STIZ69920 Dissertation

Guidelines for digital storytelling for Arab children

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ABSTRACT

Children are getting more exposed to various technologies in teaching-learning. Various types of teaching-learning have been designed, including interactive digital storytelling. In Malaysia, local children have been clear about story-based learning materials. However, the situation is a little bit different with Arab children. Because the number of Arab children migrating into Malaysia is increasing, for following their parents who are studying at higher levels, they have to also make themselves familiar with the local scenario. In accordance, this study is initiates, to identify their acceptance towards story-based learning materials, or specifically interactive digital storytelling.

Hence, this study reacts proactively, by approaching Arab children asking for their feedback on whether they have any desire for interactive digital storytelling. Through a series of interviews, this study found that they have a strong desire and tendency. Then, the following objectives have been stated: (1) to determine the components for the interactive digital storytelling for Arab children, (2) to design and develop a prototype of the interactive digital storytelling, and (3) to observe on how the Arab children experience the interactive digital storytelling.

User-centered design (UCD) approach has been gone through in ensuring that the objectives are achieved. The process of determining the components for the interactive digital storytelling was carried out by directly involving Arab children and their teachers from three preschools in Changlun and Sintok. It was similar with the efforts in determining the contents, and interface design until the prototype development. Having the prototype ready, user testing was carried out to explore the way Arab children experience the prototype. All the processes involved various techniques through observation, interviews, and noting.

Specifically, the user testing involved qualitative and empirical data. Qualitative data were gathered through observation, meanwhile the empirical data were gathered using Computer System Usability Questionnaire (CSUQ) tool. In the end, having data processed, the findings show that Arab children are highly satisfied with the prototype. Scientifically, the developed prototype is a mirror of the obtained guidelines, obtained through the UCD seminars. Hence, the positive acceptance on the prototype reflects positive acceptance on the guidelines, as the main contribution of this study.

Besides the guidelines as the main contribution of this study, the developed prototype is also a wonderful contribution to the Arab children and their teacher. They will be using it as part of their teaching and learning materials.

ABSTRAK

Kanak-kanak kian terdedah dengan pelbagai teknologi dalam aktiviti pembelajaran-pengajaran. Pelbagai jenis bahan pembelajaran telah direka bentuk, termasuk penceritaan digital interaktif. Di Malaysia, kanak-kanak tempatan begitu arif mengenai bahan pembelajaran berasaskan penceritaan. Namun, situasi adalah sedikit berbeza dengan kanak-kanak Arab. Oleh kerana ramai kanak-kanak Arab membanjiri Malaysia ekoran mengikuti ibubapa mereka atas urusan pendidikan tinggi, mereka juga perlu membiasakan diri dengan suasana setempat. Oleh itu, kajian ini mengenalpasti penerimaan mereka terhadap bahan pembelajaran berasaskan penceritaan, atau khususnya penceritaan digital interaktif.

Justeru, kajian ini mengambil langkah proaktif, dengan mendekati populasi kanak-kanak Arab dan mendapatkan maklumbalas sama ada mereka berkeinginan kepada penceritaan digital interaktif. MElalui temubual yang dijalankan, kajian ini mendapati mereka mempunyai keinginan dan kecenderungan yang nyata. Lantas, objektif berikut telah ditetapkan: (1) untuk mengenalpasti komponen-komponen yang perlu bagi penceritaan digital interaktif bagi kanak-kanak Arab, (2) membangunkan sebuah prototaip penceritaan digital interaktif, dan (3) memerhati pengalaman kanak-kanak Arab dalam menggunakan penceritaan digital interaktif.

Pendekatan reka bentuk berpusatkan pengguna (UCD) dilalui bagi mencapai objektif-objektif tersebut. Proses mengenalpasti komponen-komponen dalam penceritaan digital interaktif dilalui dengan penglibatan langsung kanak-kanak Arab beserta guru-guru mereka dari tiga tadika di Changlun dan Sintok. Begitu juga dengan usaha menentukan kandungan, dan reka bentuk antara muka sehinggalah pembangunan prototaip. Setelah prototaip disiapkan, ujian telah dilakukan bagi meneroka pengalaman pengguna. Kesemua proses tersebut melibatkan kaedah yang pelbagai melalui pemerhatian, temuduga, dan catatan.

