

DEVELOPMENT OF ACTORS AND ARTEFACTS  
TAXONOMY FOR SOCIAL RESEARCH NETWORK  
SITES

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## **SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Computer Science.

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## **STUDENT'S DECLARATION**

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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DEVELOPMENT OF ACTORS AND ARTEFACTS TAXONOMY FOR  
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## ABSTRAK

Istilah ‘Social Research Network Sites’ (SRNS) merujuk kepada perkhidmatan berasaskan web yang menyokong dan menambah baik aktiviti penyelidikan. Apabila komuniti penyelidik diperkenalkan kepada pelbagai SRNS, timbul isu berkaitan perkhidmatan dalaman serta fungsian yang berbeza bergantung kepada pembekal perkhidmatan dan tujuan SRNS tersebut. Kesannya, ahli komuniti penyelidik terpaksa mendaftar diri kepada lebih daripada satu SRNS untuk menyesuaikan dengan keperluan penyelidikan masing-masing. Mereka perlu menguruskan beberapa SRNS berbeza untuk menyelaraskan, berkongsi dan mendapatkan maklumat daripada setiap aplikasi. Keadaan ini memerlukan banyak masa dan boleh mengganggu tugas seharian penyelidik. Kajian ini mencadangkan suatu penyelesaian dalam bentuk model ‘Actors and Artefacts Taxonomy for Social Research Network Sites’. Suatu kajian dan analisis ‘mixed methods’ bagi menentukan ‘actors’ dan ‘artefacts’ penting untuk SRNS telah dijalankan. Terdapat tiga objektif utama dalam kajian ini iaitu (i) untuk mengenalpasti ‘actors’ dan ‘artefacts’ yang telah dibincangkan di dalam kajian lepas dan wujud dalam aplikasi terkini bagi menyokong SRNS, (ii) untuk mengesahkan ‘actors’ dan ‘artefacts’ yang telah dikenalpasti serta menemukan hubungan antara mereka dalam menyokong SRNS dan (iii) untuk membina satu taksonomi ‘actors’ dan ‘artefacts’ bagi SRNS. Untuk mencapai objektif pertama, analisis kandungan terhadap dokumen saintifik serta aplikasi SNS dan SRNS terkini telah dijalankan. Tinjauan berbentuk soal selidik telah dibina dan diedarkan untuk mengumpul data berkaitan persepsi ‘actors’ terhadap ‘artefacts’ di dalam SRNS. Responden yang ingin dikaji ialah komuniti penyelidik Malaysia yang berpengalaman menggunakan ‘Social Network Sites’ (SNS) atau SRNS bagi tujuan penyelidikan. ‘Factor analysis’ digunakan untuk mengkategorikan ‘artefacts’ ke dalam komponen yang sama. Komponen ini dibandingkan dengan ‘artefacts’ yang telah dikenalpasti sebelumnya. Akhir sekali, suatu taksonomi telah dibentuk. Dapatan akhir kajian ini menghasilkan ‘actors’ dan ‘artefacts’ penting yang perlu dipertimbangkan kewujudannya dalam SRNS. Terdapat lima tahap kategori iaitu kategori utama, kategori generik, subkategori, subkategori berikutnya dan unit analisis yang sebenar. ‘Actors and Artefacts for Social Research Network Sites’ dilabelkan sebagai kategori utama. ‘Actor’ and ‘Artefact’ adalah kategori generik. Ini adalah struktur utama taksonomi yang telah ditentukan menurut objektif pertama. Kemudian, subkategori adalah dapatan daripada keputusan analisis dan disenaraikan mengikut tahap kepentingan masing-masing. Terdapat tiga ‘actors’ yang dicadangkan iaitu, ‘Research Community’, ‘Organization Administrator’, and ‘System Administrator’. Untuk ‘artefacts’, terdapat lapan cadangan iaitu, ‘Repository’, ‘Talk’, ‘Report’, ‘Profile’, ‘Fund’, ‘Tool’, ‘Privacy’, dan ‘Facility’. Taksonomi yang dicadangkan ialah suatu inisiatif sebagai panduan untuk diambil kira oleh syarikat dan pembangun aplikasi bagi membangunkan suatu SRNS yang praktikal dan komprehensif untuk kegunaan komuniti penyelidik.

