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by Dyah Nugrahani

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Do We Need a Quality Assessment for Note-Taking Technologies in Technology-Assisted Interpreting? A Descriptive Study

Dyah Nugrahani[1*] & SF. Luthfie Arguby Purnomo[2]
[1]Universitas PGRI Semarang
Jalan Sidodadi Timur 24 Dr Cipto Semarang 50232, Indonesia
[2]Universitas Islam Negeri Raden Mas Said Surakarta
Jl. Pandawa, Dusun IV, Pucangan, Kec. Kartasura, Kabupaten Sukoharjo, Jawa Tengah 57168, Indonesia
*Email: dyahnugrahani@upgris.ac.id

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Abstract

Technology-assisted interpreting (TAI) signifies a binary concern encompassing not only the interpreting process but also the technology used. One of the technologies playing crucial roles in signifying the quality of interpreting is note-taking technology. Thereby we argue that note-taking technologies used in TAI require a specific quality assessment since they influence the process and result of interpreting. We propose a conceptual framework for a quality assessment specifically designed for note-taking technologies used in TAI by taking Aarseth's textonomy theory (1997), Costa, Pastor, and Muñes's technology aid based interpreting classification theory (2014), O'Brien and Toms's user engagement theory (2008), Venkatesh and Davis's technology acceptance model (2000), and Friedman's immersion theory (2014). We propose that the note-taking technology quality assessment is essential and it has to address three primary considerations. They are functional parameters, user's function considerations, and interpreting types. Functional parameters, which assess the interaction between users and note-taking technologies, consist of engagement, acceptance, and immersion. User's functions, comprising of interpretive, explorative, and configurative functions, assist the assessors in comprehending the characteristics of particular note-taking technologies. Interpreting types, classified based on the technology dominantly used in the interpreting process, helps the assessors indicate which technology fits what interpreting types.

Keywords: *note-taking; note-taking technology; technology-assisted interpreting; textonomy*

Abstrak

Penafsiran dengan bantuan teknologi (*Technology-Assissted Interpreting/TAI*) memerlukan perhatian terkati penggunaan teknologi informasi yang mencakup tidak hanya proses penafsiran tetapi juga teknologi yang digunakan. Salah satu teknologi yang berperan penting dalam kualitas interpretasi adalah teknologi pencatat. Dengan demikian peneliti berpendapat bahwa teknologi pencatatan yang digunakan dalam *TAI* memerlukan penilaian kualitas tertentu karena teknologi ini akan mempengaruhi proses dan hasil interpretasi. Peneliti mengusulkan kerangka kerja konseptual untuk penilaian kualitas yang dirancang khusus untuk menilai teknologi pencatat yang digunakan dalam *TAI* dengan menggunakan teori teksonomi Aarseth (1997), Teori klasifikasi interpretasi

berbasis bantuan teknologi Costa, Pastor, dan Muñes (2014), teori keterlibatan pengguna O'Brien dan Toms (2008), model penerimaan teknologi Venkatesh dan Davis (2000), dan teori imersi Friedman (2014). Peneliti mengemukakan bahwa penilaian kualitas teknologi pencatatan harus memperhatikan tiga pertimbangan utama. Ketiga pertimbangan utama ini adalah parameter fungsional, pertimbangan fungsi pengguna, dan tipe penafsiran. Parameter fungsional, yang menilai interaksi antara pengguna dan teknologi pencatat, terdiri dari keterlibatan, penerimaan, dan pendalaman. Fungsi pengguna, yang terdiri dari fungsi interpretatif, eksploratif, dan konfiguratif, membantu asesor dalam memahami karakteristik teknologi pencatat tertentu. Jenis penafsiran, yang diklasifikasikan berdasarkan teknologi yang dominan digunakan dalam proses penerjemahan, membantu asesor dengan menunjukkan teknologi mana yang cocok dengan jenis penerjemahan apa.

Kata kunci: *pencatatan; teknologi pencatatan; penafisran dengan bantuan teknologi; tekstonomi*

Introduction

Technologies in translation context, based on Cronin (2012), shape the translators and vice versa. This mutual reciprocal symbiosis that technologies and translators share implies that a significant degree of influence on translation quality is determined by how these two elements cooperate in a mutual circumstance. Besides triggering a particular level of influence on translation quality, translation aiding technologies, as implied by Bowker (2002), contributes to the positive image for the translators in regard to how they utilize the available translation-support technologies. The abilities for translation technologies to generate influences upon translation quality and translator image further signify the necessities to examine the quality of the technologies used in translation.