Secara spesifik, ujian pengguna melibatkan amatan secara kualitatif dan empirical. Pengamatan kualitatif dilakukan melalui pemerhatian, manakala ukuran empirical dilakukan melalui alatan *Computer System Usability Questionnaire* (CSUQ). Di akhir sesi pengujian, setelah data diproses, dapatan menunjukkan kanak-kanak Arab amat berpuas hati dengan prototaip yang dibangunkan. Secara saintifik, prototaip tersebut adalah terjemahan kepada garis panduan yang dihasilkan melalui seminar-seminar UCD. Maka, penerimaan yang baik terhadap prototaip adalah penerimaan yang baik terhadap garis panduan yang terhasil, sebagai sumbangan utama kajian ini.

Selain garis panduan tersebut sebagai sumbangan utama kajian, prototaip yang dibangunkan juga adalah sumbangan yang amat dihargai oleh populasi kanak-kanak Arab serta guru-guru mereka kerana mereka akan terus menggunakan prototaip tersebut dalam aktiviti pembelajaran mereka.

Acknowledgement

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CHAPTER ONE

INTRODUCTION

1.1   BACKGROUND

Story telling is famous in various cultures. It is a famous medium of communication. Mothers always tell stories to children about their past lifestyles, success stories, and steps in facing hurdles in their life. Meanwhile, children pay attention to the stories, which is narrative-based, utilizing hearing abilities with interest. It is a memorable time for a family. The storytelling is not just an activity, but it conveys lessons to learn. Children learn from the storyline to guide them in facing the coming days, take the good elements in the storyline as guidance, and avoid repeating the mistakes their mothers have gone through to prevent themselves. This is supported by Livo and Rietz (1986) who argue that a story is a restructured everyday experience through which people come to make sense of know, remember, and understand the surroundings. Through stories one explains interpret, and assess situations, experiences, and ideologies, leading in turn to the creation of new meanings and knowledge (Ohler, 2013).

Not only it conveys messages, but storytelling can make the messages clearer to the listener (Schafer, Valle, & Prinz, 2004). In fact, Gourlay (2013) discovered that the storytelling activity creates and establishes relationships among the listeners and between the narrator and the listeners. In a family in the above paragraph, the relationships between mothers and children will be much closed; containing the elements of caring, loving, appreciating (Johnson, 2009),

The contents of the thesis is for internal user only

REFERENCES

Abdul Sheikh A. Al-Aidaroos & Ariffin Abdul Mutalib. (2014). Multiple Input Modality Mobile Application for Pilgrims. In *Proceedings of Knowledge Management International Conference 2014,* pp. 512-517.

Agnew, P.W & Kellerman, A.S. (1996). *Distributed multimedia: Technologies, applications, and opportunities in the digital information industry.* New York: Addison-Wesley.

Alborzi, H., Druin, A., Montemayor, J., Platner, M., Porteous, J., Sherman, l. et al. (2000). Designing storyrooms: Interactive storytelling spaces for children. In *Proceeding of DIS '00.* 95-104. New York: ACM.

Andre, M, Popescu, VG, Shaikh, A, Medl, A, Marsic, I, Kulikowski, C, & Flanagan, JL. (1998). Integration of speech and gesture for multimodal human-computer interaction. *Tilburg, Jan*, 20-27

Ariffin A.M. & Norshuhada, S. (2008). Usable but not entertaining eLearning materials. In *Proceedings of World Conference on e-Learning in Corporate, Government, Healthcare, and Higher Education (e-Learn)*, USA. AACE

Ariffin A.M. & Norshuhada, S. (2009). Conceptual design model of Reality Learning Media (RLM). In *Proceedings of IADIS International Conference e-Society 2009*, Barcelona, Spain. IADIS

Ariffin, A.M. & Cut, N.A. (2010). Socio-pleasure in Digital Storybook. In *Proceedings of 6th Knowledge Management International Conference 2012 (KMICE2012)*. 203-208.

Ariffin, A.M. (2012). Incorporating Multiple Intelligence into Electronic Teaching Materials in Supports of Usability Aspect. In *Proceedings of 6th Knowledge Management International Conference 2012 (KMICE2012)*. 160-165

Ariffin, A.M. (2013), IndiWare: A Concept of Learning Tool for Indigenous Children, UUM Press.

