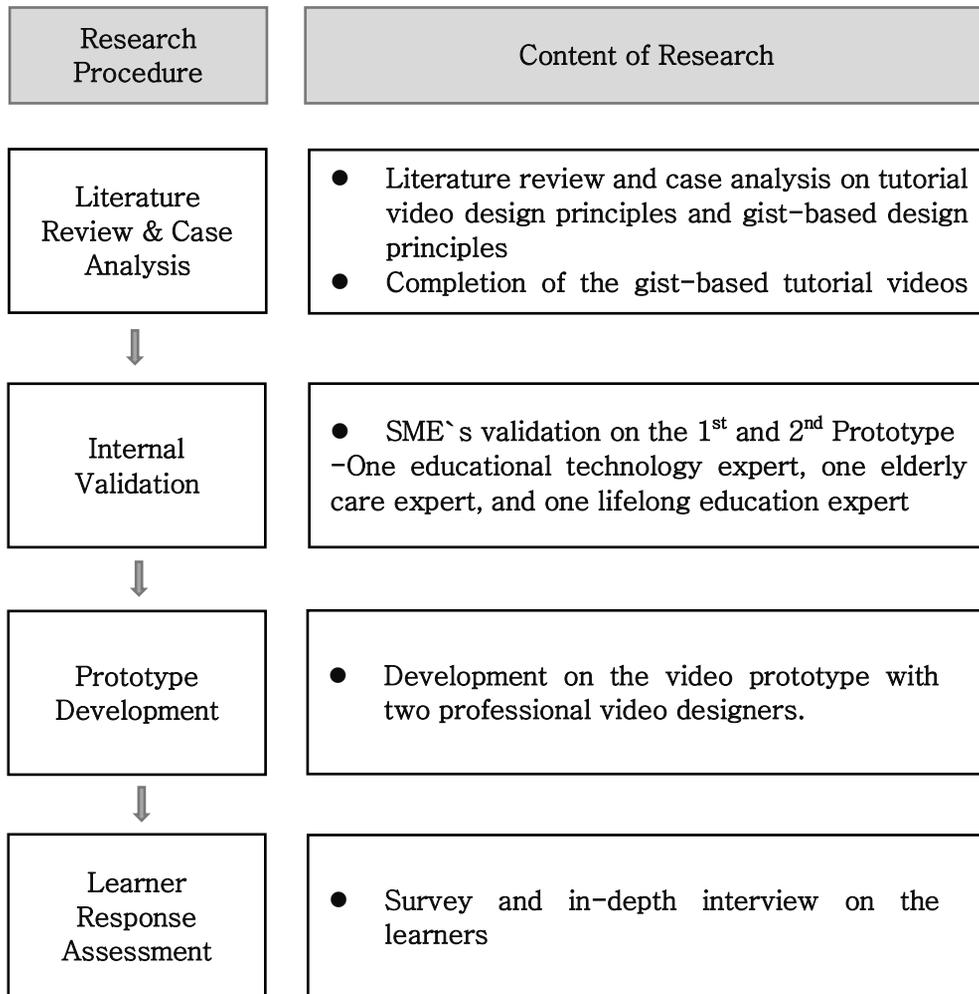
D	Professor	12 Years	Doctoral Degree	Cognitive Psychology	√
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Besides, in the process of prototype development, 2 animation designers with a master degree and 10 elderly learners (6 from the Shanghai Putuo District Community College for Senior Citizens and 4 from Baijiale Senior Center in the usability test participated in this research.

2. Research Design

This study followed a type two strategy development methodology as described by Richey and Klein (2014) including strategy development and validation. The first phase of the research included data collection through an extensive literature review to identify current theories, instructional strategies, and models of video design strategies and guidelines for online courses, fuzzy-trace theory, and elderly learners characteristics. The literature review sought to identify key strategies along with design and implementation guidelines to fully use the characteristics of gist-based design for senior learners better knowledge transformation when learning by watching tutorial videos. The strategies and guidelines were based on a synthesis of the literature which identified overlap between key theories of fuzzy-trace theory and instructional video design. In phase three of the study, validation was conducted by recruiting an expert reviewer within the areas of expertise of e-learning, video creation and senior care. Based on the responses from the expert reviewers, the strategies and guidelines were adjusted for improvements. Results included the responses from the expert reviewers and the discussion will address responses from the experts along with any necessary adjustments to the outcome. The phases of this development research are described below.

Figure III-1. Phases of the Research



Phase 1: Literature Review & Case Analysis

Phase one of the research began with an extensive review and synthesis of the literature to identify considerations for gist-based design. The literature review was the foundation for the development of the strategies. Systemic Review method (Bidwell & Jensen, 2004) is adopted in this process. An extensive review of current theories on fuzzy-tracing preference and cognition process were included in this phase of the research. The review sought to determine critical elements for incorporating gist-based design

method as a strategy for senior video learning. Data collected through the literature review was organized using a synthesis matrix created in Microsoft Excel. Literature was reviewed within the field of gist-based design, but also spanned other educational disciplines that are similar or applicable to practices of gist memory. Databases that were searched within the literature review included JSTOR, EBSCOhost, ERIC, and ISI Web of Science. All non-peer reviewed and non-empirical materials were eliminated from the search criteria and the review did not consider websites or trade magazines. Keywords used in the search process included, fuzzy-trace theory, gist memory, older adult learning, video design, health message design. After applying the exclusion criteria to the literature search, a total of thirty-three empirical studies were identified and used as data for the development of the strategies.

After critically reviewing an article, the strategies examined within the research and associated outcomes were recorded within the literature review synthesis matrix. Within Microsoft Excel, for each article, the author(s), study design, and research question were first listed within their respective columns. Then, the findings were grouped into major categories for each of the three main areas examined within the literature review.

Phase 2: Internal Validation

In order to determine if the strategies developed were accurate and appropriately supports the development of gist-based tutorial video for senior learners. Three expert reviewers were recruited to review and analyze the strategies. As recommended by Richey and Klein (2007), all reviewers received, via email, expectations for the review process, the newly developed design strategies, the extended literature review provided in Chapter Two, along with review questions to guide the evaluation, ensuring completeness and consistency. While a specific amount of time was

not given to the experts to complete their review, all reviewers completed the review within about a month of first receiving the material. Follow-up emails were sent to each expert after the first two-weeks to determine an approximate timeline and ensure they did not have questions regarding the review. Each expert was given the option to provide a written response to the questions or participate in an interview. All three reviewers chose to respond through written feedback. The results of the review were examined individually and then synthesized to identify patterns across all three responses.

As this was a process of formative evaluation, in the final phase of the research, the strategies were revised to incorporate the expert reviewers' recommendations and revisions. Data collected using the results from the reviews was analyzed individually and then synthesized to modify and improve the strategies developed in this research.

Phase 3: Prototype Development Based on the Strategies

Video prototype were developed based on the strategies to check on the usability of the strategies and see if they could be well applied in future elderly learner`s tutorial video design process. Two 3-minute-animation video on Parkinson including the basic knowledge of what it is, what cause it and treatments were developed by two professional video designers.

1) Participants

Two Video designers participated the development of the video. Both of them have experience creating instructional videos, however, none of them have designed any type of video especially targets on elderly learners.

Table III–2. Animated Video Production Participants Profiles

Participant	Major	Job Distribution	Educational Background	Experience (Years)
M	Video Design	Script Design +Screen Design	Master`s Degree	8
N	Video Design	Video Production	Master`s Degree	5

2) Process of Prototype Development

Prototype is a functional version of a new process and/or product, usually in an unfinished state, whose effectiveness and efficiency to be tested (Branch, 2010). There are two ways of prototyping. Low–fidelity prototyping is a method that allows you to move quickly with fewer spaces and less time, such as paper prototyping. Also, there is high–fidelity prototyping for the high similarity with the final product and completeness of the prototype (Hyeon, 2014). To evaluate the usability of the gist–based video design strategy, the strategy and guidelines were compiled into a high–fidelity prototype method.

Prototype development was prepared through a pre–meeting prior to the development of the video lecture. At the first meeting, designers and the PD (the researcher) participated to discuss the overall contents of development such as the number of scenes, the type of animation, and color identities. Based on the script written, the designers designed the storyboard. In addition, we examined whether the amount of learning content is appropriate and whether gist information are designed and conveyed well to elderly learners. The process for developing video prototype is summarized in Table III–3.

Table III–3. Process of Prototype Development

Phase	Things to decide	Preparation	Outcome
Pre–meeting	Analysis on the content Script design based on the strategies Storyboard of the video	General multimedia design strategies and guidelines Gist–based video design strategies and guidelines	Timeline of the production
Pre–production	Confirmation on the visuals	Voice–over record	Confirmed continuity
Production			1 st Video prototype
Review	Revision on the detail according to the Gist–based video design strategies	1 st Video prototype	Final prototype video

The process of developing storyboards, editing, and reviewing them based on the storyboards are applied by rapid prototyping before finishing the final prototype. During the process, designers and PD (researcher) worked closely together to develop,

review, and modify it both online and offline. As Jones and Richey (2000) emphasizes in the Instructional Systems Design–Rapid Prototyping Model that developing, modifying, and supplementing prototypes in the whole design and development process are nonlinear and concurrent, consistent involvement of SMEs , designers and potential users were allowed in the process.

3) The Strategies and Guidelines Provided for the Designers

The two video designers were provided with the Gist–based Tutorial Video Design Strategies for Elderly Learners’ Health–care in the appendix as reference. Also, for their clear and concise understanding, a few terms from cognitive psychology, such as ‘gist–memory’, ‘output interference’, ‘frame effect’ were explained again blew the strategies, and the layout of the table was rearranged for them as well.

4) Video Designers` Evaluation on the Strategies

The two video designers were given usability test questionnaire to give out their experience applying the gist–based tutorial video design strategies in terms of overall recognition, effectiveness, ease of application, satisfaction, generalization and willingness of adoption of the gist–based tutorial video design strategies. Also, designers` opinions on the strength, weakness and improvements of the strategies were also being collected.

Phase 4: Implementation

5 senior learners (3 of whom are familiar with life-long education while the other 2 learners are less familiar with the learning) of 10 participants were required to watch a 10mintues video on Parkinson's disease. While the other 5 learners (3 of whom are familiar with life-long education while the other 2 learners are less familiar with the learning) were asked to watch the two short animated videos which had been designed according to strategies developed with the same content as the comparison video. Reactions of learners while watching the videos, such as facial expression changes, oral comments were recorded for further analysis.

Phase 5: Learner Response Assessment

Interview was conducted to 10 participants on how senior learners perceive on the tutorial videos designed based on the gist-based design strategies. After that, memory level test was conducted to how much do senior learners attitude and knowledge change by watching the tutorial videos designed based on the gist-based strategies. Lastly, through oral survey with the participants, quantitative and qualitative data was collected on the effectiveness of the design strategies. Researcher applied usability analyses (Richey & Klein, 2007) via conducting semi-structured interviews and usability questionnaire instrument.

3. Data Collection and Analysis

3.1. Literature Review and Case Analysis

By looking down into the elements of the research topic of gist-based tutorial video design strategies, three main categories were selected as the core data source for the researcher to conduct the initial development (Bidwell & Jensen, 2004), which are shown

in the table below. Keywords used in the search process include “fuzzy–trace theory, gist memory, older adult/elderly people/seniors learning, video design, instructional video design, health message design, and false memory with age.

The first category of fuzzy–trace theory was used as a “camera lens”, and the second category of characteristics of elderly learners was considered as a lens “filter” for capturing the underlying elements of the “framework”: instructional multimedia design principles which is mainly focused in the aspect of tutorial video in this research. By applying this approach, the researcher was able to comprehensively consider the essence of fuzzy–trace theory (fuzzy–processing preference) with elderly people s characteristics from both physical and cognitive aspects, so that health–care related (relatively high–demand knowledge contained) tutorial video design strategies could be derived from the “photograph/video” shoot by the filtered camera lens.

The key findings of the first category of fuzzy–trace theory which are significant to the effectiveness of the research as the theoretical foundation of the strategy were summarized as follows:

Table III–4. Summary of the Essential Findings from Fuzzy–trace theory

	Element	Content	Resource
Category1: Fuzzy Trace Theory	Gist trace	vague, qualitative concepts that capture the ‘bottom–line’ meaning of information	Reyna, V. F., 2012
	Verbatim trac	precise and quantitative, capturing the surface (or literal) form of information	Reyna VF, 2012
	the Framing Effect	People decide on options & based on if the options are	Tversky &

Risk Perception	presented with positive or negative semantics; e.g. as a loss or as a gain. People tend to avoid risk when a positive frame is presented but seek risks when a negative frame is presented. (Tversky & Kahneman, 1981)	Kahneman, 1981
Qualitative Processing	Exact numerical information is not absolutely necessary needed for people to make a decision	Reyna & Brain, 1991
Fuzzy-Processing Preference	Learners rely on the least precise gist representations necessary to make a decision, despite parallel processing of both gist and verbatim representations	Reyna & Kiernan, 1994
The Optimization Model: A Theory of Recall Order	Overall non-monotonicity: output tends to begin with verbatim-based recall, proceeding in a harder → easier direction, and that output eventually switches to gist-based recall, proceeding in an easier → harder direction.	Reyna & Brain, 1995
output interference (proactive interference)	A response-produced process that varies across free-recall sequences as a function of the numbers and)	Brainerd & Reyna 1989; Cooney & Troyer in

	types of targets that have been recalled. Recalling an item generates off-task noise that impedes the retrieval of subsequent targets, which is output interference. Accumulated output interference is more likely to impede the retrieval of verbatim traces than the retrieval of gist traces	press; Reyna & Brainerd 1989; Brainerd & Reyna 1993b; Reyna in press
“Real Gains” Effect	People’s preferences violations are observed when real money, and even actual life and death decisions, are involved	McNeil, Pauker, Sox, & Tversky 1982; Tversky & Kahneman 1981, 1986

For the characteristics of elderly learners, literature that is on elderly people’s false memory mechanism and their basic cognitive and physical changes were reviewed to find out their major disadvantages and preferences on learning. The result is as follows

Table III–5. Critical Characteristics of Elderly Learners

	Aspect	Content	Resource
Category2: Characteristics of Elderly Learners		Hard to encode and retrieve verbatim message	Gallo, 2006
		Attention Orientation and Maintenance Decline	Hasher, 2008
	Disadvantages on learning	Pronounced imagination inflation	Gerlach, Dornblaser, & Schacter, 2014
		Low processing rate (e.g. Disadvantaged by the fast presentation rate)	Salthouse, 1996
		Eye sight and hearing loss	Common knowledge
		More reliable on gist memory to judge things than younger adult	Gallo, 2006
	Preferences on Learning	Elderly learners typically benefit from schematic support	cf. Mohanty et al., 2016
		Situational cues helps reduce false memory	Henke, 2008
		Warm color preference	Chung, 2018

Lastly, instructional multimedia design principles were looked into by searching existing literature and reports on not only

instructional video design, but also e-learning design and online course design to generate a series of key aspects and principles that should be paid attention to and strictly followed when designing any kind of multimedia learning materials. The principles or elements in the following Figure III-1 is selected by the following criteria: 1. Is it a really necessary/fundamental point for a simple tutorial video? 2. Does it suit for animated tutorial videos? 3. Will it be agreed by the elderly learners?