Technologies used in TAI conform to the mentioned abilities in three specific formats, as indicated by Costa, Pastor, and Muñes (2014), namely information storage, note-taking, and voice recording. These three technologies in relation to interpreting are in alignment with what Pöchhacker (2008) terms as the three inherent dimensions of interpreting as mediation namely cultural/linguistic, contractual, and cognitive. Three specific interpreting aiding technologies as mentioned before possess these three inherent dimensions with each having a different fashion of application. Information storing technologies in the perspectives of interpreting mainly revolve around corpus based design, glossary input, for example. Due to this corpus design based nature, cultural/linguistic dimensions tend to be the axis which mediates contractual, which focuses on social aspects of interpreting, and cognitive, employed to produce conceptual aspects of interpreting. On the other hand, note-taking, which essentially also functions as information storage in non-corpus design, tends to focus on cognitive dimension as the axis since conceptual making like what information should be considered vital and how, when, where, and why the information should be noted. Meanwhile, voice recording with STT as the primary technology tends to be abstain from any axial focus since voice recording, encompassing meaning, force, and style, is dependent upon intercultural, social, and conceptual concerns.

These relations woven by interpreting technologies and interpreting dimensions indicate that technologies specifically utilized for translational purposes have specific

considerations concerning the specific features certain types of translation have, the concerns on setbacks of TAI are namely accuracy and pragmatic acuteness (Kulig, 2009). This implication further raises a concern whether certain interpreting technologies would suffer from quality issue due to their incompatibility with the dimensions interpreting activities have. Those research on TAI by Costa, Pastor, and Muňes (2014), Pöchhacker (2008), and Kulig (2009) concerns on interpreting technologies as well as their issues. When quality issues of certain interpreting technologies become a concern, the question on whether these quality issues influence interpreting quality or not emerges.

Departing from the questions above, this article attempts to conceptually argue the necessity to design a quality assessment for interpreting technologies employed in TAI. The technologies that become the focus on this study are note-taking technologies with a consideration on the fact that these technologies require a degree of dynamicity from the interpreters and a frequent degree of functional usability.

Method

This research is a descriptive qualitative study. As a conceptual paper, this research focused on comparing handwriting and speech-to-text note-taking technologies. During the course of this study, the researchers attempted to propose a conceptual framework for a quality assessment specifically designed for note-taking technologies used in TAI in refer to Aarseth's textonomy theory (1997), Costa, Pastor, and Muňes's technology aid based interpreting classification theory (2014), O'Brien and Toms's user engagement theory (2008), Venkatesh and Davis's technology acceptance model (2000), and Friedman's immersion theory (2014).

Result and Discussion

Note-Taking Technologies in TAI Context

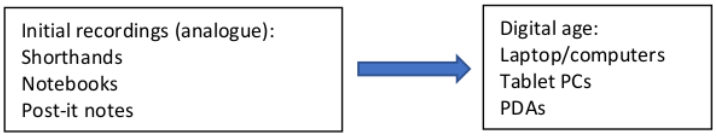

Diagram 1. A brief history of note-taking systems

Note-taking technologies are inseparable from note-taking technologies in general with pedagogical sector as the primary users and domains. Fundamentally note-taking technologies are constructed by three elements namely pen, paper, and interaction between them with the pen pushers as their users. The relationship these three elements braid the process and product of note-taking, two principal reasons behind the act of note-taking (Hartley and Davies, 1978). By process might refer to what Blair (2004) terms as an act of transmission, in which storing, sorting, summarizing, and selecting are the activities performed by the note takers. By process also refers to the formats taken by the note takers in taking the notes. Note-taking formats generally consist of three types namely conventional, outline framework, and matrix framework formats (Kiewra, Benton, Kim, and Christensen, 1995). The selection of formats referring to the act of transmission might produce a different degree of efficiency in walking through the whole

interpreting process. In the context of technologies used in interpreting, these formats and acts of transmission are constructed through user interface.