## ABSTRACT

The term ‘Social Research Network Sites’ (SRNS) is coined for web-based services that support and enhance research activities. Being introduced to various choices of SRNS, issues arise regarding different inner services and functionalities being provided by these SRNS which depends on their service providers and specific purposes. Consequently, members of researchers’ community need to get themselves registered to more than one SRNS to suit their research necessities. They have to manage few different SRNS to align, share and get information from each of these applications which is inconvenient for researchers. This study proposes a solution for this issue in a model of Actors and Artefacts Taxonomy for Social Research Network Sites. A mixed methods study and analysis to determine significant actors and artefacts for SRNS has been carried out. There are three main objectives of the study which are (i) to identify actors and artefacts discussed in previous works and exists in current applications to support SRNS, (ii) to validate the identified actors and artefacts and discover relationship between them in supporting SRNS and (iii) to develop a taxonomy of actors and artefacts for SRNS. To achieve the first objective, content analyses on scientific documents as well as latest SNS and SRNS applications have been implemented. Questionnaire survey has been constructed and distributed to collect data regarding actors’ perception towards SRNS artefacts. Targeted respondents for this survey are Malaysian researchers’ community who have experiences in using Social Network Sites (SNS) or SRNS for their research purposes. Factor analysis has been performed to categorize artefacts under same components. Finally, a taxonomy is developed. The final result of the study provides significant actors and artefacts to be considered to exist in SRNS. There are five categorization levels which are main category, generic category, subcategory, further subcategory and finally, actual unit of analysis. ‘Actors and Artefacts for Social Research Network Sites’ is labelled as the main category. ‘Actor’ and ‘Artefact’ are generic categories. This is the main structure predefined for the taxonomy according to the first objective. Then, subcategories are derived from the analysis result and listed according to their priority level. There are three suggested actors for SRNS i.e., ‘Research Community’, ‘Organization Administrator’, and ‘System Administrator’. As for the artefacts, there are eight suggestions available i.e., ‘Repository’, ‘Talk’, ‘Report’, ‘Profile’, ‘Fund’, ‘Tool’, ‘Privacy’, and ‘Facility’. Further subcategories are expansion for subcategories. The proposed actors and artefacts taxonomy for SRNS is an initiative to provide feasible suggestion of actors and artefacts to be considered by companies and developers to develop a practical SRNS. By referring this taxonomy, companies and developers may take into consideration upon each actors and artefacts as well as their categorization to be included in their SRNS design to prepare a comprehensive SRNS application environment to serve the researchers community needs.

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## LIST OF SYMBOLS

$\rho$	Significance value
$z$	Standard deviation

## LIST OF ABBREVIATIONS

AAN	Artefact-Actor-Networks
ASN	Academic Social Network
ASNS	Academic Social Network Sites
API	Application Program Interface
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CFA	Confirmatory Factor Analysis
DSG	Doctorate Support Group
EFA	Exploratory Factor Analysis
FOAF	Friend of a Friend protocol
IQR	Interquartile Range
IS	Information System
ISCI	IEEE Symposium on Computers & Informatics
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
LN	Learning Networks
LS	Learning Services
MyGRANTS	Malaysian Greater Research Network System
NCON	National Conference for Postgraduate Research
OSN	Online Social Network
PCA	Principal Component Factor Analysis
PDF	Portable Document Format
PLE	Personal Learning Environment
SEM PLS	Structural Equation Modelling Using Partial Least Squares
SM	Social Media
SME	Small and Medium sized Enterprises
SMS	Short Message Service
SN	Social Network
SNA	Social Network Analysis
SNS	Social Network Sites
SRNS	Social Research Network Sites
SRS	Software Requirements Specification
SSN	Social Semantic Network