Figure III-2. Tutorial Video Design Principles and Key Elements

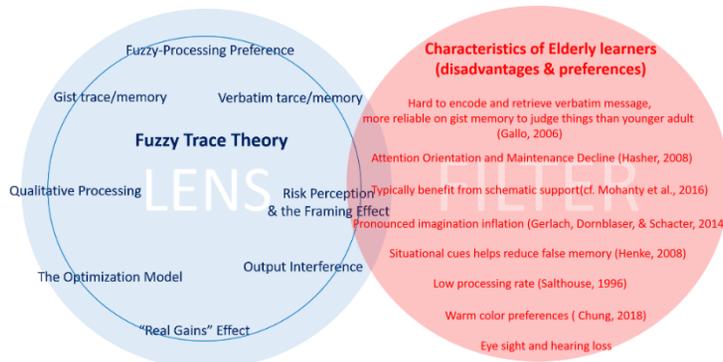
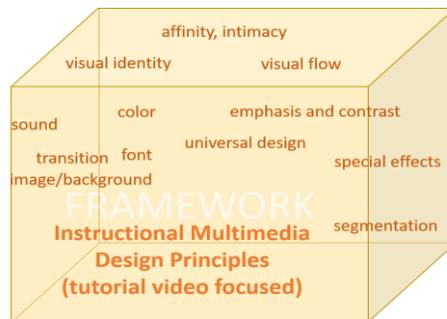


Figure III-3. Literature Review Data Analysis Method Sketch

Choi (2018) suggests that during the pre-production period clear information delivery is the main goal while in the post-production period promoting learning engagement is the major task. Due to the fact the type of tutorial video in this study will not be lecture video format which was Choi's study object, thus the traditional production, also video shooting period is not considered in this study. For gist-based tutorial video which are text and graphic based, there are two main aspects to consider about when designing gist based tutorial video for elderly learners, which are information delivery and learning engagement. For delivery of information, the principles are generally derived based on the definitions and examples of some of the effects in judgment and decision research explained by fuzzy-trace theory (Valerie F. Reyna, 2008).

Case Analysis: Screen Design Approaches on Gist Messages.

1. Use several short sentences to specify one gist messages.

Divide the long sentences which may contained several key information into several short sentences and simplify the language to give clear short clear gist messages.



Figure III-4. Example

2. Present the formation process of the gist messages.

It is quite helpful if the formation of the gist message could be showed in the video. (e.g. the formation of heart disease)

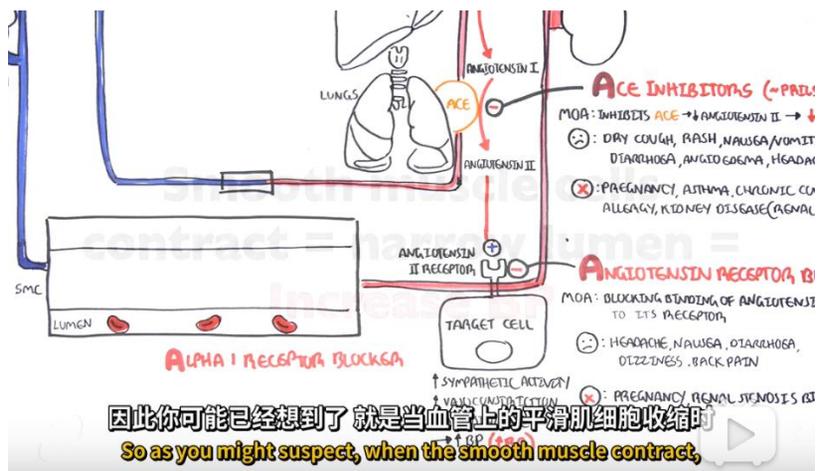


Figure III-5. Example

3. Show the text-based gist representations with reminding of the former information just taught. One approach could be a background image of the former scene.



Figure III-6. Example

4. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.

5. Use animation effect to highlight the key point.



Figure III-7. Example

6. Visualize the feelings to connect the tactual sensation with visions.

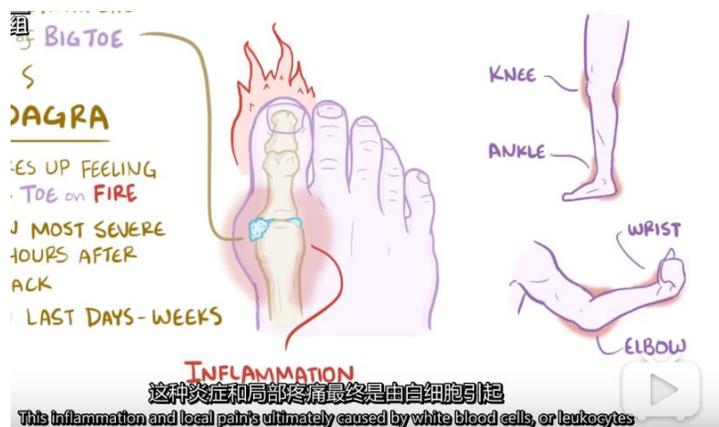


Figure III-8. Example

7. Show the visuals slightly after the narrations and pause at least 5 seconds for gist messages on screen (turn down the background music during that time if necessary).

8. Differentiate information by appropriately using colors to mark

different gist information.

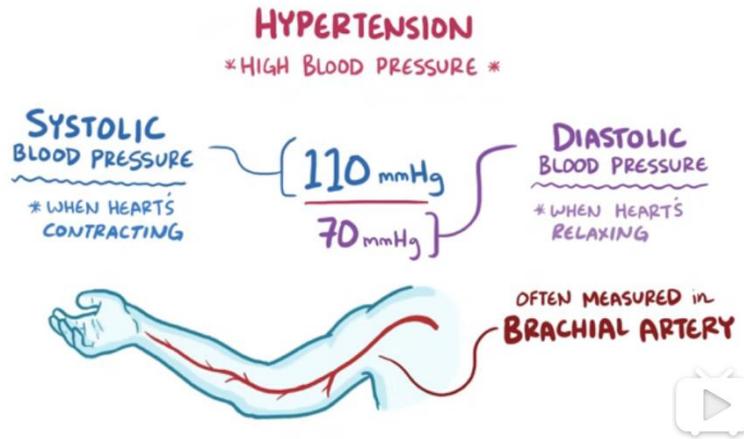


Figure III-9. Example

9. Provide an emotional impact to senior learners with a real-life related environment or situations (Levine, 2012)

Some researchers believe that the stronger the emotional connection of decision information, the stronger the relative influence of the semantic coding compared with the verbatim coding (Levine, 2012), and the belief system driven by miscalibrated emotions can lead individuals to perceive behavior choices. Thus, a real-life related settings of the background could play a role in bring a positive emotional impact on their coding process.



Figure III-10. Example

10. One piece of gist information a time

Due to elderly learner`s low processing rate and declining attention orientation (Salthouse, 1996), put one piece of gist information on the screen in one single scene helps their memorization.



Figure III-11. Example

By categorizing and analyzing with the above approaches, the initial gist-based tutorial video design strategies for elderly learners' health-care were synthesized as follows:

Table III-6. The initial gist-based tutorial video design strategies for elderly learners via literature review and case analysis

Strategies	Key Attributes	Research Reference
1. Clarify messages.	<p>gist</p> <p>Use of language</p> <hr/> <p>Additional clarification</p> <p>(the framing effect & risk perception).</p>	<ul style="list-style-type: none"> ● Salthouse, 1996 ● Fuzzy-processing preferences (Reyna & Kiernan, 1994)

2. Help the formation of learners' gist memory	Formation of gist messages Visual reminders	● Reyna & Lloyd, 2006
3. Emphasize gist messages to gain learner's enough attention.	Order of information Screen layout Pauses	● Choi, 2018 ● More processing time (Mata et al., 2007)
4. Provide appropriate gist when presenting verbatim messages. (fuzzy trace preference)	Comparison & Contrast (Qualitative Processing) Special effects Order of information decided by the difficulty (optimization model)	● Peters et al., 2019 ● Flores, C. C., et al., 2017 ● Reyna, V. F., & C. J. Brainerd., 1995 ● Reyna, V. F., & C. J. Brainerd., 1995
5. Add emotional impact on gist for elderly learners.	Affinity Intimacy Avoidance of frame effect Real gains (e.g. save of money)	● Levine, 2012 ● Morie et al., 2005 ● LeDoux, 1998; Sparrow and Knight, 2006 ● Park, T., & Lim, C., 2019 ● Fagley & Miller, 1997 ● Castel et al., 2016
6. Minimize output interference when presenting gist messages.	Information load Simplicity	● Reyna, V.F., & C. J. Brainerd., 1995 ● Reyna, V.F., & C. J. Brainerd., 1995

	Segmentation	<ul style="list-style-type: none"> ● Hong, W., Lim, C., & Park, T., 2013 ● Fisk, A. D. et al., 2018
7.	Provide gist Storytelling messages in an engaging way.	<ul style="list-style-type: none"> ● Caminotti, E., & Gray, J., 2012

3.2. Internal Validation via Expert Review

The internal validity of the initial gist-based tutorial video design strategies for elderly learners' health-care, which was derived from literature review, was conducted in two stages and 4 experts were commissioned for validation.

First, the output was organized in the form of validation paper. The questionnaire consisted of an introduction and a validity review of the study. The introductory part of the study is about the initial gist-based tutorial video design strategies and derivation of detailed guidelines. The validity review part consisted of questionnaire about overall design class design strategies and questionnaire about each strategy and detailed guidelines. Each questionnaire consisted of a four-point scale for experts to express their opinions and a space for additional opinions. Through this, the researcher tried to collect quantitative and qualitative opinions of experts.

Following by that, the results of the expert review collected first were analyzed. First, the quantitative evaluation results of the validity review paper evaluated by experts were analyzed using the Content Validity Index (CVI) and the Inter-Rater Agreement (IRA) according to the method proposed by Rubio et al. (2003). It was. Content validity is an index that indicates the degree to which the experts' positive evaluation scores coincide. This is calculated by dividing the number of experts who gave a positive evaluation for each question by the total number of experts. The content

consistency index between the evaluators is an indicator of the reliability of the score between the evaluators. This is calculated by dividing the items for which all the ratings gave positive scores by the whole item. The results were analyzed to determine if the content validity score and content agreement score between the evaluators were above 0.8 in all areas. The initial gist-based tutorial video design strategies were revised by combining the qualitative review opinions collected from the questionnaire.

Third, the 2nd validity test of was conducted in the same way as the 1st one. The strategies with detailed guidelines were summarized in the form of a validity test paper. The same four experts were asked to evaluate the validity of the output. The test results were analyzed in the same way as the primary validation. Quantitative evaluation results were analyzed using the Content Validity Index (CVI) and the Inter-Rater Agreement (IRA). The strategies was revised to reflect the opinions suggested by experts.

3.3. In-Progress Project Data from Video Designers (Usability Test)

The gist-based tutorial video design strategies developed in this study was applied in order to verify the impact of them and to improve the usability of the strategies. During the video prototype development period, two video designers' response to the strategies, and their causal communication with the researcher (PD) were also analyzed. Usability test questionnaire were given to the designers before production and after finishing the production of the videos with different assessment dimensions provided to comment on.

To evaluate the usability, the usability scores for experiences using image design strategies were collected to calculate the mean and content validity index (CVI). If the mean of the evaluation items is 3 or 4, it is regarded as a positive evaluation and treated as 1 point, and in the case of 1 and 2, it is regarded as a

negative evaluation and treated as 0. The other questions asked by users are the strengths, weaknesses, and improvements. The collected opinions were organized and classified by the researcher and used in the research, and the data were presented in the research results.

3.4. Field–Evaluation by Elderly Learners (Effectiveness of the Strategies)

First, the objective oral quizzes correctness rate on verifying the elderly learners' memory level and the degree of content understanding were calculated.

Second, the result of the survey on elderly learners' situational interest and satisfaction on the prototype videos were analyzed

Other than that, the subjective responses of students were also collected in the were followed by open coding based on the key words of each response according to Creswell (2012) qualitative research analysis method, and then the themes were derived.

In addition, observation were made during the process while the 10 elderly learners watching the video. Their facial expression changes, physical movements and words said during the process were recorded as additional data to help identify the elderly learners' satisfaction degree, engagement degree to verify the effectiveness of the gist–based tutorial video design strategies.

Last but not least, in–depth interview were conducted in a casual talk after the above process. The elderly learners were asked to feel free talking about anything related to their learning experience, both online and offline, and their typical day at the community center and community college for seniors. The collected content of the causal talk were organized and classified by the researcher and used in the recommendation part of the research.