In conventional format, if related to TAI, the note-taking technologies mainly replace the conventional note-taking, which primarily focuses on handwriting to store information, into a digital handwriting format, which stores information digitally. Digital pen, for instance, is the realization of this conventional format. Digital pen in tandem with tablet, as a replacement for paper, enables the users to write, erase, and save the notes at ease. The process digital pen and tablet do with is a replacement of what pen and paper do. This conventional paper might shift to outline framework when the note-taking process is not solely dependent upon handwriting by digital pen but also technologies, which offer unconventional writing feature. Speech-to-text (STT) is the example. This technology allows the users to type without writing but speaking. The technology transforms one's speech into text. When STT is in a collaborative use with digital pen, a framework on how to combine them in note-taking comes into consideration. In outline framework, digital pen and STT share their planned task with either digital pen or STT. Interpreters could use the former technology in which the interpreters have to perform interlingual transfer while STT in intralingual one, which primarily involves public services for the deaf and hard of hearing (Norberg, Stachl-Peier, and Tiittula, 2015). By outlining the specific framework, which conforms to the specific interpreting process, the compatibility of the technologies will be reassured. Meanwhile, a matrix framework with the focus not only on alloting the compatibility of particular technologies takes place when the interpreting process is very specific requires a hybrid or side-by-side usage of technologies. One of the examples is real-time subtitling, where the speech of an interpreter is transcribed as a subtitle. This interpreting service is very specific since it blends subtitling and interpreting at the same time. The translators act as an interpreter but the results are in subtitle format. The status of being real time even complicates the whole process since the viewers capture the messages real time with subtitle mindset. Embracing subtitle mindset indicates that the viewers have in their minds standards and rules of subtitle display. Thus, a surge of urgency to deliver 'proper' subtitles through an interpreting means is urged. In relation to TAI related technologies, digital pen and STT might be consecutively used for a different situation with digital pen working to note the main points while STT being the articulator of what digital pen has noted. This consecutive use points out the presence of a matrix, which informs the interpreters on what events the notes are taken and how the events are articulated. Departing from this information, the interpreters could examine and treat the notes as paratexts or genetic manuscript.

Meanwhile, the notes as the product of note-taking might be treated as paratexts (Toledano-Buendia, 2013) and genetic manuscript (Cordingley and Montini, 2016). Treating notes as paratexts indicates that the interpreters attempt to position intepreting as a textual activity with interpreting notes as additional and complementary texts, which construct the whole text of interpreting. In the context of TAI, this textual treatment points out the importance of textual medium, which becomes the place for the texts to appear and signify. Furthermore, because the notes are treated as a textual medium, a textual communication appears to take place in the note-taking process. Pöchhacker (2016) perceives this textual communication based on the standards of textuality, which is indicated by interpreting activities, involving cohesion, coherence, and intertextuality. These three textual elements are also the elements that construct

paratexts. In this case, the paratexts are the interpreting notes. Since notes are constructed also by these three elements, in the context of technologies used in TAI, it implies that any technologies designed for interpreting note-taking have to consider how cohesion, coherence, and intertextuality are constructed as the features of the technologies with user interface as the connecting tool between the technologies and the users.

The same prerequisites also apply for treating notes as a product in a genetic manuscript format. Treating notes, which are taken during an interpreting activity, means treating them as manuscript. Its status as being a manuscript points out that this text type might be used to indicate certain genealogical pattern or formula of the interpreters and the contexts, in which the interpreting occurs. In Venutian perspectives, genealogy tends to primarily signify the past with diverse meanings to comprehend the disunity of the present (Venuti, 2017). In interpreting perspectives, it implies that notes taken in the past interpreting, the situations, the scenes, and the participants are parameters interpreters and interpreting scholars need to take to assess interpreting quality, self-evaluation, and future interpreting plan. In TAI context, the technologies that address history function, where the interpreters could track their notes, are the primary feature to conform to the treatment of notes as a genealogical product. By digitally tracking the notes, interpreters could perform any evaluation-related assessments. By doing so, the technologies support the status of the interpreting notes as manuscripts.