UGC	User Generated Content
UMP	Universiti Malaysia Pahang
URL	Uniform Resource Locators
WWW	World Wide Web

## REFERENCES

- Aase, S. (2010). Toward e-professionalism: thinking through the implications of navigating the digital world. *Journal of the American Dietetic Association*, 110(10), 1442–1449.
- Academia.edu - About. (n.d.). Retrieved from <https://www.academia.edu/about>
- Academia.edu - Share research. (n.d.). Retrieved from <https://www.academia.edu/>
- Acord, S. K., and Harley, D. (2013). Credit, time, and personality: The human challenges to sharing scholarly work using Web 2.0. *New Media & Society*, 15(3), 379–397.
- Al-Aufi, A., and Fulton, C. (2015). Impact of social networking tools on scholarly communication: a cross-institutional study. *The Electronic Library*, 33(2), 224–241.
- Al-Yateem, N., Docherty, C., and Rossiter, R. (2016). Determinants of quality of care for adolescents and young adults with chronic illnesses: a mixed methods study. *Journal of Pediatric Nursing*, 31(3), 255–266.
- Ali, M. Y., and Richardson, J. (2018). Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries. *IFLA Journal*, 44(1), 23–34.
- Alonso, S., and Volkens, A. (2012). *Content-analyzing political texts. A quantitative approach*. Centro de Investigaciones Sociológicas.
- AMiner - Open Science Platform. (n.d.). Retrieved from <https://aminer.org/>
- AMiner - Open Science Platform | Introduction. (n.d.). Retrieved from <https://aminer.org/developer#introduction>
- Amir, Z., Abidin, H., Darus, S., and Ismail, K. (2012). Gender differences in the language use of Malaysian teen bloggers. *GEMA Online Journal of Language Studies*, 12(1), 105–124.
- Android. (n.d.). Retrieved from <https://www.android.com/>
- Apandi, S. H., and Arshah, R. A. (2016). Validation of a proposed dashboard model for researchers in social research network sites. *Journal of Theoretical and Applied Information Technology*, 89(2), 409.
- Arcila-Calderón, C., Calderín, M., and Aguaded, I. (2015). Adoption of ICTs by communication researchers for scientific diffusion and data analysis. *El Profesional de La Información*, 24(5), 526–536.
- Artino Jr, A. R., La Rochelle, J. S., Dezee, K. J., and Gehlbach, H. (2014). Developing questionnaires for educational research: AMEE guide no. 87. *Medical Teacher*, 36(6), 463–474.
- Awang, Z. (2012). *Research methodology and data analysis*. Penerbit Universiti Teknologi MARA Press.