4. Instruments

4.1. Instrument for Internal Validation

Questionnaire of internal validation was developed to conduct SME internal validation, which was consisted by general introduction of background of the research, research questions, methods and the validation form on the strategies.

The details of the internal validity tool were organized based on validity, explanatory power, usefulness, universality, and ease of understanding with reference to expert validity evaluation items used in the study of 나일주, 정현미(2001). As Table III-7, SMEs were asked to respond to the four-point scale for each area (4 points: Agree very much, 1 point: not agree at all) and a space for writing additional comments was also provided. Further opinions were collected from experts on the overall strategies through open questions

The second round of SMEs review was carried out in the same way as the first round of SMEs review, while prototype videos were provided as references.

Table III-7. Aspects of Internal Validation

Aspect	Content
Validity	This strategy is valid to improve memory level of elderly learners on health-care learning.
Explanatory Power	This strategy explains the way to design gist-based tutorial video for elderly learners on health-care
Usefulness	This strategy is useful to improve memory level of elderly learners on health-care learning.
Universality	This strategy can be used universally to improve

	memory level of elderly learners on health-care learning.
Ease of Understanding	This strategy is easy to understand when design gist-based tutorial video for elderly learners on health-care.

4.2. Instrument for Usability Test

Usability test items for the gist-based tutorial video design strategies and guidelines include overall recognition of the design strategy, effectiveness of the design strategy, ease of understanding of the design strategy, ease of application, satisfaction, generalization potential, willingness of adoption. A total of 11 questions consisted of seven questions consisting of expectations for the four questions and four semi-structured questions asking for user feedback (see [Appendix 3]). This evaluation item was developed by revising and supplementing the development items of the prior literature (Park, 2015; Yu, 2016) with the items optimized for this study. Usability test questions were asked to be answered on a 4-point scale. Detailed content is shown in the Table below.

Table III-8. Aspects of Usability Test

Aspect	Content
Overall recognition on the gist-based strategies	This strategy is well-informed to improve memory level of elderly learners on health-care learning.
Effectiveness of the gist-based strategies	This strategy is effective to improve memory level of elderly learners on health-care learning
Ease of application of the gist-based design	This strategy is easy to apply when design gist-based tutorial video for

strategies	elderly learners on health-care
Satisfaction on the gist-based strategies	This strategy on gist-based tutorial video for elderly learners on health-care satisfies me.
Generalization of the gist-based strategies	This strategy can be used generally to improve memory level of elderly learners on health-care learning.
Willingness of adoption	Willingness to adopting the strategy in the future is quite strong.

4.3. Instrument for External Validation

1) Devices and Settings for Video Watching

The two around-4-minute prototype videos produced by animated video designers on Parkinson's Disease and the example video of an existing common tutorial video on the same topic were displayed to the elderly learners in two similar (in terms of suitability for video watching) environment settings with a 10.1-inch tablet PC provided by research.

The experiment was conducted twice in different places, one of which was a community college office and the other was an open lobby of a community senior center. Both of the two places were relatively ideal for the elderly learners to sit and watch the videos played by the tablet PC.

What worth mentioning on the instrument is that besides the tablet PC, 5 randomly captured screen shots of the video content were sent to the elderly learners' cell phones for learners to recognize the color and size of the video elements. Feedback on the visual experience were then collected on two different devices.

2) Effectiveness Test and Usability Interview

A questionnaire was developed to identify elderly learners' responses to the gist-based health-care tutorial video. The questionnaire was designed into three parts for the quantitative data collection. 4 questions on situational interest consists the first part of the questionnaire. Situational interest is the emotional response of students interested in and immersed in a specific activity (Hidi & Renninger, 2006). In this study, the items of the situation interest area of Rotgans and Schmidt (2009) were used. Followed by that, there are 10 quizzes on the effectiveness of the learning, which also includes elderly learners' attitude and intention towards the content (Parkinson's disease). Then, questions were asked on their satisfaction with the video in terms of visuals and sounds. All the above questions were designed in a five-point Likert scale. All the responses to the quantitative data, which are collected data, were coded using Excel. After verifying the reliability of each composition area, the mean and standard deviation of the student responses were derived for each area and the questionnaire was interpreted based on this.

Also, three more open questions were asked to the elderly learners on the strengths, limitations, and improvements of the prototype videos when compared to the existing health-care related tutorial videos. The student responses to the open questions, which are qualitative data, were analyzed in the same way as the observation and interview data described later. Student questionnaires used in the study can be found in Appendix X.

Table III-9. Aspects of Questionnaire for Elderly Learner Response

Type of Questions	Aspects	Number of Questions	α
Multiple-Choice	Situational Interest	4	0.85

Questions using a	Accuracy of Memory	10	0.87
five-point Likert scale	Satisfaction on the tutorial videos	10	0.92
Open Question	Strength, weakness, and preferred future improvement on this type of video	3	

CHAPTER IV. RESULTS

The purpose of this study is to help elderly learners to understand the health care related information more easily with appropriate design approach.

In order to develop gist-based tutorial video design strategies that can be improved, this study first developed the initial gist-based tutorial video design strategies through literature review, and revised and supplemented it through two-time internal validation process by expert review. In addition, the effects and limitations of the strategies developed through the video designer and elderly learner response data were examined. The gist-based tutorial video design strategies and the detailed guidelines for elderly learners' health-care are shown in Chapter 4.4. And is explained according to the order of guidelines. Besides that, the results of expert validation and the effects and limitations of the gist-based tutorial video design strategies is presented as follows.

1. Results of Expert Review and Video Designers' Opinions

1.1. 1st Round of Expert Review

The first round of expert reviews was conducted to verify the internal validity of the strategies developed through the literature review. Two education and one cognitive psychology experts participated in the expert review, and the results of the expert review can be found in Table IV-1 below.

The first expert review found that the overall feasibility, degree of articulation, usefulness, universality, ease of understanding that promote improvement in memory level of elderly learners when

learning health care related videos were three to four, with experts recognizing the overall support strategy positively. In addition, both the CVI and IRA values for each item were 1; the confidence in the positive response of the expert and the overall confidence in the professional review results were high. However, the strategy for providing appropriate gist when presenting verbatim messages was the lowest. Opinions were given on provide easier explanation on the concepts and terms from fuzzy-trace theory, including the framework effect, the optimization model, for people not familiar with the cognitive psychology theory to grasp the key idea better. Also, the result of experts' review also shows that lack of dimension is a major pitfall of the strategy, thus, Kirkpatrick Model is recommended to embed in. Other than that, inquiry style learning method was also recommended to intrigue elderly learners' initiative learning.

Table IV–1. Results of the 1st Round of Expert Review

Item	SMEs				Mean	SD	CVI	IRA
	A	B	C	D				
This strategy is valid to improve memory level of elderly learners on health-care learning.	4	4	3	4	3.75	.43	1.00	1.00
This strategy powerfully explains the way to design gist-based tutorial video for elderly learners on health-care	4	4	3	4	3.75	.43	1.00	1.00
This strategy is useful to improve memory level of elderly learners on health-care	4	4	4	4	4	.00	1.00	1.00

learning.									
This strategy can be used universally to improve memory level of elderly learners on health-care learning.	3	3	3	4	3.25	.43	1.00	1.00	
This strategy is easy to understand when design gist-based tutorial video for elderly learners on health-care.	4	4	4	4	4	.00	1.00	1.00	

The mean of responses to individual guidelines shown in the following table ranged from 3 to 4, indicating that experts consider that each support strategy is valid. However, the guidelines had a CVI value of less than .8 and the IRA value of .74, which was less than .8, suggests that the support strategy should be reviewed and revised. The full version of the results of the first expert review, including the response scores for each expert, can be found in the Appendix.

Table IV-2. Results of the 1st Round of Expert Review (Guidelines)

Guidelines	Mean	SD	CVI	IRA
1-1. Presentation rate should be relatively slow.	3.33	.82	0.8	
1-2. Use several short sentences to specify one gist messages.	3.50	.55	1.0	
1-3. Provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors' own probability judgments many of which are not objective enough (the framing effect).	4.00	.00	1.0	0.74
2-1. Present the formation process of the gist messages.	3.33	.82	0.8	

2-2. Show the text-based gist representations with reminding of the former information just taught. One approach could be a background image of the former scene.	3.33	.82	0.8
2-3. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.	3.5	.84	0.8
3-1. Show gist messages at the beginning and the end. Or always on-display on the left side.	3.33	.52	1.0
3-2. Use animation effect to highlight the key point.	3.17	.75	0.8
3-3. Visualize the feelings to connect the tactual sensation with visions.	3.33	.82	0.8
3-4. Show the visuals slightly after the narrations and pause at least 5 seconds for gist messages on screen (turn down the background music during that time if necessary).	3.33	.82	0.8
3-5. Differentiate information by appropriately using colors to mark different gist information.	3.17	.75	0.8
4-1. Present information in a manner that facilitates direct comparison	3.83	.41	1.0
4-2. Present similar information in close temporal proximity	3.67	.52	1.0
4-3. Interpret numerical information by comparing and contrasting with other data to create gist memory (e.g. risks).	3.5	.84	0.8
4-4. According to the optimization model, for those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.	4.00	.00	1.0
5-1. Provide an emotional impact to	3.50	.50	1.00

elderly learners with a real-life related environment or situations (Levine, 2012)			
5-2. Use visuals to remind elderly learner to avoid risky choice frame effect	3.50	.82	0.8
5-3. Emphasize elderly learners` real gain to create their priority processing of the information	4.00	.00	1.0
6-1. One piece of gist information a time	4.00	.00	1.0
6-2. Keep animation effect simple and do not provide unnecessary detailed motions or graphics	4.00	.00	1.0
6-3. Segment the tutorial videos into more than 2 minutes but less than 5 minutes` video clips.	4.00	.00	1.0
7-1. Use storytelling to form better gist memory.	3.17	.75	0.8
7-2. Use daily vocabulary and sentence patterns to deliver gist messages.	3.50	.55	1.0

The major weakness of individual guidelines were divided into two parts which are the adequacy of the content and the clarity of expression. In terms of the adequacy of the content, it was pointed out that the problem is that there are some of the guidelines were not aligned with the strategies. For example, it was suggested that Guideline 4-4. “For those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand” is not aligned with Strategy 4 Provide appropriate gist when presenting verbatim messages” but should be part of the guidelines of Strategy 1 which is clarifying gist messages. In addition, it was pointed out that there was some similarity of the content. For example, providing real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors own probability judgments has high similarity

with using storytelling to engage elderly learners. In terms of expression, the major opinion from the experts was the vague standards used in the strategies , Guideline1 of presentation rate should be relatively slow for an example.

Arranging and reflecting on the opinions of the experts, the strategy and the corresponding guidelines were revised as follows:

Table IV–3. Revision after the 1st Round of Expert Review

Aspect	Experts’ Opinion	Revision
Overall Strategy	Lack of categories to be applied systematically	Further categorizing process
	Lack elderly learners’ own opportunity to think so that memory could be strengthened	Adjusting to more heuristic way of delivering content
	Lack of learner–content interaction	
Individual Guidelines	Adequacy Alignment problem with some of the guidelines	Reconsideration on the guidelines
	Similarity of the content	Revision on combination and deletion
	Clarity of Expression	Vague standards to follow
	Not concrete enough to understand	Included more examples with the guidelines

Revisions have been made based on the above table and a

updated version gist-based tutorial video design strategies were compiled for the second round of expert review, and the result of which could be found in the following article.

1.2. 2nd Round of Expert Review

The second expert review was conducted to review the validity of the revised strategies by reflecting the results of the first expert review. Four experts who participated in the first expert review participated in the second expert review. The results of the second expert review on overall gist-based tutorial video design strategies are shown in Table IV-4. As a result of the expert review, the mean of validity, explanatory power, usefulness, universality, and understanding of the overall support strategy were 3.75 to 4, which confirmed the expert's positive perception of the overall support strategy. In addition, the CVI and IRA values for each item were also 1, which was over .80, which proved the validity of the support strategy and the reliability of the expert review results. Expert D, however, pointed out that the expressions used in the strategy tended to be somewhat longer and more difficult in general.

Table IV-4. Results of the 2nd Round of Expert Review

Item	SMEs				Mean	SD	CVI	IRA
	A	B	C	D				
This strategy is valid to improve memory level of elderly learners on health-care learning.	4	4	4	4	4	.00	1.00	1.00
This strategy powerfully explains the way to design gist-based	4	4	4	4	4	.00	1.00	

tutorial video for elderly learners on health-care								
This strategy is useful to improve memory level of elderly learners on health-care learning.	4	4	4	4	4	.00	1.00	
This strategy can be used universally to improve memory level of elderly learners on health-care learning.	4	3	4	4	3.75	.43	1.00	
This strategy is easy to understand when design gist-based tutorial video for elderly learners on health-care.	4	4	4	3	3.75	.43	1.00	

The results of a second expert review of detailed guidelines for the gist-based tutorial design strategies for elderly learner's health-care are shown in the table below. The mean of 22 guidelines for develop gist-based tutorial video design strategies was positive from 3.25 to 4 points. In addition, the CVI and IRA values are above 0.8, demonstrating the feasibility of individual guidelines and the reliability of expert review results.