Note-Taking in the Scope of Communication Technology Assessment

In assessing note-taking technologies, we propose three functional parameters for a basis of the assessment namely engagement, acceptance, and immersion. Engagement refers to how the users comprehend the interfaces of the note-taking technologies, acceptance to how the users cognitively apply note-taking technologies on particular TAI contexts, and immersion to how the users could assess potential distractors which might occur from using particular note-taking technologies.

The first functional parameter is Note-Taking and Technology Engagement. Note-taking technologies fall into communication technology category due to their nature as a support communication technology for the interpreters. In communication technologies, interactivity is their nature and thereby they influence human communication (Rogers, 1986). This influence signifies that certain communication technologies are capable of redefining how their users communicate and even the culture of communication in macro level. In micro level, this influence circumnavigates on the scope of user engagement. User engagement primarily refers to experience evoked from the interactivity between users and technologies through different interaction variables and dimensions (O'Brien and Toms, 2008). Since different communication technologies are designed to generate different types of interaction, the experiences that are expected to emerge from the relationship between the technologies and the users are diverse. Though diverse, experiences generally encompass three fundamental elements namely the perception of instrumental qualities, of non-instrumental qualities, and emotional responses to the system (Thüring and Mahlke, 2007).

Instrumental qualities mainly circumnavigate around the controllability of the technology system. Controllability is closely tied to the user's psychology since

controllability, as suggested by Hockey, Briner, Tattersall, and Wiethoff (1989), might contribute to the stress level of the users if cognitive and affective aspects of controllability are not properly addressed. In note-taking technology context like digital pen and tablet, this controllability is implemented through writing and storing functions, as the mimetic projection of pen and paper. Due to their mimetic functions, the users expect that their engagement with digital pen and tablet shares a close similarity to conventional pen and paper. Controllability, which is mainly mechanical, is designed and devised with non-instrumental elements, which aesthetically support the mechanical functions. Icons for button pressing, for examples, are designed to provide a clear clue and function for the users to interact with. In note-taking technology perspective, digital pen and tablet might work mechanically but it requires simple and understandable icon pictures for the users to make the pen work. The time consumed to comprehend the depicted icons on digital pen and tablet becomes one of the focal points in term of engagement. The time consumption needed to comprehend the icons might result in stressful condition for the users. This psychological condition, which results from the interaction between technologies and their users, is what highlights the third element. Emotional responses, as the third element in constructing experiences, are intertwined by both instrumental and non-instrumental qualities, which define ergonomics. Technologies which adhere the importance of ergonomics indicate that the technologies put concerns on the interaction the technologies have toward their users via interface. As stated by Bridger (2008), adherence toward ergonomics in technology design eliminates inefficiency, fatigue, accidents, injuries, errors, user difficulties, and low morale and apathy. In the context of note-taking technologies, adhering to ergonomics ensures the smoothness of interpreting process. The necessities to be concerned on ergonomics indicate that when particular technologies neglect it, the quality of the technologies is in question. To reveal whether particular technologies adhere to ergonomics, an assessment is required.

In communication technology, like any other technologies, assessment primarily highlights the aspects of quality, which determine particular communication technologies having particular quality. Technology assessment (TA) is contextually examined in regard to the firms that design the technology and the target societies of the technology (Bhatnagar and Jancy, 2003). Due to the necessities for TA to be concerned on firms and societies, various assessment methods might come into use. Lugmayr, Niiranen, and Kalli (2004) in their research on voice and speech technology assessment, propose questions which could be used to address the quality aspects of communication technologies. Those questions are summable into five items namely the relationship between features and users, the description of features, feature accessibility, the web one feature weaves with other features, and the completeness of the features. Locating features as the axis of quality assessment indicates that part-to-whole paradigm becomes the guideline for the assessment. This condition implies that an assessment which is designed with the features of the technology as the center of assessment is product-oriented. A different approach of assessment is shown by Driessen (2009) who emphasizes on ethical relationships and impacts, which are generated by communication technologies and their users. This approach highlights measures, which need to be taken to deal with the ethical issues, yielded by particular communication technologies. These measures encompass the necessities to involve experts in ethics and communication, to socialize technologies to the society, and to

anticipate any opportunities and threats. The involvement of social elements in this assessment indicates that product is not only the orientation but how the products are ethically accepted and used by the users becomes a more concerned orientation. Adhering to products, users, and ethical concerns would contribute to the acceptance level of particular technologies.