- Axinn, W. G., and Pearce, L. D. (2006). *Mixed method data collection strategies*. Cambridge University Press.
- Azza Jauhar, A. T. (2015). Defining professional communication skills for Malaysian graduates: Evidence analysis using ATLAS . ti. *International Journal of Multidisciplinary Approach & Studies*, 2(2), 1–21.
- Baheti, A. D., and Bhargava, P. (2017). Altmetrics: A measure of social attention toward scientific research. *Current Problems in Diagnostic Radiology*, 46(1), 391–392.
- Balakrishnan, V., and Shamim, A. (2013). Malaysian facebookers: Motives and addictive behaviours unraveled. *Computers in Human Behavior*, 29(4), 1342–1349.
- Barjak, F., Lane, J., Poschen, M., Procter, R., Robinson, S., and Wiegand, G. (2010). E-infrastructure adoption in the social sciences and humanities: Cross-national evidence from the AVROSS survey. *Information, Communication & Society*, 13(5), 635–651.
- Bloor, M., and Wood, F. (2006). *Keywords in qualitative methods: A vocabulary of research concepts*. United States: SAGE Publications.
- Boroon, L., Abedin, B., and Erfani, S. (2018). Exploring the dark side of online social networks: A taxonomy of negative effects on users. *Proceedings of 26th European Conference on Information Systems*, 1–10.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40.
- Boyd, D. M., and Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13(1), 210–230.
- Briones, R. L., Kuch, B., Liu, B. F., and Jin, Y. (2011). Keeping up with the digital age: How the American Red Cross uses social media to build relationships. *Public Relations Review*, 37(1), 37–43.
- Brown, C. (2005). Where do molecular biology graduate students find information? *Science & Technology Libraries*, 25(3), 89–104.
- Bullinger, A. C., Hallerstedte, S. H., Renken, U., Soeldner, J.-H., and Moeslein, K. M. (2010). Towards research collaboration – A taxonomy of social research network sites. *Proceedings of Americas Conference of Computer Information Systems*, 1–10.
- Burnard, P. (1996). Teaching the analysis of textual data: an experiential approach. *Nurse Education Today*, 16, 278–281.
- Byrnes, J. E. K., Ranganathan, J., Walker, B. L. E., and Faulkes, Z. (2014). To crowdfund research, scientists must build an audience for their work. *PloS One*, 9(12), e110329.
- Cabrera, D., Roy, D., and Chisolm, M. S. (2018). Social media scholarship and alternative metrics for academic promotion and tenure. *Journal of the American College of Radiology*, 15(1), 135–141.
- Carr, C. T., and Hayes, R. A. (2015). Social media: Defining, developing, and divining. *Atlantic Journal of Communication*, 23(1), 1–43.

- Chakrabarti, A. K., and Santoro, M. D. (2004). Building social capital and learning environment in university - industry relationships. *International Journal of Learning and Intellectual Capital*, 1(1), 19.
- Chang, H. H., and Chuang, S.-S. (2011). Social capital and individual motivations on knowledge sharing: Participant involvement as a moderator. *Information & Management*, 48(1), 9–18.
- Chen, B., and Marcus, J. (2012). Students' self-presentation on Facebook: An examination of personality and self-construal factors. *Computers in Human Behavior*, 28(6), 2091–2099.
- Chen, K. H., Shen, K. S., and Ma, M. Y. (2012). The functional and usable appeal of Facebook SNS games. *Internet Research*, 22(4), 467–481.
- Chen, R. (2013). Living a private life in public social networks: An exploration of member self-disclosure. *Decision Support Systems*, 55(3), 661–668.
- Cheung, C. M. K., Chiu, P.-Y., and Lee, M. K. O. (2011). Online social networks: Why do students use facebook? *Computers in Human Behavior*, 27(4), 1337–1343.
- Chiong, C. (2014). MDA and comScore Release Rankings of top Web Entities in Malaysia for September 2014 - comScore. *comScore*. Retrieved from <http://www.comscore.com/Insights/Press-Releases/2014/11/MDA-and-comScore-Release-Rankings-of-Top-Web-Entities-in-Malaysia-for-September-2014>
- Chiua, C.-M., Chenga, H.-L., Huangb, H.-Y., and Chen, C.-F. (2013). Exploring individuals' subjective well-being and loyalty towards social network sites from the perspective of network externalities: The Facebook case. *International Journal of Information Management*, 33(3), 539–552.
- Cook, J., and Santos, P. (2014). Social network innovation in the Internet's global coffee houses: designing a mobile help seeking tool in learning layers. *Educational Media International*, 51(3), 199–213.
- Creswell, J. W. (2013)a. *Qualitative inquiry and research design: choosing among five approaches* (3rd ed.). United States: SAGE Publications.
- Creswell, J. W. (2013)b. *Research design: Qualitative, quantitative, and mixed methods approaches*. United States: SAGE Publications.
- Creswell, J. W., Plano, C., and Gutmann, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). United States: SAGE Publications.
- Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., and Hanson, W. E. (2003). Advanced mixed methods research designs. *Handbook of Mixed Methods in Social & Behavioral Research* (pp. 209–240). United States: SAGE Publications.
- Czaja, R. (1998). Questionnaire pretesting comes of age. *Marketing Bulletin*, 9(5), 52–66.
- de Rosa, A. S., Dryjanska, L., and Bocci, E. (2018). Mapping the dissemination of the theory of social representations via academic social networks. *Encyclopedia of Information Science and Technology* (pp. 7044–7056). IGI Global.