Table IV-5. Results of the 2nd Round of Expert Review (Guidelines)

Guidelines	Mean	SD	CVI	IRA
1-1. Provide accurate gist when presenting verbatim messages.	4.00	.00	1.0	1.0
1-2. Interpret numerical information by comparing and contrasting with	4.00	.00	1.0	

other data to help create gist memory			
1-3. Explain the formation of gist messages.	3.25	.43	1.0
2-1. Use several short sentences to specify one gist messages.	4.00	.00	1.0
2-2. Use daily vocabulary and sentence patterns to deliver gist messages.	4.00	.00	1.0
2-3. Use heuristic way of storytelling to provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors` own probability judgments many of which are not objective enough	3.5	.84	0.8
2-4. Presentation rate should be relatively slow. (175 Chinese characters per minute for reference)	3.75	.43	1.0
3-1. Present information in a manner that facilitates direct comparison	3.5	.84	0.8
3-2. Visualize the feelings to connect the tactual sensation with visions.	3.5	.84	0.8
3-3 Present information following the ideal visual flow, and put gist message at center of the upper 1/3 of the screen	4.00	.00	1.0
4-1. Highlight the gist message by adding special effect and using warm color with high degree of saturation.	4.00	.00	1.0
4-2. Show the visuals slightly after the narrations and pause at least 3 seconds for digestion (turn down the background music during that time if necessary).	3.75	.43	1.0
4-3. Present text-based gist messages on the background of the same visuals that have been just used	4.00	.00	1.0
4-4. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge.	3.50	.84	0.8

Fast and fantastic transition animation should be avoided.			
4-5. Provide a “gist timeline” to show where and when the key gist is formed for learner`s longer exposure to information.	4.00	.00	1.0
5-1. Emphasize elderly learners` real gains to create their priority processing of the information	3.50	.50	1.00
5-2. Provide an emotional impact to elderly learners with a real-life related environment or situations	3.50	.82	0.8
5-3. Use visuals to remind elderly learner to avoid risky choice frame effect	3.25	.43	1.0
6-1. Segment the tutorial videos into more than 2 minutes but less than 5 minutes` video clips.	4.00	.00	1.0
6-2. For those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.	4.00	.00	1.0
6-3. One piece of gist information a screen	4.00	.00	1.0
6-4. Keep animation effect simple and do not provide unnecessary detailed motions or graphics	4.00	.00	1.0

The second expert review of individual guidelines is mainly based on the conciseness of expression.

Weakness regarding clarity of the guidelines have been noted. First, the need for specifying some of the guidelines was raised. Expert C pointed out that guidelines 1-1, 1-2, and 1-3 are not concrete enough to be understood, and advised that descriptions and examples should be specified for actual use. Next came the need to delete unnecessary expressions and to refine the sentence briefly. Especially for the terms and concepts referred from the fuzzy-trace

theory may cause the video designers who have are more likely to have no realted experience before to resist reading the guidelines in thoroughly. Reflecting the opinions of these experts, the guidelines were revised as shown in Table IV–6.

Table IV–6. Revision after the 2nd Round Expert Review (Guidelines)

Aspect	Experts' Opinion	Revision
Overall Strategies	Expression are not condensed enough	Revise the expressions for clear and precise understanding
Individual Adequacy Guidelines	Alignment problem with some of the guidelines	Re–categorize the guidelines to make sense for video designers and other related developers
	Clarity of Expression Not enough to understand	Included more explanations and text and visual examples with the guidelines

First, in order to improve the understanding of overall support strategies, expressions have been reviewed and revised in general to make them clear and simple.

Next, the reseacher revised and supplemented the guidelines for which problems were identified.

In the case of gulidelielie 1–1, 1–2, and 1–3, more specific and easy–understanding additional description on “gist” and “verbatim” were given and examples of how exactly the content should be adjusted by the gist–based tutorial video design guidelines were provided as well. In addition, the researcher reviewed the use of

duplicated expressions overall and deleted words that were considered unnecessary to convey meaning. In the case of terms or expressions whose meanings are unclear, the meanings are made clear by specifying the description. Finally, the examples were modified to fit the content of the revised guidelines.

The results of the second expert review, including the response scores for each expert, can be found in Appendix

1.3. Usability Test for Video Designers

The usability test of the gist-based tutorial video design strategies and the related guidelines was conducted to examine whether the strategies were developed appropriately for use by video designers. Two video designers with a Master Degree of Media and Communication participated in this usability test, after producing the two prototype videos based on the gist-based tutorial video design strategies.

The usability questionnaire on the gist-based tutorial video design strategies consists of seven questions: overall recognition of the gist-based strategies, effectiveness of the gist-based strategies, ease of understanding, applicability, satisfaction, generalization, and willingness to use the gist-based tutorial video design strategies. As the following table shows, among all seven items, ease of use had the lowest score of 3 points, and 3.5 points for satisfaction and willingness to use. All of the CVI was found to be valid with one point.

The results of the usability test of the gist-based tutorial video design strategies could be found in Table IV-7.

Table IV–7. Results of Animated Video Designers’ Usability Test

Item	Animated Video Designer		Mean	CVI
	M	N		
Overall recognition on the gist–based strategies	4	4	4	1.00
Effectiveness of the gist–based strategies	4	4	4	1.00
Ease of application of the gist–based strategies	4	4	4	1.00
Satisfaction on the gist–based strategies	3	4	3.5	1.00
Generalization of the gist–based strategies	3	3	3	1.00
Willingness of adoption in the strategies in future work	4	3	3.5	1.00

Both video designers generally had a positive perception of the gist–based tutorial video design strategies. And they consider not only video designers but also script writers, graphics designers, and project managers would benefit from having the strategies in mind when design tutorial videos for elderly learners. In addition, guidelines were prepared for each stage of video production, so it is possible for them to refer to the entire work process from the planning stage to the final editing stage. In addition, although there have been many design strategies related to the user interface, the gist–based video design strategies for elderly learners’ health care is distinguished from other design strategies for it is a strategy for the most simplified understanding and the best memorizing when elderly people watch the tutorial videos.

On the other hand, there were some suggestions on improving the strategies as well. For example, there was a request to suggest the guidelines through a more specific example, and even

to present some of the guidelines video examples, so the guidelines could be precisely followed in the future by other designers. They also provided additional ideas on adding sound effect related guidelines in the gist-based tutorial video design strategies to engage elderly learners better. What also worth paying attentions to is that both of the designers pointed out the biggest weakness of the gist-based tutorial video design strategies is that it is actually hard to be utilized very well since the video designers and even their project team usually have their own working process, and it is hard for them to distribute the job easily according to the gist message design strategies. For example, there are many guidelines on how gist messages should be arranged in sequences, which is the job of a script writer. Video designers felt confused and inefficient when they had to go back revising the script when they have started designing the visuals and produced the animations. In the following, the opinions of designers were divided into validation related and using experience related.

Table IV–8. Revision based on the Video Designers’ Opinion

Aspect	Designers’ Opinion	Revision
Validation	Neglect on utilizing sound effects to engage elderly learners more	Adding the content on sound effects
	Inappropriateness on the data (e.g. seconds to keep still of the frame)	Revising as designers’ professional opinion
	Add use of screen filter	Not considered for current development
Using Experience	Complexity of some of the psychological terms (no need to show the exact the fuzzy-trace	Attachment on simplified term-explanation

theory related evidence)	
Similarity of the content	Revision on combination and deletion
Confliction with the work flow	Matching the strategies with video
Uneasiness for job distribution when designers work as team	designers' common work flow

Based on the Table IV–8, revisions have been made especially on improving video designer’s working experience when applying the gist–based tutorial video design strategies to create tutorial videos for elderly learners to learn and memorize. The final revision could be found in the fourth part of this chapter.

2. Gist–based Tutorial Video Prototype

2.1. Summary on the Gist–based Tutorial Video Prototype

The type of gist–based tutorial video on health–care prototype was determined as animated video which information could be better organized and presented in the form of gist messages. Because gist–based type of design has been proved to be highly effective and suitable in terms of retrieving medical knowledge and making probability judgments for elderly learners whose physical and cognitive changes such as loss of eyesight and declining attention orientation and maintenance have great negative impact on their learning efficiency in previous studies (Fishbein M., 2008; Hasher, 2008; Reyna VF, 2012; Cressey D, 201; Peters E., et.al., 2013)

At the pre–meeting for design planning, the process of gist–based tutorial video presented in Table III–3 was carried out. In addition, the gist–based tutorial video design strategies and guidelines developed by the researcher were provided to the designers for reference during the meeting.

At the meeting about design planning, analysis on the original medical material on Parkinson's disease and script adjusted according to the gist-based tutorial video developed by the designer was checked with the PD (the researcher). After that, storyboard of the two videos were developed based on the narration script.

In the following pre-production phase, we reviewed the draft of the visuals elements to be include in the videos and animation samples developed by the video designers to make sure the visuals were aligned with the gist-based tutorial video design strategies, as well as the instructional content itself. Also, as the voice-over has been recorded, the design team checked on the appropriateness of the tone, pause and the accuracy of the narration.

After the pre-production meeting, the designers were given a week of production period to finish the 1st video prototype, during when designers and the PD communicate online on the detailed parts of the video design. Eventually, after reviewing the complete version of the first video prototype, revisions were conducted after a second round of aligning with the gist-based tutorial video design strategies.

2.2. Development of the Gist-based Tutorial Video Prototype

1) Topic of the Tutorial Video

Parkinson's disease is a progressive nervous system disorder that affects movement. Symptoms start gradually, sometimes starting with a barely noticeable tremor in just one hand. Tremors are common, but the disorder also commonly causes stiffness or slowing of movement.

In the early stages of Parkinson's disease, your face may show little or no expression. Your arms may not swing when you walk. Your speech may become soft or slurred. Parkinson's disease symptoms worsen as your condition progresses over time.

Although Parkinson's disease can't be cured, medications might significantly improve your symptoms. Occasionally, your doctor may suggest surgery to regulate certain regions of your brain and improve your symptoms.

2) Results of the Pre-meeting

The narration script was reorganized and adjusted according to the original instructional content from a lecture addressed by an authorized hospital doctor specialized in neurology via public in Shanghai, and the format of which is suggested as Figure III-11. Also, other authorized content from the Internet.



Figure III-12. Screen shot of the public broadcasting on Parkinson s Disease where original content was from

As Figure III-12 shows, the final narration script consists of three parts. The first part as the red part in the thumbnail image is the requirements for voice-over artist, which contains the rate of speaking, the ideal tone, and an explanation on the meaning of the yellow-color-underlining and bolding, which represents important information and gist-messages respectively. What worth mentioning that in this development, Shanghai dialects were asked to spoken to engage elderly learners because of the wide use of Shanghai dialects among elderly people in Shanghai. The researcher however, not

consider this as a compulsive requirements when the characteristic of dialect using among target audience changes.

配音要求：

对象及立场： 60岁以上老年人看的自我健康学习视频，配音老师的角色定位可以是“和老人年龄差10几20岁的阿姨”。

1. 有知识点的重点部分请放慢一点，口齿清楚一点低于每分钟200字，差不多“新老娘舅”或是上海话版的“新闻坊”语速一点点就好，60岁以上老年人跟的上就行，(不要全程很慢，希望有节奏感，让人听得进去)。
2. 黄色部分为重要信息，黄色加黑部分为核心信息，只要老年朋友好理解，记得住就好，可以用自己舒服的上海话词汇句型换着讲。
3. 建议把对象想成在自己面前的一个老年家人，“慢慢叫”讲清楚帕金森病怎么会的，有什么症状，讲得老年人听进去，记得住，能引起重视就好。

帕金森 1：帕金森是什么病？和我有多远？

引入： 邓小平同志，拳王阿里，
嘴巴留着口水，手在不停颤动，腿脚也不灵活，
对的，他们就是生的帕金森。

中国 60 岁以上的老年人，帕金森病的患病率虽然只有高 1%，但是超过 65 岁以后，生帕金森病的可能性增加了 70%，比过去大了很多。

尤其是现在阿拉上海老龄化严重，社会都在关心老年朋友的健康尤其是年龄越大，患病率越高的帕金森病。

虽然帕金森的原因还查不清楚，但是阿拉晓得一下“多巴胺”，叫多巴胺的这种神经细胞的减少直接导致了帕金森。

第一节：帕金森这种毛病与大脑，肌肉和多巴胺有很大关系。
大脑负责做决定(司令)，肌肉负责执行(军团)，神经细胞多巴胺在当中负责传递信息(送信员)，
多巴胺少了，命令就不能被准确传达到肌肉，笑一笑也笑不好。

第二节：接下来阿拉再来看看帕金森有啥症状：

得了帕金森的人，手一直在颤个不停，也叫“搓丸样震颤”。

70%，绝大多数，不过不是全部的帕金森患者会有这个症状，要等夜里睡觉了，手才好不抖。

从手抖开始，慢慢手臂也抬不起来，腿也不好跑路，最好四肢肌肉都不好使，就彻底没办法走动了，还有就是动作慢，反应迟钝，正常人 0.1 秒能做出的反应，帕金森病人要 3 分钟，路上遇到熟人打招呼也停不下来。所以说帕金森病人过马路容易发生车祸，阿拉千万要小心。

手脚肌肉不受控制，这还算小问题。

问题是，心脏，胃，肠子，都是肌肉呀，帕金森会一点点地把人的身体彻底搞垮。

总结：虽然讲，现在阿拉身体还好，没啥征兆，不过阿拉还是希望依提前晓得帕金森是啥毛病，尤其是它的严重性，防范一手，幸福长寿。

Figure III-13. Example of the Narration Script

Other than that, storyboards were developed by the designers in PowerPoint pages based on the content of the narration script. As the sketch presented below, screen layout were designed with the corresponding gist-messages written in the column beside the screen.

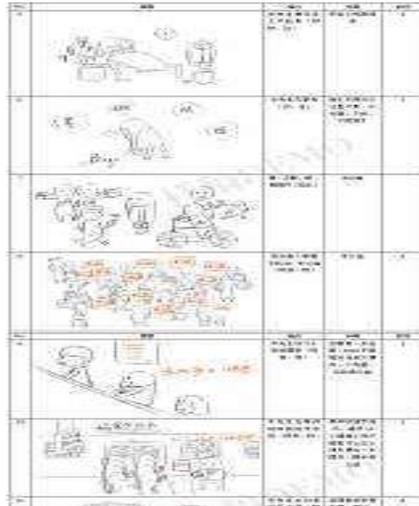


Figure III-14. Example of storyboards

3) Results of the Pre-Production

After going through the pre-production process of this prototype development, visual elements and animation were decided together. Video designers first conducted animated video style ideation. Animated video on medical tutorials were collected and analyzed to match with the ideal style of gist-based Parkinson's disease tutorial video, which is clear and easy to watch. During the pre-production, Image Forming Steps for Materializing Visual Identity (Moon Chan et al., 2010) presented in Table IV-9 was used as a reference.