The second functional parameter is Note-Taking and Technology Acceptance Model. Acceptance level on technologies is commonly studied under technology acceptance model (TAM). In TAM, Venkatesh and Davis (2000) state that there are two factors, which influence technology acceptance namely social influence and cognitive instrumental processes. Further, they propose that social influence processes refer to subjective norm, voluntariness, and image while cognitive instrumental processes refer to job relevance, output quality, result demonstrability, and perceived ease of use. The presence of these two factors indicates that ergonomics as the key factor in influencing technology quality plays a significant role also in the technology acceptance.

In the context of note-taking technologies, the application of TAM as suggested by Venkatesh and Davis would cover how the technologies influence anybody involving in the TAI and the quality of the interpreting itself. To reveal the degree of influence and quality, a TAM for note-taking is required. A model like observational study as proposed by Schepman, Rodway, Beattie, and Lambert (2012) on Evernote might be useful in acquiring qualitative assessment regarding with the technology used. By providing a training on the use of the note-taking technology, a familarization process on week basis, and a specific category of users, an observational model is able to expose how note-taking technologies are accepted by particular community of users. This model however is absent from revealing whether similar technologies as Evernote and more conventional technologies than those of Evernote excel Evernote or not. A comparative model might fill this hole. A comparative study as proposed by McFall (2005), for instance, which attempt to compare between electronic text books with substances from note-taking technologies and traditional text book without the substances from note-taking technologies, indicates that both result in the same learning achivement when used by students.

A different model out of observational and comparative model, which concerns not only on the user's acceptance but also environment's acceptance, might also be applied to note-taking. A model from Harter, Vroegindeweij, Geelhoed, Manahan, and Ranganathan (2004) serves this purpose. They put a concern on how technologies are used with regard to the energy consumption of the technologies. In note-taking, primary issues in regard to energy consumption are the length spent in performing note-taking and e-waste, resulting from the use of the technologies. The length in using note-taking technologies, like what happens on any other technologies, resulting in a larger amount of energy consumption. Here interpreting types usher a significant impact on the length of performing the interpreting activities and thereby, adjusting interpreting types with note-taking technologies is what interpreters should be concerned of. Study by Berber-Irabien (2010), for instance, indicates that interpreters involving consecutive interpreting mostly tend to incorporate information and communication technology (ICT) in their interpreting activities in a more natural way. By more natural way implies that the level of acceptance has reached at a certain height that the interaction between the users and the interpreting technologies runs automatically. Brandl, Richter, and Haller (2010) emphasize the importance of evoking naturalness in note-taking

technology design by thoroughly examining the strategies and habits taken by paper based note takers in maintaining the natural flow of note-taking and transferring those strategies and habits into a digital version. That being natural mainly refers to the interaction via interface indicates that interface itself requires a design, which is considered to be natural. Sproull, Subarmani, Kiesler, Walker and Waters (1997) suggest that the naturalness of particular interface might come from the implementation of humanlike design on the interface. They give an example from text-to-speech (TTS) technology, in which they suggest that to ensure the naturalness of speech spoken from the text, TTS should adopt a mimetic approach by displaying the face of a human especially the mouth to show the users how to pronounce particular expressions. This mimetic concept of naturalness for technology interface points out that particular degree of immersion the users have to the technologies is existent.

As for the third functional parameter is Note-Taking and Technology Immersion.In interpreting context, Ribeiro (2007) states that immersion occurs not only in language interaction but also physical interaction, which he calls physical contiguity, a direct interaction to diminish any border that blockades a conversation. In the context of TAI, physical contiguity, besides covering bodily physical interactions, also encompasses the interaction between the technologies used and the interpreters and the clients. Bodily interactions like digital pen-skin interaction, though seemingly to be trivial, might influence the process of interpreting in TAI context and thereby, physical contiguity in note-taking should become a crucial consideration in designing a technology assessment. The ways the interpreters respond to the physical contiguity of the note-taking technologies will decide their immersion level.