- De Swert, K. (2012). Calculating inter-coder reliability in media content analysis using Krippendorff's Alpha. *Center for Politics and Communication*, 1–15.
- Dempster, P. G., Woods, D. K., and Wright, J. (2013). Using CAQDAS in the analysis of foundation trust hospitals in the national health service: Mustard seed searches as an aid to analytic efficiency. *Forum: Qualitative Social Research*, 14(2), 3.
- Denzin, N. K. (2009). *The research act: A theoretical introduction to sociological methods*. AldineTransaction.
- Dey, I. (1993). *Qualitative data analysis: A user-friendly guide for social scientists*. Routledge.
- Earnshaw, R. (2017). *State of the art in digital media and applications*. Springer.
- Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice* (2nd ed.). Merrill.
- Elo, S., Kaariainen, M., Kanste, O., Polkki, T., Utriainen, K., and Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, 4(1), 1–10.
- Elo, S., and Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62, 107–115.
- Erzberger, C., and Prein, G. (1997). Triangulation: Validity and empirically-based hypothesis construction. *International Journal of Methodology*, 31(2), 141–154.
- Fidel, R. (2008). Are we there yet?: Mixed methods research in library and information science. *Library & Information Science Research*, 30(4), 265–272.
- Franzosi, R. (2008). *Content analysis: Objective, systematic, and quantitative fescription of content*. *SAGE Benchmarks in Social Research Methods: Content analysis*. SAGE Publications Ltd.
- Free Reference Manager and PDF Organizer - Mendeley. (n.d.). Retrieved from <https://www.mendeley.com/>
- Freelon, D. (2010). ReCal: Intercoder reliability calculation as a web service. *International Journal of Internet Science*, 5(1), 20–33.
- Freelon, D. (2013). ReCal OIR: Ordinal, interval, and ratio intercoder reliability as a web service. *International Journal of Internet Science*, 8(1), 10–16.
- Friese, S. (2011). Using ATLAS. ti for analyzing the financial crisis data. *Forum: Qualitative Social Research*, 12(1).
- Friese, S. (2014). *Qualitative data analysis with ATLAS. ti*. Sage.
- Friesike, S., Widenmayer, B., Gassmann, O., and Schildhauer, T. (2014). Opening science: towards an agenda of open science in academia and industry. *The Journal of Technology Transfer*, 40(4), 581–601.
- Garaizar, P., and Reips, U.-D. (2013). Build your own social network laboratory with Social Lab: A tool for research in social media. *Behavior Research Methods*.