Ariffin, A.M., Syarifah Nadia, S.Y., Sobihatun Nur, A.S., Mazida, A. & Massudi, M. (2014). Assistive Contents for Hearing-Impaired People. In *Proceedings of Knowledge Management International Conference 2014,* pp. 885-888.

Aufenanger, S. (2005). Stimuli, not set answers. *Televizion*. 18/2005 E. 53-55.

Baloian, N., Berges, A., Buschmann, S., Gaßner, K., Hardings, J., Hoppe, H.U. & Luther, W. (2002). Documant management in a computer integrated classroom. In Haake, M. Joerg & Pino, A. Jose, editors, Proceedings of *CRIWG 2002, 8th International workshop on groupware*, LCNS, Springer

Bateman, John. (2008). *Multimodality and genre: A foundation for the systematic analysis of multimodal documents*: Palgrave Macmillan.

Bauckhage, Christian. (2002). *Evaluating integrated speech-and image understanding.* Paper presented at the Proceedings of the 4th IEEE international conference on Multimodal interfaces.

Bernhaupt, R., Schwaiger, D., Riegler, S. & Enthaler, D. (2007). Evaluating children's gaming experience. In *Proceedings of ACE'07*, Salzburg, Austria: ACM.

Biswas, Pradipta, Duarte, Carlos, Langdon, Patrick, Almeida, Luis, & Jung, Christoph. (2013). *A Multimodal End-2-End Approach to Accessible Computing*: Springer.

Blumendorf, Marco, Roscher, Dirk, & Albayrak, Sahin. (2010). *Dynamic user interface distribution for flexible multimodal interaction.* Paper presented at the International

Conference on Multimodal Interfaces and the Workshop on Machine Learning for Multimodal Interaction.

Borsook, T.K. & Higginbotham-Wheat, N. (1991). Interactivity: What is it and what can it do for computer-based instruction. *Educational Technology.* 31(10). 11-17.

Bourguet, Marie-Luce. (2003). *Designing and Prototyping Multimodal Commands.* Paper presented at the INTERACT.

Bransford, J. D. & Stein, B. S. (1993). *The Ideal Problem Solver (2nd Ed).* New York: Freeman.

Burns, Catherine M, Ho, Geoffrey, & Arrabito, G Robert. (2011). *Mapping ecologically to modalities.* Paper presented at the Proceedings of the Human Factors and Ergonomics Society Annual Meeting.

Card, Stuart K, Moran, Thomas P, & Newell, Allen. (1980). The keystroke-level model for user performance time with interactive systems. *Communications of the ACM, 23*(7), 396-410.

Carter & Burgess, Inc. (2004). *Carter & Burgess' glossary of telecommunications terms.* Retrieved from http://www.c-b.com/industryinfo/glossaries/telecom.asp on 27th June 2007.

Carvajal, D. (1999) "Racing to Convert Books to Bytes". *The New York Times*, December 9th

Caschera, Maria Chiara, Ferri, Fernando, & Grifoni, Patrizia. (2013). InteSe: An Integrated Model for Resolving Ambiguities in Multimodal Sentences. *Systems, Man, and Cybernetics: Systems, IEEE Transactions on, 43*(4), 911-931.

Caschera, Maria Chiara. (2009). Interpretation methods and ambiguity management in multimodal systems. *Handbook of Research on Multimodal Human Computer Interaction and Pervasive Services: Evolutionary Techniques for Improving Accessibility*, 87-102.

Caschera, Maria Chiara. (2009). Interpretation methods and ambiguity management in multimodal systems. *Handbook of Research on Multimodal Human Computer Interaction and Pervasive Services: Evolutionary Techniques for Improving Accessibility*, 87-102.

Chai, Joyce Y, Hong, Pengyu, & Zhou, Michelle X. (2004). *A probabilistic approach to reference resolution in multimodal user interfaces.* Paper presented at the Proceedings of the 9th international conference on Intelligent user interfaces.

Churchill, N., Ping, L.C., Oakley, G. & Churchill, D. (2008). Digital storytelling and digital literacy learning. In *Proceedings of International Conference on Information Communication Technologies in Education (ICICTE) 2008*. 418-430.

Cooper, A., Reinmann, R., & Cronin, D. (2007). *About Face 3: The essentials of interaction design*. USA: Wiley Publishing Inc.