In note-taking context, immersion might incline to the examination of potential distractors, which might be possibly disrupting the process of interpreting (Friedman, 2014). Potential distractors for note-taking might come from the technology, the adaptive level of the technology, and the unassessed impacts of the technology. These potential distractors, if managed to be prevented from appearing, might contribute to the immersive level of users and the technology used. A simulation like virtual environments as suggested by Poupyrev, Tomokazu, and Weghorst (1998) might function well in preventing the emergence of the distractors. Virtual environments, which are generated from virtual reality device, are able to simulatively construct real condition and environment of the expected interpreting and thereby potential distractors could be assessed. To assess potential distractors, an expected environment could be forecast by utilizing questionnaires inteded to be given to those involved in the expected interpreting environments. The questionnaires could cover both experiential and non-experiential elements. Experiental elements in note-taking technology context, just as seen from any other technologies, are basically habit-related. Due to its habit-related nature, users are expected to share their receptive assessment in terms of the technologies that they use. Meanwhile non-experiential elements might cover technology criticism from any standpoint and point views whether they are interdisciplinary or multidisciplinary. Thereby, when the former is selected, immersive level will be revealed at personal level, which might be beneficial to understand how note-taking technologies weave habitual threads to the users in frequent basis. If the latter is selected, immersive level will be revealed through different perspectives of disciplines, which allow potential users to adjust note-taking technology selection with their interpreting modes.

In relation to quality assessment, immersive levels that note-taking technologies have are inseparable from acceptance level because immersive levels might be incorporated as a parameter for technology acceptance. Since immersive and acceptance levels share similar user-oriented paradigm, a quality assessment designed from this paradigm would result in an assessment which relies on receptive perspectives. These perspectives encompass user-involvement and user-satisfaction. The former refers to how users participate in the improvement of particular technology while the latter to how the technologies could address the issues the users have in using the technologies (Gales and Mansour-Cole, 1995; Melone, 1990). These two user-oriented categories are reciprocal and influential toward one another and therefore, their inclusion as parameter is of necessity.

Textonomy for Note-Taking Technology Assessment

We propose note-taking technology assessment under textonomy umbrella with three parameters, as discussed above, as the points of departure. Textonomy is the study of textual media (Aarseth, 1997; Eskelinen, 2012). In textonomy, particular textual media, though used for the same purpose, has distinctiveness in traversal mode, how the textual media is accessed. This distinctiveness on traversal mode is articulated through the emphasis on user's functions namely interpretive, explorative, and configurative. The factors differentiating these user's functions are the ability of the media to be modified or adjusted for particular needs or contexts. Interpretive user's function is a function where particular media is not modifiable or adjustable for certain contexts. Explorative user's function, on the other hand, allows limited modification on the use of the technologies for an adjustment. The last, configurative user's function, provides an open access and open source, which allows the users to modify the technologies and the use of the technologies as they deem appropriate.

In the context of note-taking technologies for TAI, the user's functions might occur on manual and digital note-taking technologies as a standalone or combinative functions. Standalone function indicates that particular note-taking technologies have one of the three user's functions only. Meanwhile, combinative function indicates the presence of the combination among the three types of user's functions on particular note-taking technologies. Manual pens, for instance, might be interpretive, explorative, and configurative. Manual pens with color changing features are explorative since the users could, in a certain degree of flexibility, improvise themselves in taking their notes such as point highlighting. Manual pens with color changing features are explorative yet the papers to which the pens are applied are interpretive since explorative and configurative features are absent from the papers. On the other hand, digital pens or stylus, for instance, might be interpretive when they do not have explorative functions like color changing features yet the tablets to which the pens are applied are configurative. These user's functions are integrated with interpreting types to generate how particular types of interpreting are fit to particular user's functions and thereby, an assessment on note-taking technologies will have a point of departure. Here we employ the theory from Costa, Pastor, and Munes (2014) which classify interpreting with interpreting technologies as the concerns.