- Ge, J., and Gretzel, U. (2018). A taxonomy of value co-creation on Weibo—a communication perspective. *International Journal of Contemporary Hospitality Management*, 30(4), 2075–2092.
- Gottschalk, P. (2001). Descriptions of responsibility for implementation: A content analysis of strategic information systems/technology planning documents. *Technological Forecasting and Social Change*, 68(1), 207–221.
- Greene, J. C., and Caracelli, V. J. (1997). Advances in mixed-method evaluation: the challenges and benefits of integrating diverse paradigms. *New Directions for Evaluation*, 54(74), 97.
- Greenhow, C., and Gleason, B. (2015). The social scholar: Re-interpreting scholarship in the shifting university. *On the Horizon*, 23(4), 277–284.
- Gruzd, A., Staves, K., and Wilk, A. (2012). Connected scholars: Examining the role of social media in research practices of faculty using the UTAUT model. *Computers in Human Behavior*, 28(6), 2340–2350.
- Hafizi, R., Miskon, S., Rahman, A. A., Sim, A. T. H., Abdullah, N. S., and Ahmad, N. (2016). Analyzing sharing experiences in government sector based on shared service perspective. *Journal of Theoretical and Applied Information Technology*, 88(1), 123.
- Hanna, R., Rohm, A., and Crittenden, V. L. (2011). We're all connected: The power of the social media ecosystem. *Business Horizons*, 54(3), 265–273.
- Hassan, M. K., Mohamed, H., Ashaari, N. S., Sahran, S., and Hanawi, S. A. (2002). *Statistik untuk teknologi maklumat & industri*. McGraw-Hill.
- Hayes, A. F., and Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1(1), 77–89.
- Heidemann, J., Klier, M., and Probst, F. (2012). Online social networks : A survey of a global phenomenon. *Computer Networks*, 56(18), 3866–3878.
- Herring, S. C. (2004). Computer-mediated discourse analysis: An approach to researching online communities. *Designing for Virtual Communities in the Service of Learning*, 338–376.
- Herring, S. C. (2010). Web content analysis: Expanding the paradigm. *International Handbook of Internet Research* (pp. 233–249).
- Herring, S. C., Scheidt, L. A., Kouper, I., and Wright, E. (2007). Longitudinal content analysis of blogs: 2003-2004. *Blogging, Citizenship and the Future of Media* (pp. 3–20).
- Herring, S. C., Scheidt, L. A., Wright, E., and Bonus, S. (2005). Weblogs as a bridging genre. *Information Technology & People*, 18(2), 142–171.
- Higginbottom, G. M. A. (2004). Sampling issues in qualitative research. *Nurse Researcher*.



- Holland, C. P., and Gutiérrez-Leefmans, M. (2018). A taxonomy of SME e-commerce platforms derived from a market-level analysis. *International Journal of Electronic Commerce*, 22(2), 161–201.
- How Has Doctorate Support Group Been Helping You In Your Postgraduate Journey? (n.d.). Retrieved from [https://web.facebook.com/groups/doctsupp/permalink/1041027215923437/?qa\\_ref=pp&\\_rdc=1&\\_rdr](https://web.facebook.com/groups/doctsupp/permalink/1041027215923437/?qa_ref=pp&_rdc=1&_rdr)
- Hrastinski, S., and Aghaee, N. M. (2011). How are campus students using social media to support their studies? An explorative interview study. *Education and Information Technologies*, 17(4), 451–464.
- Hu, C., and Racherla, P. (2008). Visual representation of knowledge networks: A social network analysis of hospitality research domain. *International Journal of Hospitality Management*, 27(2), 302–312.
- Hum, N. J., Chamberlin, P. E., Hambright, B. L., Portwood, A. C., Schat, A. C., and Bevan, J. L. (2011). A picture is worth a thousand words: A content analysis of Facebook profile photographs. *Computers in Human Behavior*, 27(5), 1828–1833.
- Hwang, S. (2008). Utilizing qualitative data analysis software: a review of Atlas. ti. *Social Science Computer Review*, 26(4), 519–527.
- Igbaria, M., Guimaraes, T., and Davis, G. B. (1995). Testing the determinants of microcomputer usage via a structural equation model. *Journal of Management Information Systems*, 11(4), 87–114.
- Imran, A. S., Pireva, K., Dalipi, F., and Kastrati, Z. (2016). An analysis of social collaboration and networking tools in elearning. *Proceedings of International Conference on Learning and Collaboration Technologies*, 332–343.
- InCites™. (n.d.). Retrieved from <https://jcr.incites.thomsonreuters.com/>
- iOS 9 - Apple. (n.d.). Retrieved from <http://www.apple.com/ios/>
- Jabr, N. H. (2011). Social networking as a tool for extending academic learning and communication. *International Journal of Business & Social Science*, 2(12), 93–102.
- Jie Tang (Tang, Jie) 's Homepage. (n.d.). Retrieved from <http://keg.cs.tsinghua.edu.cn/jietang/>
- Johnson, R. B., Onwuegbuzie, A. J., and Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133.
- Jordan, K. (2016). Digital scholarship and the social networking site: How academics conceptualise their networks on academic social networking sites and Twitter. *Selected Papers in Internet Research, Association of Internet Researchers*.
- Jordan, K. (2017). Understanding the structure and role of academics' ego-networks on social networking sites. The Open University.