Costa, David, & Duarte, Carlos. (2011). Adapting multimodal fission to user's abilities *Universal Access in Human-Computer Interaction. Design for All and eInclusion* (pp. 347-356): Springer.

CTGV (1992). The Jasper experiment: An exploration of issues in learning and Instructional Design. *Educational Technology Research and Development*, 40(1), 65-80.

CTGV (1993). Anchored instruction and situated cognition revisited. *Educational Technology*, 33(3), 52-70.

D'Ulizia, Arianna. (2009). Exploring Multimodal Input Fusion Strategies. *The Handbook of Research on Multimodal Human Computer Interaction and Pervasive Services: Evolutionary Techniques for Improving Accessibility*, 34-57.

DeMeo, K.K. (2010). *Impact of parenting styles on academic achievement: Parenting styles, parental involvement, personality factors and peer orientation*. PhD Thesis. Long Island University, The Brooklyn Center.

DePue, Todd L, & Hein, David A. (2006). Flexible touch-sense switch: Google Patents.

Digital Storytelling Association. (2002). *Digital Storytelling*. Retrieved on 6 March 2015 from http://www.dsaweb.org/

Doolittle, Ryan. (2010). Human-Computer Interaction.

D'Ulizia, Arianna, Ferri, Fernando, & Grifoni, Patrizia. (2010). Generating multimodal grammars for multimodal dialogue processing. *Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on, 40*(6), 1130-1145.

Elsom-Cook, M. (2001). *Principles of interactive multimedia.* Singapore: McGraw-Hill

Ferri, Fernando, & Paolozzi, Stefano. (2009). Analyzing Multimodal Interaction. *Multimodal Human Computer Interaction and Pervasive Services*, 19.

Frohlich, D.M., Rachovides, D., Riga, K., Bhat, R., Frank, M., Edirisinghe, E. et al. (2009). StoryBank: Mobile storytelling in a development context. In *Proceedings of CHI 2009*. 1761-1770. Boston: ACM.

Gallucci, C. (2013). Storytelling Way. *ESPERIENZE D'impresa*, (1), 109-157. doi:10.3280/ei2013-001005

Gardner, H. (1983). *Frames of Mind*. New York: Basic Books.

Gardner, H. (1993). *Multiple Intelligences: The Theory in Practice*, NY. Basic book

Geldard, Frank A. (1957). Adventures in tactile literacy. *American Psychologist, 12*(3), 115.

Gourlay, L. (2013). Technologies, 'content' and storytelling. *Research In Learning Technology, 21*(0). doi:10.3402/rlt.v21i0.22393

Grudin, Jonathan. (2011). Human-computer interaction. *Annual review of information science and technology, 45*(1), 367-430.

Halimah, B.Z. (1996). Multimedia dalam pendidikan: Hala tuju, polisi, dan pembudayaan di UKM. *Seminar multimedia dalam pengajaran dan pembelajaran.* UKM, Bangi. 11 Julai.

Halimah, B.Z. (2007). Achieving teaching and learning excellence through virtual reality laboratory (VLab-C): Malaysian experience. In *Proceedings of International Conference on Teaching and Learning for Excellence*. Tamkam University, Taiwan.

Hart, J. (2007). *The Art of the Storyboard, Second Edition: A filmmaker's introduction, 2nd edition*. USA: Focal Press

Hillman, D. (1998). *Multimedia technology and application.* New York: Delmar Publishers.

Honold, Frank, Schüssel, Felix, & Weber, Michael. (2012). *Adaptive probabilistic fission for multimodal systems.* Paper presented at the Proceedings of the 24th Australian Computer-Human Interaction Conference.

Ismail, NA, & O'Brien, EA. (2008). *Enabling multimodal interaction in web-based personal digital photo browsing.* Paper presented at the Computer and Communication Engineering, 2008. ICCCE 2008. International Conference on.

Janove, J. (2009). A Story Is Worth a Thousand Lectures. *HRMagazine. Alexandria*. 54(7). 66-68.

Jesse, J. G. (2000). *The elements of user experience. User-centered design for the web*. USA: New Riders.

Johnson, M. (2009). The Power of a Good Story; Storytelling connects with your audience and makes your message memorable. *CIO. Framingham*. 22(12).