Table IV-9. Image Forming Steps for Materializing Visual Identity (Moon Chan et al., 2010)

Activity	Content of Activity
1. Find the meaning of the topic	Approach it aesthetically and philosophically

2. Extract key words for expression (find out conflicting images and discuss universality)	Brainstorming to maintain universality and objective value
3. Find a few adjectives related to the subject and organize them in groups.	Assign to adjective map
4. Position the color on the axis of the adjective language.	Assign to color map
5. Find associative images for formative thinking	The first round of searching visual images
6. Secure basic materials that could be used for designing visual identities.	Decide color, typeface, font size and other visual elements

In addition, the gist-based tutorial video design strategies and guidelines developed by the researcher were provided to designers for reference during the pre-production process.

As a result of the pre-production, typeface, font size, colors, characters and elements in the videos were identified as the following concept images.





Figure III-15. Concept images of visual identities

4) Results of the Production

Complete version of initial prototype video were produced as a result of the production process. The following screen shots are some examples captured from the initial prototype videos

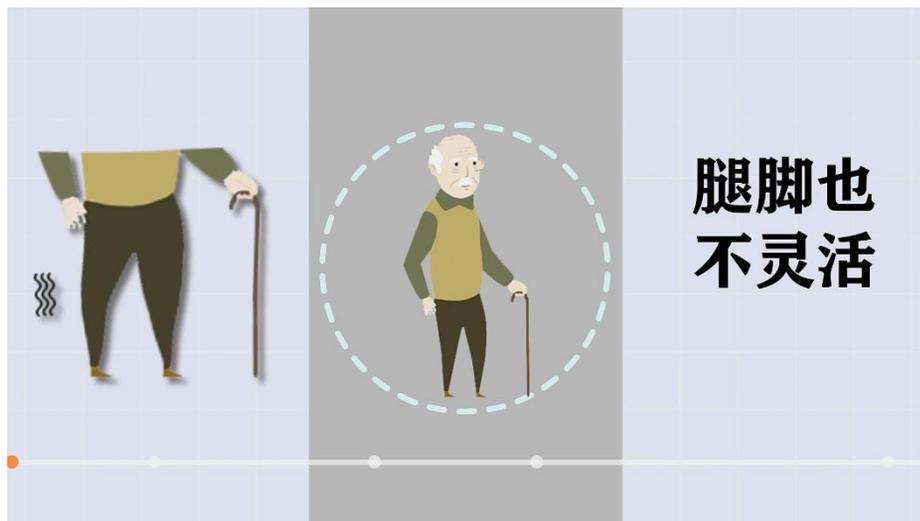


Figure III-16. A visual example from the prototype video on “visualize the feelings to connect the tactual sensation with visions” which says “Parkinson s disease causes stiffness of the arms, legs” from the prototype video



Figure III-17. An Example on highlighting the gist message by adding special effect (animation effect) and using warm color with high degree of saturation from the prototype video

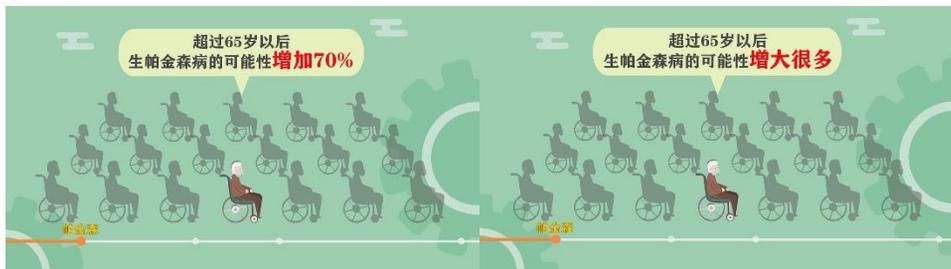


Figure III-18. A visual example from the prototype video on “interpret numerical information by comparing and contrasting with other data to help create gist memory” which says that when you are over 65 years old, the possibility of you having Parkinson’s disease has increased by 70% than 5 years ago, which means the risk of having Parkinson’s disease is much higher as you are turning over 65 years old

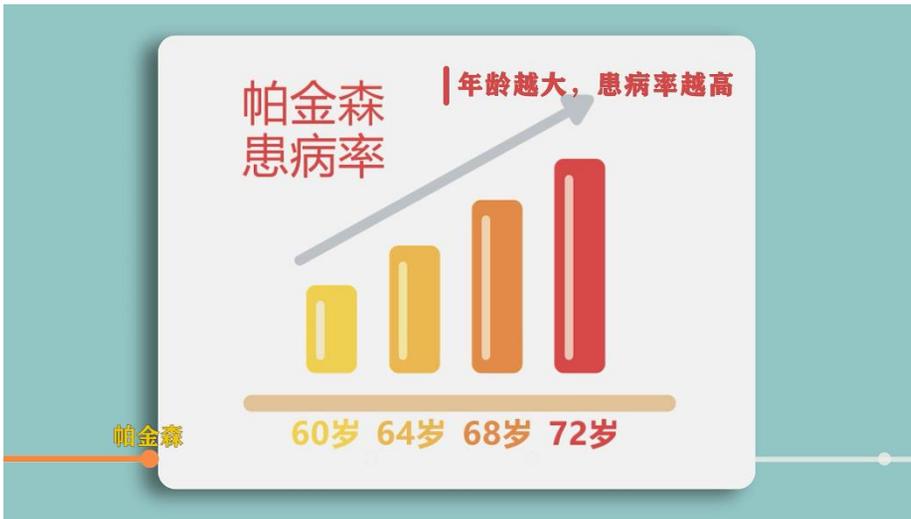


Figure III-19. A visual example from the prototype video on “visualize gist messages” which says that the possibility of having Parkinson’s disease increase as people get older.

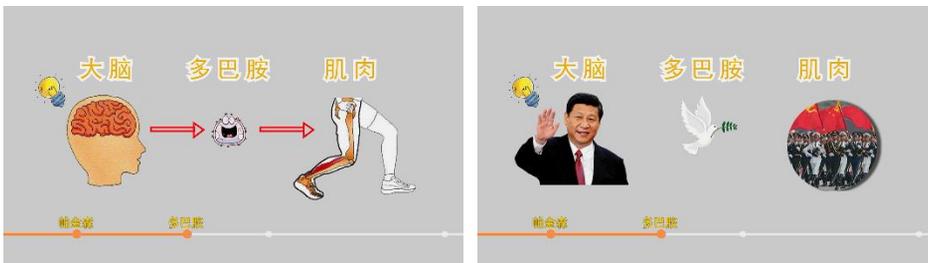


Figure III-20. A visual example from the prototype video on “use metaphor that could be visualized to facilitate understanding” which says that brain sends instructions to the muscles through dopamine in the brain's nerves.



Figure III- 21. A visual example from the prototype video on “present information in a manner that facilitates direct comparison” which says that “normal person can respond in 0.1 seconds, however it takes Parkinson's patients 3 minutes to respond.”



Figure III- 22. A visual example from the prototype video on “present text-based gist messages on the background of the same visuals that have been just used” which says that when having similar symptoms to Parkinson’s disease it is recommended for consulting a doctor for confirmed diagnosis.



Figure III- 23. A visual example from the prototype video on “Provide an emotional impact to elderly learners with a real-life related environment or situations” when recommend the elderly with Parkinson`s disease to keep a regular and positive life pattern.



Figure III- 24. A visual example from the prototype video on “one piece of gist information a screen” which says that there is also

possibility for other disease but not Parkinson`s disease to cause elderly`s trembling of hands

5) Results of the Post-Production

Sound effects for proving strong impression on elderly learners to improve strengthen their memory were added, including the pop-out sound when a gist message pops out in the screen, sound of environment and movements, for example, sound of walking and sound of a park with birds tweeting, and sound of alert when presenting misunderstanding that many people may made.

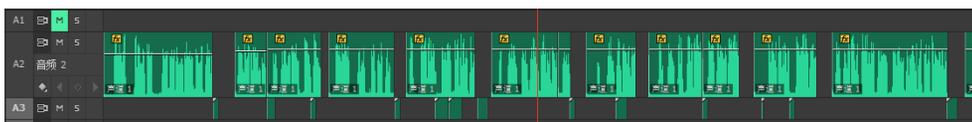


Figure III- 25. Sound Track of sound effects

Also, “gist timeline” was created in the lower space of the screen to show where and when the key gist is formed for learner`s longer exposure to information.

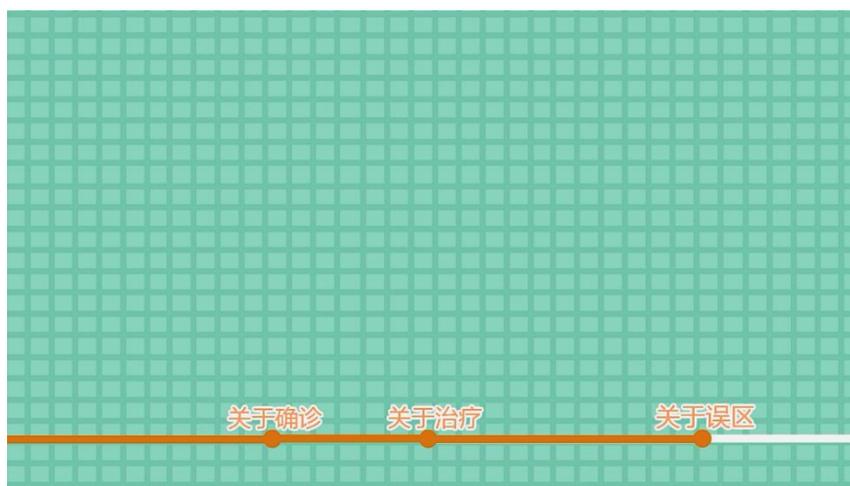


Figure III- 26. An example of the gist timeline from the prototype

6) Check on the Final Videos

The initial gist-based tutorial video design strategies for elderly learners' health-care prototype were checked to make sure the strategies were strictly followed and the details, for example the correctness of the subtitle were checked again before the final two 4-minute-around gist-based tutorial video prototype on Parkinson's disease were exported.



Figure III- 27. Prototype Videos

3. Final Gist-based Design Strategies of Tutorial Video for Elderly Learners' Health-Care

In the present study, older adults may have been particularly disadvantaged by the fast presentation rate, consistent with work on general slowing of memory processes in old age (Salthouse, 1996). According to this finding, the presentation rate including the speed of narration, the motional changes of screens (animation effect, subtitle changes, transition).

Because of elderly learners attention orientation and maintenance decline (Hasher, 2008), it is highly recommended for designers especially script designers (if there is one) to reorganize the sentence structures of the original medical knowledge to separate the long sentences which may contained several key information into several short sentences and simplify the language to give clear short clear gist messages.

People decide on options based on if the options are presented with positive or negative semantics; e.g. as a loss or as a gain. People tend to avoid risk when a positive frame is presented but seek risks when a negative frame is presented. (Tversky & Kahneman, 1981). And it is especially easily to be confused when it comes to making health-related choices, we suggest providing elderly learners with real life situation/story to clarify and interpret the underlying gist message to avoid possible false memory and judgement made by elderly learners in the future.

Prior studies that have noted the importance of situational cues in helping reduce false memory (Henke, 2008), and also according constructivism, it is quite helpful if the formation of the gist message could be showed in the video. (e.g. showing the process of how a system is formed, showing how Parkinson s disease makes people can t smile properly)

It has also been proved that older adults typically benefit from

schematic support, there may be differential patterns of support for item and associative information (cf. Mohanty et al., 2016). Older adults may also remember the first instance that a price is presented, but have difficulty encoding later similar prices of similar items or bids, due to the build-up of proactive interference (cf. Lustig, May, & Hasher, 2001). In this type of situation, older adults may struggle more to weigh their options and choose the “better buy”, but may succeed if the options are presented simultaneously, or organized in a way that facilitates sequential comparison.

Also, designers should display the visuals slightly after the narrations and pause at least 5 seconds for gist messages on screen (turn down the background music during that time if necessary). Using colors to mark different gist information to differentiate information by appropriately

As the previous experiment has found that it is necessary to hold information in working memory for a substantial period, at least until the presentation of the other comparable item. Also, as compared to younger adults, older adults’ memory appears to benefit only when information are presented in a manner that facilitates direct comparison. In the present study, we found that there are some situations in which older adults’ reliance on gist memory is not detrimental to performance. When similar information is presented in close temporal proximity, it is easier to remember the differences between items (Cynthia C., et al., 2015).

According to Reyna & Brain (1995) s finding of the overall non-monotonicity of recall order: output tends to begin with verbatim-based recall, proceeding in a harder – – -> easier direction, and that output eventually switches to gist-based recall, proceeding in an easier – – -> harder direction, for those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.

Some researchers believe that the stronger the emotional

connection of decision information, the stronger the relative influence of the semantic coding compared with the verbatim coding (Levine, 2012), and the belief system driven by miscalibrated emotions can lead individuals to perceive behavior choices. Thus, a real-life related settings of the background could play a role in bring a positive emotional impact on their coding process.

People decide on options based on if the options are presented with positive or negative semantics; e.g. as a loss or as a gain. People tend to avoid risk when a positive frame is presented but seek risks when a negative frame is presented. (Tversky & Kahneman, 1981). However, people's preferences violations are observed when real money, and even actual life and death decisions, are involved (McNeil, Pauker, Sox, & Tversky 1982; Tversky & Kahneman 1981, 1986). Thus, emphasizing

Due to elderly learner's low processing rate and declining attention orientation (Salthouse, 1996), put one piece of gist information on the screen in one single scene.

As mentioned in the literature review, output interference (proactive interference) in fuzzy-trace theory leading to the inefficient cognitive system (Brainerd & Reyna 1989; Cooney & Troyer in press; Reyna & Brainerd 1989; Brainerd & Reyna 1993b; Reyna in press), animation effect should be designed as simple and less as possible to avoid output interference.