Table 1. Interpreting Types and Their User's Functions in Note-Taking Technology Context

	Interpretive	Explorative	Confiigurative
Whispered			
Conference			
Business			
Court			
Teleinterpreting			
Community Interpreting			

The use of green, yellow, and red colors is to indicate note-taking technology preference for particular interpreting. Green indicates 'suggested', yellow 'suggested with minor concerns', and red 'suggested with major concerns'. Interpretive note-taking technology is suggested to aid whispered interpreting since this type of interpreting relies heavily on the acts of whispering. Thereby, conventional or manual note-taking technologies are preferred since modifications on the note-taking process might hinder the interpreters in delivering the message via whispers. Conference interpreting is suggested to be aided by explorative note-taking technologies since conferences have to consider between amount of time allocated to adjust to the situational context of the conference with the technologies used. Thus, explorative comes as a preference since explorative technologies have simple limited modifications which benefits the interpreters in negotiating between time spent for interpreting and for note-taking modifications. Business interpreting, due to its specific group focus, is more open and vulnerable to context adjustment and thereby requiring note-taking technologies with high adaptive configurative features. Court interpreting shares similarity in note-taking technology type preference to that of whispered interpreting, which is interpretive. In court interpreting, due to its intensity and pressure, interpretive note-taking technology is preferred to disallow any emergence of distractions in modifying the note-taking tools. Teleinterpreting, due to its high level of interpreting technology reliance, requires note-taking technologies with configurative nature to adjust them with other interpreting technologies to smoothen the process of interpreting. Community interpreting like whispered and court interpreting is preferred being in tandem with interpretive note-taking technologies since this type of interpreting has a high degree of intensity with minimum intervals. This preference indicator points out that note-taking technology for interpreting should take a start from examining whether the note-taking technology falls into particular user's function and particular interpreting type. The second step taken after using the above indicator is to assess the user's functions of the assessed note-taking technologies.

Table 2. Note-Taking Technology Types and Their User's Functions

	Interpretive	Explorative	Confiigurative
Pen			
Paper			
Stylus			
Tablet			
STT			
TTS			

Note-taking technologies fundamentally comprise of writing, semi-writing, and oral. They are realized into pen, paper, stylus, tablet, STT, and TTS. Each has its own specific features. Manual pen and paper tend to be interpretive in engagement, acceptance, and immersion, meaning that they have a high degree of familiarity by the users. This interpretive user's function by manual pen and paper indicates that actually manual pen and paper might also have a high degree of flexibility but since the function is interpretive, flexible uses are dependent to the user's subjectivity. Meanwhile, stylus and tablet, which digitalize the function of manual pen and paper, tend to be explorative. The explorative aspects of stylus and tablet are perceptible from the presence of interface, allowing the users to explore writing-related menu such as the icons available on stylus, tablet, STT, and TTS to adjust the note-taking with the interpreting. Similar user's function also applies for oral based note-taking technologies, appearing on STT and TTS. In the case of these voice recognition based technologies, STT and TTS could take form as a direct interpreting technology, as seen from Talkao's Translate Voice-Translator, iTranslate's Translator & Dictionary, NyxCore's Easy Language Translator, and other speech recognition based apps, and as a part of digital pen and paper. Either way these speech recognition technologies are explorative in their user's functions. Departing from this tendency of user's functions for each note-taking technology, assessors could link between this tendency with the interpreting types to recognize which note-taking technologies tend to fit to particular interpreting types and which tends to not.

Examining which note-taking technologies fit to what interpreting types, the next step taken to assess particular note-taking technologies is to consider the features each note-taking technology has. In analyzing the features, the guideline taken refers to engagement, acceptance, and immersion of the technologies. The following is the guideline for each assessment element:

Table 3. Functional Parameters and Their Link to Note-Taking Technologies

	Pen and Paper	Stylus and Tablet	STT and TTS
Engagement	Static Determinate	Dynamic Determinate	Dynamic Determinate/Indeterminate
Acceptance	Explicit Impersonal	Explicit Personal	Implicit Personal
Immersion	Controlled Transient	Controlled Transient/Intransient	Controlled Transient/Intransient

The theory used to reveal the characteristics of the note-taking technologies is adapted from textonomy variable by Aarseth (1997). In assessing engagement, the considerations taken are whether the engagement is static or dynamic and whether it is determinate or indeterminate. Static engagement means that the note-taking technology is absent from providing the users with choices through the presence of interface menu. Meanwhile, dynamic engagement, due to the presence of interface menu, allows the users to dynamically adjust themselves with their needs via the interface menu. Determinate and indeterminate engagement circumnavigates around whether the assessed note-taking technologies, when applied to practice, generate expected results or not. Pen, paper, stylus, and tablet are determinate since they are written based while STT tends to stay between determinate and indeterminate, depending on the pronunciation of the speakers.