Kaleen, Tomas, & Allwood, Carl Martin. (1991). A survey of the training of computer users in Swedish companies. *Behaviour & Information Technology, 10*(1), 81-90.

Kaplan, N., Chisik, Y., Knudtzon, K., Kulkarni, R., Moulthrop, S., Summers, K. & Weeks, H. (2004). Supporting sociable literacy in the International Children's Digital Library. In *Proceedings of Interaction Design and Children 2004*. 89-96.

Kettebekov, Sanshzar, & Sharma, Rajeev. (2001). Toward natural gesture/speech control of a large display *Engineering for human-computer interaction* (pp. 221-234): Springer.

Kodaira, S.I. (2005). Where does educational TV go?. *Televizion*. 18/2005 E. 47-52.

Kress, Gunther. (2010). *Multimodality: A Social Semiotic Approach to Contemporary Communication* (1st ed.). New York, USA: Routledge.

Kruse, K. (2004). *The Benefits and Drawbacks of e-Learning*. Retrieved on 8 February 2009 from http://www.e-learningguru.com/articles/art1_3.htm

Landoni, M. (1997). *The Visual Book system: A study of the use of visual rhetoric in the design of electronic books.* Glasgow: Department of Information Science of the University of Strathclyde (PhD Thesis).

Leishman, D. (2004). Visual literacy and learning: Finding some online territories for the slow learner. On The Horizon. 12(1). 26-30.

Lewis, A., & Porter, J. (2004). Interviewing children and young people with learning disabilities*: guidelines for researchers and multi- professional practice. British Journal of Learning Disabilities, 32(4), 191-197.

Livo, N.J. & Rietz, S.A. (1986). *Storytelling: Process and practice*. Littleton, CO: Libraries Unlimited.

Lucente, Mark, Zwart, Gert-Jan, & George, Andrew D. (1998). *Visualization space: A testbed for deviceless multimodal user interface.* Paper presented at the Intelligent Environments Symposium98, AAAI Spring Symposium.

Lutkewitte, Claire. (2010). *Multimodality is…: a survey investigating how graduate teaching assistants and instructors teach multimodal assignments in first-year composition courses.* Ball State University.

Lutkewitte, Claire. (2013). *Multimodal Composition: A Critical Sourcebook* (1st ed.). Boston, USA: Bedford/St. Martin's.

Marshall, C. C. (2011). Fourth Generation Ebooks: Keynote for JCDL 2011 Workshop on Semantic Web Technologies for Libraries and Readers.

Masura, R. & Madihah, M.S. (2007). E-Learning assessment application based on Bloom's taxonomy. *In Proceedings of The 14 International Conference on Learning*, Johannesburg, South Africa.

Meadows, D. (2003). Digital Storytelling: Research-based practice in new media. *Visual Communication*. 2(2). 189-193.

Meadows, D. (2003a). *Capture Wales BBC digital storytelling*. Retrieved on 6th March 2010 from http://www.bbc.co.uk/wales/capturewales/conference/danielmeadows.shtml

Michaelis, Paul Roller, & Wiggins, Richard H. (1982). A human factors engineer's introduction to speech synthesizers. *Directions in Human-Computer Interaction, Ablex, Norwood, NJ*, 149-178.

Murray, Joddy. (2010). Composing Multiliteracies and Image. *What We Are Becoming: Developments in Undergraduate Writing Majors*, 217.

Nabi, R. & Krcmar, M. (2004). Conceptualizing media enjoyment as attitude: implications for mass media effects research. *Communication Theory,* 4(14), 288-310.

Nilsson, S. & Johansson, B. (2007). Fun and Usable: Augmented reality instructions in a hospital setting. In *Proceedings of OzCHI 2007*, 123-130, Adelaide, Australia: ACM.

Norhashim, A. S., Mazenah, Y. & Rose Alinda, A. (1996). *Pengajaran Berbantukan Komputer*, Kuala Lumpur, DBP

Norhayati, A. M. (1999). *Perisian pengarangan.* Petaling Jaya: Prentice Hall

Norshuhada, S**.** & Landoni, M. (2003). Children's E-Book Technology: Devices, Books and Book Builder, *International Journal of Information Technology in Childhood Education Annual*, AACE, USA, 105-138.