It is preferable to break large segments of instruction into smaller, more manageable ones. This will help to avoid overwhelming the processing capacity of the learner (Hong, W., Lim, C., & Park, T., 2013). As it is usually recommend to segment the video into 5 to 10 minutes, it is more appropriate for gist-based tutorial videos to last from 2 to 5 minutes as adjustment according to the cognitive characteristics of elderly learners.

“ Storytelling in organizations is a powerful tool for communicating complex ideas and persuading people to change ”

according to Brown et al. (2005). In the context of elderly learning, storytelling is also definitely an adoptable approach to convey the key ideas and help elderly learners to form better gist memory. Stories of real experience on the learning content are encouraged to collect before the script production.

To promote engagement and decline the complexity of the learning, daily vocabularies and common sentence patterns should be more frequently used, especially for the narrations going on explicating the instructions.

Other than that, if the most of the target learners of the videos are widely using dialect in certain area, it is even recommended to have the narration spoken in the dialect to enable viewers to focus more easily.

Table IV–10. Gist–based Design Strategies of Tutorial Video for Elderly Learners Health–Care

Strategy 1. Clarify gist messages for better understanding			
Jobs Included	Guidelines	Period of Production	Additional Explanation
Narration Script–Writing	1–1. Provide accurate gist when presenting verbatim messages.	Pre–Production	<p>Verbatim representations are precise and quantitative, and capture the surface (or literal) form of information.</p> <p>Gist representations are vague, qualitative concepts that capture the ‘bottom–line’ meaning of information.</p>
	1–2. Interpret numerical information by comparing and		E.g. when you are over 65 years old, the

contrasting with other data to help
create gist memory

possibility of you
having Parkinson`s
disease has increased
by 70% than 5years
ago, which means the
risk of having
Parkinson s disease is
much higher as you
are turning over 65
years old

1-3. Explain the reason of the
gist messages.

E.g. Explain that it is
the significant
decrease of the
amount of dopamine
hinders the brain`s
command ability to
the muscles, leading
to Parkinson`s
disease instead of
only provide the gist
which is dopamine
causes the disease

Strategy 2. Deliver gist messages clearly in an engaging way.

Jobs Included	Guidelines	Period of Production	Additional Explanation
Narration Script–Writing & Recording	2–1. Use several short sentences to specify one gist messages.	Pre–Production	
	2–2. Use daily vocabulary and sentence patterns to deliver gist messages.		
	2–3. Use heuristic way of storytelling to provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors own probability judgments many of which are not objective enough		

2-4. Presentation rate should be relatively slow.
(175 Chinese characters per minute for reference)

Strategy 3. Present information properly to facilitate formation of learners gist memory

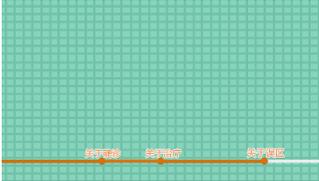
Jobs Included	Guidelines	Period of Production	Additional Explanation
Narration Script–Writing & Visuals Design	3-1. Present information in a manner that facilitates direct comparison		
Visuals Design	3-2. Add sound effect or visualize the feelings to connect the tactual sensation with visions and hearings.	Production	E.g. visualize the hurt as red and add sound effect like “Ow!”
	3-3 Present information following the ideal visual flow, and put gist message at center of the		Ideal visual flow: eyes moves easily from the top left to

upper 1/3 of the screen

the bottom right

Strategy 4. Emphasize gist messages for elderly learners

Jobs Included	Guidelines	Period of Production	Additional Explanation
Visuals Design & Use of Sound Effect	4-1. Highlight the gist message by adding special effect (animation effect or sound effect) and using warm color with high degree of saturation.		
Visuals Design & Animation Design	4-2. Show the visuals slightly after the narrations and pause at least 3 seconds for digestion (turn down the background music during that time if necessary).	Production	Animated example
Visuals Design (Size, Color, Position, Choice on the visuals)	4-3. Present text-based gist messages on the background of the same visuals that have been just used		

Animation Design	4-4. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.	Animated example
Visuals Design	4-5. Provide a “gist timeline” to show where and when the key gist is formed for learner s longer exposure to information.	

Strategy 5. Add emotional impact on gist for elderly learners.

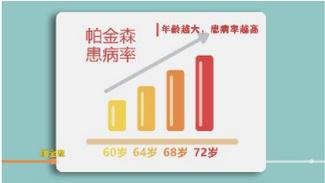
Jobs Included	Guidelines	Period of Production	Additional Explanation
Narration Script-Writing	5-1. Emphasize elderly learners real gains to create their priority processing of the information	Pre-Production	E.g. “Through well management and treat, well controlled Parkinson s disease could actually do no harm to your

5-2. Use metaphor that could be visualized to facilitate understanding

lifespan,:

E.g. Explaining that brain sends instructions to the muscles through dopamine in the brain's nerves by comparing brain to a commander, muscles to an army, and dopamine to a carrier pigeon that sends commands,



Visuals Design	5-3. Provide an emotional impact to elderly learners with a real-life related environment or situations		
Visuals Design	5-4. Visualize gist messages especially the potential risk to provide a deeper impression	Production	

Strategy 6. Minimize output interference.

Jobs Included	Guidelines	Period of Production	Additional Explanation
Narration Script-Writing	<p>6-1. Segment the tutorial videos into more than 2 minutes but less than 5 minutes video clips.</p> <p>6-2. For those gist information that is hard to be confused should be reviewed first to avoid later</p>	Pre-Production	

interference to the information
that is hard to understand.

Visuals Design
(Size, Color, Position,
Choice on the visuals)

6-3. One piece of gist information
a screen

Production



Animation Design

6-4. Keep animation effect
simple and do not provide
unnecessary detailed motions or
visuals

4. Elderly Learners' Response to the Prototype

First of all, ten quizzes on the content of the prototype video were given to ten elderly learners to see how accurate and clear did they recall the gist messages presented in the video.

The mean of accuracy of elderly learner's memory on the gist messages is 9.74 of 10.

Table IV–11. Descriptive Statistics Analysis on Accuracy of Elderly Learners' Memory and Understanding Level of the Video

Category	Number of Questions	Mean	SD
Accuracy of memory	10	9.74	.62

The questionnaire used for investigating the elderly learners' response to the health-care related tutorial videos is made up of 4 situational interest questions. Ten elderly learner were required to respond to the 5-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Undecided, 4: Agree, 5: Strongly Agree) according to the degree of agreement with each item. The analysis results on the learners' response to the questionnaire are shown in the table below.

Table IV–12. Descriptive Statistics Analysis on Elderly Learners' Oral Survey

Category	Number of Questions	Mean	SD
Situational Interest	4	4.36	.72
Satisfaction	10	4.82	.54

The participants appeared to be interested and concentrated in watching the videos ($M = 4.36$, $SD = .72$), and it was recognized that the elderly learners had relatively high satisfaction level for the quality of the tutorial videos when compared to those original tutorial

videos in the market ($M = 4.82$, $SD = .54$). It can be seen that except situational interest, the mean of satisfaction and the accuracy of learners' memory level are all high because of the subject itself (Parkinson's disease) contains quite an amount of essential and complicated information to understand and memorize.

Table IV–13. The Elderly Learners Response on Their Satisfaction on the tutorial video prototype

Item	Mean	SD
1. I am overall much satisfied with the gist–based tutorial video than the control video.	5.00	.00
2. I was able to recognized the key points very easily	4.82	.23
3. Key points in the gist–based tutorial videos are much clearer than me than the control video.	5.00	.62
4. The gist messages are delivered much less complicated than the control video.	4.93	.54
5. The gist–based tutorial videos largely helped my memorizing on the gist messages.	4.92	.42
6. The screen was designed very comfortable to view when compared to the control video.	4.73	1.1
7. Font and font size is easy for me read than the control video.	4.66	0.83
8. The videos transit very naturally and I was given enough time to absorb the knowledge on the screen when compared to the control video.	4.81	0.82
9. The colors were chosen very appropriately and comfortable.	4.76	1.12
10. The length of the videos are okay to me	4.58	1.24

According to the data showed in Table IV–12, we can tell

that all 10 participants were overall quite satisfied with the prototype videos, especially with regard to the clearness and easiness of how content were delivered and how the video were designed to help their memorizing. On the other hand, the result also shows that improvements should be made on enlarging the font size and shortening the length of the video. What worth mentioning here is that the opinion on shortening the length of the videos may be caused by that two around-4-minute videos were presented to the elderly learners at once for the limited experiment time.

Despite the similar high accuracy rate of their memories on the learning content, there was a slight difference of situational interest between the two groups in that participants from the community college for senior citizens seemed to have higher situational interest score to the tutorial videos than participants from the local senior center. And it could be also viewed as a positive evidence from this result that although elderly people`s with more learning experience may have higher motivation and interest to learn by watching tutorial videos, gist-based tutorial videos designed by the strategies developed in this research are overall effective regardless to learner`s differences in learning experience.

CHAPTER V. DISCUSSION AND CONCLUSION

1. Discussion

The purpose of this study was to develop a series of tutorial video design strategies for elderly learners to understand and memorize gist messages of the content clearly and easily despite their declining attention orientation and maintenance, low processing rate, eye sight loss and other physical and cognitive changes. For this, the strategies used the fuzzy-trace theory as the “camera lens” while adding a “filter” of characteristics of elderly learners to look carefully at the instructional multimedia design principles, especially for the tutorial video.

1.1. Significance of the Gist-based Video Design Strategies for Elderly Learners Health-Care

This study has significance due to the following. First of all, all three aspects of fuzzy-trace theory, characteristics of elderly learner, instructional video design strategies and guidelines have been reviewed separately and then synthesized in the design strategies. Fuzzy-trace theory that draws upon dual-trace conceptions were delved into to predict and explain cognitive phenomena, particularly in memory and reasoning. In order to help elderly learners have better memory on the health-care related learning content which includes critical medical decision making probability judgments and complex information, it is essential to summarize the cognitive phenomena or preference that could possibly reduce elderly learners false memory, strengthen their memorizing on the key information and have better risk perception and estimation. And Cognitive phenomena were used as “a camera lens”. Characteristics of elderly learners, including their

disadvantages and preferences when it comes to learning was summarized. For example, elderly learners whose processing rate is relatively much lower than younger adult also appear to be more reliable on gist memory to judge things than younger adult, their attention orientation and maintenance declines significantly while pronounced imagination inflates. Thus, additional and specialized facilitation such as situational cues and color choices is quite helpful for examples. The characteristics were added to the “camera lens” as a “lens filter” so that instructional video design strategies and guidelines could be “shoot” from elderly learners’ perspectives.

In addition, this strategy does not use the usual method of categorizing strategies according to the production stage in general video design strategies, but instead uses the designer's gradually deepening of the gist message as this gist-based video design strategies (Provide→ Deliver→ Present→ Emphasize→ Add emotional impact→ Minimize Output Interference). At the same time, concurrent processing and nonlinear design are used, emphasizing that each stage (Pre-Production, Production, Post-Production), and each division of labor (Script-Writing, Visual Design, Animation Design, Special Effects) should consider the gist information. Extraction, design and display.

Moreover, this Gist-based Video Design Strategies for Elderly Learners Health-Care is not limited to extracting and arranging gist messages for elderly learner’s better understanding and higher memory level from the perspective of Fuzzy-Trace Theory in cognitive psychology, but integrates other elderly Physical and psychological characteristics, that is, the problems they may encounter in learning are different from other young adult learners and their learning preferences, and contains the core design strategies that most affect memory effects in general instructional video design strategies, such as picture layout, visual flow, emphasis and contrast, visual identities. Ensures validation of the entire Gist-

based Video Design Strategies for Elderly Learners Health–Care in all aspects.

In addition to the above advantages, this strategy extends the previous research on gist–based design to the field of graphic design for younger adults (Cho, 2018; Flores, et al., 2017). Provides a practical design strategy for the elderly in the era of digital learning (learning via microvideo) through the widespread use of mobile devices. At the same time, this strategy also includes a basic static picture strategy, which has a wide range of practical applications, including posters, brochures, TV shows, short videos, card news, etc.

1.2. Effectiveness of the Gist–based Video Design Strategies for Elderly Learners Health–Care

By showing 10 elderly people a prototype video designed according to Gist–based Video Design Strategies for Elderly Learners Health–Care, as well as existing TV shows on the same topic and other videos on the Internet, and testing their video Memory levels of key information that appeared ($M = 4.74$, $SD = .62$), and they appeared to be interested and concentrated in watching the videos ($M = 4.36$, $SD = .72$). This also proves that this strategy can effectively provide key guidance in designing health–related videos for the elderly.

But it is worth noting that compared with elderly learners (5 seniors from the community senior center), who have less interest and learning experience, elderly learners (5 seniors from the community college for senior citizens) can show more in–depth understanding of the video and will generate more interest in deep learning after learning.

1.3. Improvements on the Gist-based Video Design Strategies for Elderly Learners Health-Care

Presently, there is a lack of a more specific classification of health-care related information, such as exercise steps, pathological reasons, descriptions, and emotional resonance. Therefore, the researcher also hopes to cooperate with experts in elderly care-related for future in-depth categorizing.

In addition, more study could be done on strategies that focus on improving elderly learners understanding and memorizing on gist messages through interaction with the content. For example, designing quizzes that are embedded into the video (interactive video) to strengthen elderly learner's memories could be added into the strategies.

2. Conclusion and Recommendation

2.1. Summary and Conclusion

This research works on tutorial video strategies that focus on how gist information is designed and presented for elderly people's learning on health-care. And perceptions of elderly learners on the gist-based tutorial video (text, visuals, numbers, etc.) are analyzed based on the prototype developed based on the strategies.