Explicit and implicit acceptance refers to how the assessed note-taking technologies prompt the users in utilizing them for particular contexts. Explicit acceptance indicates that note-taking technologies usher an explicit comprehension on how to use the technologies for various contexts. Meanwhile implicit acceptance indicates that the note-taking technologies, due to their sophisticated features, trigger a low level of familiarity, which results in the emergence of implicit acceptance. On the other hand, personal and impersonal acceptance is related to how the note-taking technologies are customisable to adjust with the interpreting types or not. Pen and paper tend to be explicit and impersonal since the users are already familiar with them yet the technologies are not customisable concerning the interpreting types. Stylus and tablet, which root from pen and paper, are explicit like pen and paper due to their familiarity. Yet stylus and tablet, due to the presence of interface menu, tend to be personal. Meanwhile STT and TTS, due to the fact that these technologies could stand by themselves as an interpreting tool and could be integrated to stylus and tablet, tend to be personal and implicit in their application to meet certain contexts.

Controlled and random immersion refers to whether note-taking technologies, in providing inputs for the users to assess potential distractors, provide clear hints and guideliness for the users or not. All of note-taking technologies falls into controlled fashion of immersion, meaning that the users are aware of any potential distractors, which might contribute to the appearance of hindrances in the interpreting process. Meanwhile transient and intransient immersion refers to the time taken by note-taking technology users in resolving the emergence of distractors. Pen and paper, due to the fact that it has the highest level of familarity, is transient in immersion since this high level of familiarity enables the users to solve any distractors, emerging from the technology, in an expected length of time. On the other hand, stylus, tablet, STT, and TTS stand between transient and intransient category since their degree of familiarity is lower than that of pen and paper. Furthermore, a diverse range of interface through out different brands compels the users to select various possible solutions for any encountered problems.

Conclusion

We hereby conclude that note-taking technologies are of necessity to have their own quality assessment since interpreting, in responding the rapid growth of technology integration, tends to evolve into technology assisted interpreting. In assessing note-taking technology, we propose three primary considerations namely functional parameters, user's function considerations, and TAI related interpreting types.

Three functional parameters of assessment are engagement, acceptance, and immersion. The first refers to how the technologies enable the users to comprehensively recognize the features and interface menu of the technology and operate them in a functional manner. The second refers to how particular note-taking technologies are applicable in a real context of interpreting types. The third refers how particular note-taking technologies assist the users to spot potential distractors, which might emerge from the technology and its application on certain interpreting context.

Those three functional parameters are in tandem with user's function considerations, taken from textonomy and textonomy variable theory by Aarseth (1997). User's functions are classified into interpretive, explorative, and configurative functions. Note-taking technologies with interpretive user's function direct the users to use the technologies the way they are since note-taking technologies which are categorized into

interpretive provide no features or interface to allow the users to modify the technologies or the use of the technologies. On the other hand, explorative user's function allows the users to modify the use of the technology while configurative user's function allows the users to modify the use of the technology and technology itself.

Three functional parameters and three user's functions are integrated with interpreting types by Costa, Pastor, and Munes (2014) to generate a qualitative assessment. The proposed assessment is exercised through suggestions, meaning that particular interpreting type is assumed to conceptually fit for particular note-taking technology. The first step taken by an assessor is to comprehend the interpreting types to which note-taking technologies will be applied. As shown from the colored-guideline table, whispered interpreting is suggested to be aided by interpretive note-taking technologies, conference interpreting by explorative, business by configurative, court by interpretive, teleinterpreting by configurative, and community interpreting by interpretive. After examining the interpreting types and their suitability with the user's function types of the note-taking technologies, an examination toward the note-taking technology types in terms of their user's function. The last step is to examine the engagement, acceptance, and immersion characteristics of the note-taking technologies to ensure whether the technologies suit the interpreting types.

The conceptual framework of this note-taking technology assessment limits itself on general note-taking technologies and thus, it exposes theoretical gap on the classification of note-taking technologies with hardware, software, application, and program based as the ground for classification. This framework also finds itself a hole to fill on the absence of social, economic, and environmental contexts. Future research could utilize this theoretical framework as a basis to design a model of quality assessment on note-taking technologies in TAI contexts.

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