Norshuhada, S**.**, Landoni, M., Gibb, F. & Shahizan, H. (2003). E-Books Technology and Its Potential Applications in Distance Education, *Journal of Digital Information,* 3(4), British Computer Society and Oxford University Press.

Nurulnadwan, A., Ariffin, A.M, Siti Mahfuzah, S, & Mohd Saifullizam, J. (2013). Preliminary Investigation on Creative Educational Content for Visually-Impaired (VI) Learners, in Advances in Visual Informatics, Springer, vol. 8237, pp. 408-417.

Oblinger, D. (1993). *Multimedia in instruction.* Chapel Hill, NC: The Institute for academic technology.

Ohler, J. (2013). *Digital storytelling in the classroom: new media pathways to literacy*. Thousand Oaks: Corwin.

Oviatt, Sharon. (2003). Multimodal interfaces. *The human-computer interaction handbook: Fundamentals, evolving technologies and emerging applications*, 286-304.

Oxford advanced learner's dictionary (2000). 6th ed. New York: Oxford University Press.

Palmeri, Jason. (2007). *Multimodality and composition studies, 1960--present*: The Ohio State University.

Peck, D.D. (1998). *Multimedia. A hands-on introduction*. New York: Delmar Publishers.

Regan, M. & Sheppard, S. (1996). Interactive multimedia courseware and the hands-on experience: an assessment study. *Journal of engineering education*. April 1996. 123-131.

Régules, S. (2014). Storytelling and Metaphor in Science Communication. *Bookbird*, *52*(3), 86-90. doi:10.1353/bkb.2014.0107

Rey-Lopez, M., Diaz-Redondo, R.P., Fernandez-Vilas, A. & Pazos-Arias, J.J. (2007). Entercation: Engaging viewers in education through TV. *ACM Computers in Entertainment*, 5(2).

Rhodes, D.M. & Azbell, J.W. (1985). Designing interactive video instruction professionally. *Training and development journal.* 39(12). 31-33.

Rodriguez, BH, Wiechno, P, Dahl, DA, Ashimura, K, & Tumuluri, R. (2012). Registration & discovery of multimodal modality components in multimodal systems: use cases and requirements. *World Wide Web Consortium. http://www. w3. org/TR/mmi-discovery/. Accessed November, 26*, 2012.

Sabri, Y. & Zainul Akramin, M. S. (2001). *Pengajaran pembelajaran berbantukan komputer*. Retrieved from http://sabri23.tripod.com/definisi.html on 3rd May 2007

Salomon, G. (1979). *Interaction of media, cognition, and learning*, San Francisco: Jossey-Bass.

Salomon, G. (1981). *Communication and Education*. Beverly Hills, CA: Sage.

Salomon, G., Perkins, D., & Globerson, T. (1991). *Partners in cognition: Extending human intelligence with intelligent technologies*. Educational Researcher, 20(4), 2-9.

Sarter, Nadine B. (2006). Multimodal information presentation: Design guidance and research challenges. *International journal of industrial ergonomics, 36*(5), 439-445.

Scala, Inc. (2004). *Multimedia definition.* Retrieved from http://www.scala.com/multimedia/multimedia-definition.html on 26th June 2007.

Scalise, K. & Gifford, B. (2006). Computer-based assessment in e-Learning: A framework for constructing "Intermediate Constraints" questions and tasks for technology platforms. *The Journal of Technology, Learning, and Assessment*, 4(6). Retrieved on 8 February 2009 from www.jtla.org.

Schafer, L., Valle, C. & Prinz, W. (2004). Group storytelling for team awareness and entertainment. In *Proceedings of NordiCHI '04*. 441-444.

Sinha, Gaurav, Shahi, Rahul, & Shankar, Mani. (2010). *Human Computer Interaction.* Paper presented at the Emerging Trends in Engineering and Technology (ICETET), 2010 3rd International Conference on.

Sobihatun-Nur, A. S., Asmidah, A. & Ariffin, A. M. (2006) *"Comparing Different Types of eBook Readers"* In *Proceedings of International Conference of Computing and Informatics 2006*, Malaysia.

Sowa, Timo, Kopp, Stefan, & Latoschik, Marc Erich. (2001). *A communicative mediator in a virtual environment: processing of multimodal input and output.* Paper presented at the Proceedings of the International Workshop on Information Presentation and Natural Multimodal Dialogue (IPNMD-2001).