Through two rounds of expert review conducted by three experts in educational technology and one expert in cognitive psychology, the final strategies (see Table IV-13) were verified internal validated for the content. Also, by working closely with the video designers and asking for their evaluation during the prototype development process, opinions on the usability of the strategies were collected and condensed to improve the final strategies in the aspects of working flow and job distribution for video production.

Lastly, the elderly learners showed a high accuracy rate on

memorizing the gist messages in the video as well as high situational interest and focus during their watching the videos. Meanwhile, the elderly learner all expressed their knowledge and attitude changes on the ignorance of the disease by watching the videos.

Thus, this research has developed a series of meaningful strategies on gist-based tutorial video design for elderly learners' health-care that could finally help promote a healthier and happier life of elderly people in the increasing aging society in this research.

2.2. Limitations

In terms of the verification of the learning effect of the strategy in the elderly learner of this research, although a prototype video was produced and displayed to 10 seniors from different sources (community college for senior citizens and community senior center), one of the major drawbacks of this experiment is that Due to the small sample size, the memory test of the actual elderly learners was tested only by simple yes / no questions, and no experimental control group was established. Compare the difference between the learning videos designed by gist-based tutorial video design strategies and the learning videos designed without gist-based tutorial video design strategies. Therefore, based on the above, the effect of this study on comprehensively verifying the memory level of the elderly has certain limitations.

Also this research focuses on the characteristics of health-care knowledge in this gist-based tutorial video design strategies. At present, it only considers that it contains more verbatim information, and there is more decision-making process, which makes it easy for learners to make mistakes and In terms of the frame effect, there is a lack of a more specific classification of health-care related information, such as exercise steps, pathological reasons, descriptions, and emotional resonance. Therefore, the researcher

also hopes to cooperate with experts in elderly care-related for future in-depth categorizing.

2.3. Recommendation

For Gist-based Tutorial Video Developers:

1) About the Extraction of “Gist”

Although this article does not provide specific operation methods for the extraction of gist information, it only hints at the definition of gist representation in fuzzy-trace theory, that is, gist representations are vague, qualitative concepts that capture the 'bottom-line This requires video producers to build on the original learning materials in the early stages of production (may require the learners to have prior knowledge of relevant backgrounds or basic knowledge, or the language is jerky) based on personal understanding of Gist Adapt the script. Although it has been mentioned in the limitation section of this research before, this research lacks certain standards in the process of extracting gist information, but here the researcher recommends that in the process of extracting gist information, it should be performed with SMEs with professional knowledge. Cooperation and listening to experts to verify the accuracy and refinement of the extracted gist can ensure the accuracy of Gist information extraction, and lay the foundation for the visual and animation design of future Gist-based tutorial video design.

2) Collaboration between video producers and script designers

Considering the current market characteristics of digital learning content production on e-learning or other platforms, when

applying this strategy to actually make gist-based tutorial video, it will no longer be involved with the video producers in this research. All the work in the early, production and later stages of the video is done in stages and division of labor, especially in video production agencies with a certain industrial scale. Therefore, this researcher strongly recommends continuous collaboration and communication between video producers and script designers during the production of gist-based tutorial video. And if there are many production modes that are jointly participated by video producers, it is even more necessary for all personnel involved in the production to make regular and multiple feedbacks to ensure that the expression of Gist information and the understanding of video producers during script design are not inconsistent. At the same time, the script designer also needs to in turn check whether the text, visual performance and animation effects are accurate, and effectively send relevant gist messages to the elderly learners.

According to the video designers who have worked in the industry for 5 to 8 years, during the production of instructional videos, especially for animated learning videos that need to largely rely on visual and narration to convey information, due to one-way and one-time communication between video producers and script designers, inaccurate or inefficient information transmission are very common. In order to solve this problem, this strategy does not specifically design this gist-based tutorial video design strategy in the order of the production process or according to the division of labor. Instead, it is written according to the level of gist information processing during self-study video production. Under the framework of the strategy, specific and operable guidelines are given, and the work elements involved and the production stages are labeled, which is convenient for reference and use by relevant people in video production.

Gist-based Tutorial Video Application in Older Adult Education

At the beginning of this research, the researcher identified the current growing demand for digital learning content by the elderly and the high popularity of personal smart devices among urban elderly in China today, the feasibility of the tutorial video dissemination. Researchers have not communicated with older learners and produced questionnaires to understand the deeper needs analysis of older people for such health-related self-study videos. Therefore, this study has imperfections in the needs analysis stage.

In fact, in the later interviews between community senior colleges and actual senior learners, the researcher found that a large proportion of senior learners who have learning needs or have a high motivation for learning are more mobile than those who are more personal. The device watches the video statically on its own and prefers to go out of the house and come to a place where there are other elderly learners, such as community colleges to learn health knowledge by listening to live teacher lectures. The main reasons are as follows:

- 1) High confidence in traditional classrooms and authoritative teaching.

Although the beautifully designed learning videos are very attractive to learners, they also lack the role and influence of the image of the lecturer. A considerable number of elderly learners still indicated that they acquired knowledge through face-to-face classroom instruction with authoritative experts, especially in terms of health and well-being, or they had a more trusting sense of learning than the traditional elderly learners.

2) The opportunity to exchange questions with the teacher.

Many elderly people often start to develop related health knowledge after they start to have related initial symptoms or witness the experience of people around them. Therefore, many elderly people have many health-related problems that arise. Answer. Participating in health courses similar to those organized by senior universities or off-line face-to-face health knowledge lectures organized by governments or institutions, and directly asking experts are also reasons why they are temporarily not interested in fully autonomous health video learning.

3) Communication opportunities with other older learners.

It is worth mentioning that, in addition to the traditional effect of the interaction between learners on the learning effect, for lonely elderly people who retire at home, often even at home alone, come to the senior university classroom and learn from other elderly people. The exchange of content, and the extended exchanges of various life experiences, surrounding people, and experience, can not only help them deepen their understanding and application of the knowledge they have learned, but also give them a shared idea to ease loneliness and stress. The platform, so this is another big reason for their favorite traditional classroom learning.

Therefore, based on the above reasons, researchers recommend using this gist-based tutorial design strategies to develop learning videos for older learners. In addition to general online education or self-regulated learning for older people, it is recommended for older people. A university or other forms of off-line learning environment, such as pre- or post-school review of related health courses. Besides, the form of communication can also

be broadcast in the classroom or spread in learning groups through social software familiar to the elderly, such as WeChat (a widely used social application in China) which is convenient for the elderly to learn and exchange and share on the personal mobile device anytime, anywhere.

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APPENDIXES

- [Appendix 1] the 1st Round Expert Review Questionnaire for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care
- [Appendix 2] the 2nd Round Expert Review Questionnaire for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care
- [Appendix 3] Usability Test for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care (For Video Designer)
- [Appendix 4] Questionnaire for Gist-based Tutorial Health-care Video Prototype (For Elderly Learner)

[Appendix 1]

Expert Review Questionnaire for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care

Hello, I am ZHUO XIAOJING and a master's student in Educational Technology, Seoul National University. I am conducting a research on providing Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care. For this purpose, I have already developed the strategies with detailed strategies and this questionnaire is designed to for you to examine the internal validation of Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care. Your personal information will be kept confidential. I sincerely appreciate you for giving your precious time and effort for this study.

ZHUO XIAOJING
010-3518-0295
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Seoul National University Education Department 2018-26505

Profile of Research Participant

- Full Name:
- Academic Background:
- Major:
- Affiliation and position:
- Related Experience:

1. Research Background

As the "third period of human life (after retirement)" is prominently lengthening (Rowland, DT, 2009), the opportunity for older people to acquire new skills can be gained in many ways by age. It can reduce the degree of disadvantage.

The importance of this flexible delivery method, which integrates technology and pedagogy well and creates significant added value to this target group, is not yet fully highlighted. However, depending on their physical and mental state, older people have the most opportunities for learning about skills–building to address a wide variety of needs (Sonia Hetzner & Paul Held, 2007).

2. Significance of the Research

Among the various forms of online tutorials, video tutorials have been widely used in the aged care industry, most of which target carers or caregiver trainers. However, since user devices such as laptops, tablets, and mobile phones are easily operated for the elderly to access more easily, online video viewing is not so complicated for the elderly. According to the study, despite the growing needs of older adults for video tutorials on self–healing management, the quality of existing learning materials is still lacking. Many older learners have argued that medical–related learning is very difficult to understand because of the medical terminology and complex pathogens (on–screen visual or voice over) described in the video. Gatti et al. (2017) pointed out three aspects of learning disabilities experienced by older people: perceptual and motor decline, cognition, and psychosocial sensations. In particular, there is difficulty in converting numbers (and other health–related information) into meaningful representations or points, and the complexity inherent in the concept of processing rates such as probability, reliably searching and

implementing their values and knowledge, among other factors (Fishbein M, 2008). The meaning of health-related information is seldom self-explanatory, and even health professionals have difficulty searching knowledge and nested or nested classes related to probability judgment. Therefore, it is time for us to look for standardized video tutorial design principles to better understand the knowledge and skills that older learners are more likely to adopt in their daily lives.

Research Purpose & Research Questions

This study works on tutorial video strategies that focus on how gist information is designed and presented for elderly people's learning on health-care. And perceptions of elderly learners on the gist-based tutorial video (text, visuals, numbers, etc.) are analyzed based on the prototype made based on the strategies. The study is based upon the following research questions:

1. What are the gist-based design strategies of tutorial video for elderly learners' health-care?
2. Are the design strategies of gist-based tutorial video internally valid?
3. How do elderly learners perceive the prototype of gist-based tutorial video?

2. Please check put 1: Strong Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree

Expert Evaluation on the Gist-based Tutorial Video Strategies on Health-Care for Elderly Learners.	Item				
	Validity	Usefulness	Universality	Explanatory Power	Ease of Understanding
1. Clarify gist messages					
1-1. Presentation rate should be relatively slow.					
1-2. Use several short sentences to specify one gist messages.					
1-3. Provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors own probability					

judgments many of which are not objective enough (the framing effect).					
2. Help the formation of learners gist memory					
2-1. Present the formation process of the gist messages					
2-2. Show the text-based gist representations with reminding of the former information just taught. One approach could be a background image of the former scene.					
2-3. Transit different scenes					

slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.					
3. Emphasize gist messages to gain learner s enough attention.					
3-1. Show gist messages at the beginning and the end. Or always on-display on the left side.					
3-2. Use animation effect to highlight the key point.					

<p>3-3. Visualize the feelings to connect the tactual sensation with visions.</p>					
<p>3-4. Show the visuals slightly after the narrations and pause at least 5 seconds for gist messages on screen (turn down the background music during that time if necessary).</p>					
<p>3-5. Differentiate information by appropriately using colors to mark different gist information.</p>					

<p>4. Provide appropriate gist when presenting verbatim messages. (fuzzy trace preference)</p>					
<p>4-1. Present information in a manner that facilitates direct comparison</p>					
<p>4-2. Present similar information in close temporal proximity</p>					
<p>4-3. Interpret numerical information by comparing and contrasting with other data to create gist memory (e.g. risks).</p>					
<p>4-4. According to the optimization</p>					

model, for those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.					
4-1. Present information in a manner that facilitates direct comparison					
5. Add emotional impact on gist for elderly learners.					
5-1. Provide an emotional impact to elderly learners with a real-life related					

environment or situations (Levine, 2012)					
5-2. Use visuals to remind elderly learner to avoid risky choice frame effect					
5-3. Emphasize elderly learners real gain to create their priority processing of the information					
6. Minimize output interference when presenting gist messages.					
6-1. One piece of gist information a time					
6-2. Keep animation effect simple and do not					

provide unnecessary detailed motions or graphics					
6-3. Segment the tutorial videos into more than 2 minutes but less than 5 minutes video clips.					
7. Provide gist messages in an engaging way.					
7-1. Use storytelling to form better gist memory.					
7-2. Use daily vocabulary and sentence patterns to deliver gist messages.					

3. Opinions on Gist-based Tutorial Video Design Strategies for Senior Learners' Health-care

3.1 What do you think are the strengths of the strategies?

3.2 What do you think are the weaknesses of the strategies?

3.3 What do you think should be improved for the strategies?

3.4 Other opinions or feelings to add?

[Appendix 2]

Expert Review Questionnaire for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care (2nd Round)

Hello, I am ZHUO XIAOJING and a master's student in Educational Technology, Seoul National University. I am conducting a research on providing Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care. For this purpose, I have already developed the strategies with detailed strategies and this questionnaire is designed to for you to re-examine the internal validation of Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care. Your personal information will be kept confidential. I sincerely appreciate you for giving your precious time and effort for this study.

ZHUO XIAOJING
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Seoul National University Education Department 2018-26505

Profile of Research Participant

- Full Name:
- Academic Background:
- Major:
- Affiliation and position:
- Related Experience:

1. Research Background

As the "third period of human life (after retirement)" is prominently lengthening (Rowland, DT, 2009), the opportunity for older people to acquire new skills can be gained in many ways by age. It can reduce the degree of disadvantage.

The importance of this flexible delivery method, which integrates technology and pedagogy well and creates significant added value to this target group, is not yet fully highlighted. However, depending on their physical and mental state, older people have the most opportunities for learning about skills–building to address a wide variety of needs (Sonia Hetzner & Paul Held, 2007).

2. Significance of the Research

Among the various forms of online tutorials, video tutorials have been widely used in the aged care industry, most of which target carers or caregiver trainers. However, since user devices such as laptops, tablets, and mobile phones are easily operated for the elderly to access more easily, online video viewing is not so complicated for the elderly. According to the study, despite the growing needs of older adults for video tutorials on self–healing management, the quality of existing learning materials is still lacking. Many older learners have argued that medical–related learning is very difficult to understand because of the medical terminology and complex pathogens (on–screen visual or voice over) described in the video. Gatti et al. (2017) pointed out three aspects of learning disabilities experienced by older people: perceptual and motor decline, cognition, and psychosocial sensations. In particular, there is difficulty in converting numbers (and other health–related information) into meaningful representations or points, and the complexity inherent in the concept of processing rates such as probability, reliably searching and

implementing their values and knowledge, among other factors (Fishbein M, 2008). The meaning of health-related information is seldom self-explanatory, and even health professionals have difficulty searching knowledge and nested or nested classes related to probability judgment. Therefore, it is time for us to look for standardized video tutorial design principles to better understand the knowledge and skills that older learners are more likely to adopt in their daily lives.