Spilker, Jörg, Klarner, Martin, & Görz, Günther. (2000). Processing self-corrections in a speech-to-speech system *Verbmobil: Foundations of speech-to-speech translation* (pp. 131-140): Springer.

Stephanidis, Constantine, & Antona, Margherita. (2013). *Universal Access in Human-computer Interaction: Design Methods, Tools, and Interaction Techniques for EInclusion: 7th International Conference, UAHCI 2013, Held as Part of HCI International 2013, Las Vegas, NV, USA, July 21-26, 2013, Proceedings*: Springer.

Stevens, J. (2007). Multimedia storytelling. Retrieved on 8th March 2010 from http://multimedia.journalism.berkeley.edu/tutorials/starttofinish/storyboarding/

Stivers, Tanya, & Sidnell, Jack. (2005). Introduction: multimodal interaction. *Semiotica, 2005*(156), 1-20.

Sun Microsystem Inc. (2009). Online Courses: Tutorials and Online Training. Retrieved on 8 February 2009 from http://java.sun.com/developer/onlineTraining

Sun, Yong, Shi, Yu, Chen, Fang, & Chung, Vera. (2007). *An efficient multimodal language processor for parallel input strings in multimodal input fusion.* Paper presented at the Semantic Computing, 2007. ICSC 2007. International Conference on.

Sylla, C., Branco, P., Coutinho, C., Coquet, E., & Skaroupka, D. (2011, May). TOK: a tangible interface for storytelling. In CHI'11 Extended Abstracts on Human Factors in Computing Systems (pp. 1363-1368). ACM.

Takayoshi, Pamela, & Huot, Brian. (2002). *Teaching Writing with Computers: An Introduction* (3ed ed.): Cengage Learning.

Tutorialized (2008). Photoshop made disco ball in photoshop tutorial. Retrieved on 8 February 2009 from http://www.tutorialized.com/view/tutorial/Made-Disco-Ball-in-Photoshop/40768

Tyner, K. (2009). Media literacy and the tyranny of the narrative. *Afterimage. Rochester*: 37(2). 3-10.

van Gils, F. (2005). Potential applications of digital storytelling in education. In *Proceedings of 3rd Twente Student Conference on IT*. University of Twente

Vassiliou, Marius S, Sundareswaran, Venkataraman, Chen, S, Behringer, Reinhold, Tam, Clement K, Chan, M, . . . McGee, Joshua H. (2000). *Integrated multimodal human-computer interface and Augmented Reality for interactive display applications.* Paper presented at the AeroSense 2000.

Vitense, Holly S, Jacko, Julie A, & Emery, V Kathlene. (2002). *Multimodal feedback: establishing a performance baseline for improved access by individuals with visual impairments.* Paper presented at the Proceedings of the fifth international ACM conference on Assistive technologies.

Vo, Minh Tue, & Wood, Cindy. (1996). *Building an application framework for speech and pen input integration in multimodal learning interfaces.* Paper presented at the Acoustics, Speech, and Signal Processing, 1996. ICASSP-96. Conference Proceedings., 1996 IEEE International Conference on.

Wechsung, Ina. (2014). What Are Multimodal Systems? Why Do They Need Evaluation?—Theoretical Background *An Evaluation Framework for Multimodal Interaction* (pp. 7-22): Springer.

Welch, Kathleen E. (1999). *Electric rhetoric: Classical rhetoric, oralism, and a new literacy*: MIT Press Boston.

Widjajanto, W.A., Lund, M. & Schelhowe, H. (2008). "Wayang authoring": A web-based authoring tool for visual storytelling for children. In Proceedings of *The 6th International Conference on Advances in Mobile Computing & Multimedia (MoMM2008)*. 464-467. Austria: ACM.

Yusof, J. & Ariffin, A.M. (2014). Interactive Teaching Materials for Pre-Schools: Some Practical Guidelines. In *Proceedings of Knowledge Management International Conference 2014,* pp. 416-421.

Yussof, R., Abas, H., & Paris, T. (2012). Affective Engineering of Background Colour in Digital Storytelling for Remedial Students. *Procedia - Social And Behavioral Sciences*, *68*, 202-212. doi:10.1016/j.sbspro.2012.12.220