Research Purpose & Research Questions

This study works on tutorial video strategies that focus on how gist information is designed and presented for elderly people's learning on health-care. And perceptions of elderly learners on the gist-based tutorial video (text, visuals, numbers, etc.) are analyzed based on the prototype made based on the strategies. The study is based upon the following research questions:

1. What are the gist-based design strategies of tutorial video for elderly learners' health-care?
2. Are the design strategies of gist-based tutorial video internally valid?
3. How do elderly learners perceive the prototype of gist-based tutorial video?

2. Please check put 1: Strong Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree

Expert Evaluation on the Gist-based Tutorial Video Strategies on Health-Care for Elderly Learners.	Item				
	Validity	Usefulness	Universality	Explanatory Power	Ease of Understanding
Strategy1. Provide appropriate gist for better understanding					
1-1. Provide accurate gist when presenting verbatim messages.					
1-2. Interpret numerical information by comparing and contrasting with other data to help create gist memory					
1-3. Explain the formation of gist messages.					
Strategy2. Deliver gist messages clearly in an engaging way.					

2-1. Use several short sentences to specify one gist messages.					
2-2. Use daily vocabulary and sentence patterns to deliver gist messages.					
2-3. Use heuristic way of storytelling to provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors own probability judgments many of which are not objective enough					
2-4. Presentation rate should be relatively slow. (175 Chinese characters per minute for reference)					

Strategy3. Present information properly to facilitate formation of learners gist memory					
3-1. Present information in a manner that facilitates direct comparison					
3-2. Visualize the feelings to connect the tactual sensation with visions.					
3-3 Present information following the ideal visual flow, and put gist message at center of the upper 1/3 of the screen					
Strategy4. Emphasize gist messages for elderly learners					
4-1. Highlight the gist message by					

<p>adding special effect and using warm color with high degree of saturation.</p>					
<p>4-2. Show the visuals slightly after the narrations and pause at least 3 seconds for digestion (turn down the background music during that time if necessary).</p>					
<p>4-3. Present text-based gist messages on the background of the same visuals that have been just used</p>					
<p>4-4. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition</p>					

animation should be avoided.					
4-5. Provide a “ gist timeline ” to show where and when the key gist is formed for learner s longer exposure to information.					
Strategy5. Add emotional impact on gist for elderly learners.					
5-1. Emphasize elderly learners real gains to create their priority processing of the information					
5-2. Provide an emotional impact to elderly learners with a real-life related environment or situations					

5-3. Use visuals to remind elderly learner to avoid risky choice frame effect					
Strategy6. Minimize output interference.					
6-1. Segment the tutorial videos into more than 2 minutes but less than 5 minutes video clips.					
6-2. For those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.					
6-3. One piece of gist information a screen					
6-4. Keep animation effect simple					

and do not provide unnecessary detailed motions or graphics					
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3. Opinions on Gist-based Tutorial Video Design Strategies for Senior Learners' Health-care

3.1 What do you think are the strengths of the strategies?

3.2 What do you think are the weaknesses of the strategies?

3.3 What do you think should be improved for the strategies?

3.4 Other opinions or feelings to add?

[Appendix 3]

Usability Test for Gist-based Tutorial Video Design Strategies for Elderly Learners' Health-care (Video Designer)

1. Please check put 1: Strong Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree

Expert Evaluation on the Gist-based Tutorial Video Strategies on Health-Care for Elderly Learners.	Item					
	Overall recognition	Effectiveness	Ease of application	Satisfaction	Generalization	Willingness of adoption
Strategy1. Provide appropriate gist for better understanding						
1-1. Provide accurate gist when presenting verbatim messages.						
1-2. Interpret numerical information by comparing and contrasting with other data to help create gist memory						
1-3. Explain the formation of gist messages.						

Strategy2. Deliver gist messages clearly in an engaging way.						
2-1. Use several short sentences to specify one gist messages.						
2-2. Use daily vocabulary and sentence patterns to deliver gist messages.						
2-3. Use heuristic way of storytelling to provide real life situation/story to clarify/interpret the gist messages in different ways to avoid seniors own probability judgments many of which are not objective enough						
2-4. Presentation rate should be relatively slow. (175 Chinese characters per minute for reference)						
Strategy3. Present information properly to facilitate formation of learners gist memory						

3-1. Present information in a manner that facilitates direct comparison						
3-2. Visualize the feelings to connect the tactual sensation with visions.						
3-3 Present information following the ideal visual flow, and put gist message at center of the upper 1/3 of the screen						
Strategy4. Emphasize gist messages for elderly learners						
4-1. Highlight the gist message by adding special effect and using warm color with high degree of saturation.						
4-2. Show the visuals slightly after the narrations and pause at least 3 seconds for digestion (turn down the background music during that time if necessary).						

4-3. Present text-based gist messages on the background of the same visuals that have been just used						
4-4. Transit different scenes slowly (at least 3 seconds) to provide enable individual construction of knowledge. Fast and fantastic transition animation should be avoided.						
4-5. Provide a “ gist timeline” to show where and when the key gist is formed for learner s longer exposure to information.						
Strategy5. Add emotional impact on gist for elderly learners.						
5-1. Emphasize elderly learners real gains to create their priority processing of the information						

5-2. Provide an emotional impact to elderly learners with a real-life related environment or situations						
5-3. Use visuals to remind elderly learner to avoid risky choice frame effect						
Strategy6. Minimize output interference.						
6-1. Segment the tutorial videos into more than 2 minutes but less than 5 minutes video clips.						
6-2. For those gist information that is hard to be confused should be reviewed first to avoid later interference to the information that is hard to understand.						
6-3. One piece of gist information a screen						
6-4. Keep animation effect simple and do not provide						

unnecessary detailed motions or graphics						
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2. Opinions on Gist-based Tutorial Video Design Strategies for Senior Learners' Health-care

2.1 What do you think are the strengths of the strategies?

2.2 What do you think are the weaknesses of the strategies?

2.3 What do you think should be improved for the strategies?

2.4 Other opinions or feelings to add?

[Appendix 4]

Questionnaire for Gist-based Tutorial Video Prototype (Elderly Learner)

*This survey were conducted verbally to the elderly learners

1. Please check True or False on the following sentences

Memory Level Test on the Gist-based Tutorial Video Prototype	Choice	
	True	False
1. What causes Parkinson?		
2. Is it easier to have Parkinson`s disease as people get older?		
3. What are the typical symptoms of Parkinson's?		
4. Does trembling hands totally represent Parkinson?		
5. Is neurotherapy a Parkinson's treatment?		
6. Do all Parkinson's patients have trembling hands?		
7. Do Parkinson`s patient tremble after falling in asleep at night?		
8. Can I keep using chemicals such as pesticide when I get Parkinson?		
9. What fruit is suitable for Parkinson's patients?		
10. Is it possible to cure Parkinson`s disease by early detection and treatment?		

2. Please check 1: Strong Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree

Satisfaction on the Gist-based Tutorial Video Prototype	Score			
	1	2	3	4
1. I am overall much satisfied with the gist-based tutorial video than the control video.				
2. I was able to recognized the key points very easily				
3. Key points in the gist-based tutorial videos are much clearer than me than the control video.				
4. The gist messages are delivered much less complicated than the control video.				
5. The gist-based tutorial videos largely helped my memorizing on the gist messages.				
6. The screen was designed very comfortable to view when compared to the control video.				
7. Font and font size is easy for me read than the control video.				
8. The videos transit very naturally and I was given enough time to absorb the knowledge on the screen when compared to the control video.				

9. The colors were chosen very appropriately and comfortable.				
10. The length of the videos are okay to me				

3. Opinions on Gist-based Tutorial Video Prototype

3.1 What do you think are the strengths of the video?

3.2 What do you think are the weaknesses of the video?

3.2 What do you think should be improved for the videos?

3.3 Other opinions or feelings to add?

국문초록

다양한 형태의 튜토리얼 중 비디오 튜토리얼은 노인 요양산업에서 널리 사용되어 왔으며, 대부분은 간병인이나 간병인 트레이너를 대상으로 한다. 그러나, 노트북, 태블릿, 휴대폰 등 사용자 기기들이 노인들에게 더 접근하기 쉽고 편리해짐에 따라, 온라인 비디오 시청도 노인들에게는 더 이상 그렇게 복잡하지 않다. 건강관리에 관한 비디오 튜토리얼에 대한 노인들의 요구가 증가하고 있음에도 불구하고, 기존 학습 자료의 질은 여전히 충분히 높지 않다고 이 연구는 밝혔다.

많은 노인 학습자들은 의학 용어와 비디오에서 설명된 복잡한 병리 생성 때문에 의학 관련 학습 내용이 너무 어려워서 이해할 수 없다고 주장했다(화면 영상이나 음성 인식). 가티 외 연구진(2017년)은 노인들에 의해 경험되는 학습 난이도의 세 가지 관점을 지적했다. 지각력 및 운동능력 저하, 인지능력, 정신사회감각이다. 특히 숫자(및 기타 건강 관련 정보)를 의미 있는 표현이나 요점으로 번역하는 데 어려움이 있으며, 그 가치와 지식을 신뢰성 있게 검색하고 구현하며, 다른 요인 중에서도 확률과 같은 처리 비율 개념과 관련된 내재적 복잡성을 가지고 있다(Fishbein M, 2008).

건강 관련 정보의 의미는 좀처럼 자명하지 않으며, 보건 전문가조차도 지식을 검색하고 확률 판단에 관련된 중첩되거나 중복되는 클래스를 처리하는 데 어려움을 겪는다. 따라서, 노인 학습자들이 일상 생활에서 그것을 채택할 가능성이 더 높은 지식과 기술에 대해 더 잘 이해할 수 있도록 표준화된 튜토리얼 비디오 설계 원칙을 찾아야 할 때다.

본 연구는 노인 건강관리에 대한 학습을 위해 주요 정보를 어떻게

설계하고 제공하는지에 초점을 맞춘 튜토리얼 비디오 전략에 관한 연구다. 그리고 핵심정보기반 튜토리얼 비디오 디자인전략 (텍스트, 시각, 숫자 등)에 대한 노인 학습자의 인식은 전략에 따라 개발된 프로토타입에 기초하여 분석한다. 본 연구의 구체적인 연구문제는 다음과 같다. 첫째, 노인학습자 건강관리를 위한 핵심정보기반 튜토리얼 비디오 디자인전략은 무엇인가? 둘째, 개발된 지원전략은 내적으로 타당한가? 셋째, 개발된 전략이 적용된 건강 관리 학습 영상에 대한 노인학습자의 반응은 어떠한가?

퍼지 추적이론, 노인 학습자의 특성, 교육용 비디오 디자인 전략 및 지침의 세 가지 측면을 모두 개별적으로 검토 한 다음 디자인 전략에서 종합했다. 양방향 추적 개념에 근거한 퍼지 추적이론은 특히 기억과 추론에서 인지현상을 예측하고 설명하기 위해 탐구 되었다. 노인 학습자들이 가능성 판단을 위한 중요한 의학적 의사결정 및 복잡한 정보를 포함하는 건강관리와 관련 있는 학습내용에 대한 기억력을 향상시키기 위해서는 노인 학습자의 허위 기억을 줄이고 주요 정보에 대한 암기력을 강화하며 더 나은 위험 인식 및 추정을 가질 수 있는 인지현상 또는 인지 선호경향을 정리 파악하는 하는 것이 필수적이다. 그리고 인지현상은 ‘카메라 렌즈’로 사용되었다. 학습에 대한 단점과 선호경향을 포함한 노인 학습자의 특성이 요약되었다. 예를 들어, 젊은 성인보다 처리속도가 상대적으로 느린 노인 학습자들은 사물을 판단하는데 있어 젊은 성인보다 핵심 정보기반 기억을 더 신뢰하는 것으로 나타난다. 또 다른 현상으로 주의력과 유지력이 상당히 저하되고 상상력은 풍부해진다. 따라서 노인 학습자 들에게 있어서 추가적이고 전문적인 도움, 예를 들어 상황에 맞는 신호 및 색상선택 등의 도움이

유용할 수 있다. 튜토리얼 비디오 디자인 전략과 지침을 노인 학습자의 관점에서 ‘촬영’ 할 수 있도록 ‘카메라렌즈’ 에 ‘렌즈필터’로 특성이 추가되었다.

교육공학 전문가 3명과 인지심리학 전문가 1명이 실시한 두 차례의 전문가 검토를 통해 최종 전략이 내적으로 타당함을 검증하였다. 또한, 비디오 설계자와 긴밀히 협력하고 프로토타입 개발 프로세스 중에 이들의 평가를 요청함으로써, 비디오 제작을 위한 작업 흐름 및 직무 분포 측면에서 최종 전략을 개선하기 위해 전략의 유용성에 대한 의견을 수집하고 응축하였다.

마지막으로, 노인 학습자들은 비디오를 보는 동안 높은 상황적 흥미와 집중력을 보였을 뿐만 아니라, 비디오의 주요 메시지를 암기하는 데도 높은 정확도를 보였다. 한편 노인 학습자는 모두 동영상을 보면서 질병의 무지에 대한 지식과 태도 변화를 표현했다.

따라서 본 연구는 고령화 사회 속에서 노인들의 건강하고 행복한 삶을 촉진할 수 있는 노인 건강관리에 대한 일련의 의미 있는 핵심정보기반 튜토리얼 비디오 디자인 전략을 발전시켰다.

주요어 : 핵심정보 기반 디자인, 튜토리얼 비디오 디자인 전략,
노인 학습자, 이러닝, 퍼지 추적 이론(Fuzzy-Trace Theory)

학 번 : 2018-26505