- Jordan, K., and Weller, M. (2018). Communication, collaboration and identity: Factor analysis of academics' perceptions of online networking. *Research in Learning Technology*, 26.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36.
- Kaplan, A. M., and Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59–68.
- Karlsson, M., Bergström, A., Clerwall, C., and Fast, K. (2015). Participatory journalism - the (r)evolution that wasn't. Content and user behavior in Sweden 2007-2013. *Journal of Computer-Mediated Communication*, 20(3), 295–311.
- Kjellberg, S., Haider, J., and Sundin, O. (2016). Researchers' use of social network sites: A scoping review. *Library & Information Science Research*, 38(3), 224–234.
- Koch, M., and Richter, A. (2009). *Enterprise 2.0: Planung, einföhrung und erfolgreicher einsatz von social software in unternehmen*. Booksgooglecom.
- Koper, R. (2009). *Learning network services for professional development. Learning Network Services for Professional Development*.
- Kowald, D., Dennerlein, S., Theiler, D., Walk, S., and Trattner, C. (2013). The social semantic server a framework to provide services on social semantic network data. *Proceedings of I-SEMANTICS 2013 Posters & Demonstrations Track co-located with 9th International Conference on Semantic Systems*, 50–54.
- Krejcie, R. V, and Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607–610.
- Krippendorff, K. (1989). *Content analysis. International Encyclopedia of Communication*. Oxford University Press New York.
- Krippendorff, K. (2004). Reliability in content analysis. *Human Communication Research*, 30(3), 411–433.
- Krippendorff, K. (2013). *Content analysis: An introduction to its methodology*. United States: SAGE Publications.
- Krumm, J., Davies, N., and Narayanaswami, C. (2008). User-generated content. *IEEE Pervasive Computing*, 7, 10–11.
- Kusumowidagdo, A., Sachari, A., and Widodo, P. (2016). Visitors' perceptions on the important factors of atrium design in shopping centers: A study of Gandaria City Mall and Ciputra World in Indonesia. *Frontiers of Architectural Research*, 5(1), 52–62.
- Learning Layers. (n.d.). Retrieved from <http://learning-layers.edu>
- Leon, A. C., Davis, L. L., and Kraemer, H. C. (2011). The role and interpretation of pilot studies in clinical research. *Journal of Psychiatric Research*, 45(5), 626–629.

- Lim, S. S., Chan, Y. H., Vadrevu, S., and Basnyat, I. (2013). Managing peer relationships online – Investigating the use of Facebook by juvenile delinquents and youths-at-risk. *Computers in Human Behavior*, 29(1), 8–15.
- Lincoln, Y. S., and Guba, E. G. (1985). *Naturalistic inquiry* (Vol. 75). Sage.
- Ljepava, N., Orr, R. R., Locke, S., and Ross, C. (2013). Personality and social characteristics of Facebook non-users and frequent users. *Computers in Human Behavior*, 29(4), 1602–1607.
- Lombard, M., Snyder - Duch, J., and Bracken, C. C. (2002). Content analysis in mass communication: Assessment and reporting of intercoder reliability. *Human Communication Research*, 28(4), 587–604.
- Lombard, M., Synder-Duch, J., and Bracken, C. C. (2010). Practical resources for assessing and reporting intercoder reliability in content analysis research projects. *Matthew Lombard*. Retrieved from <http://matthewlombard.com/reliability/>
- Lozano-Alvarez, A., Asensio-Perez, J. I., Vega-Gorgojo, G., and Martinez-Mones, A. (2015). Helping teachers align learning objectives and evidence: Integration of ePortfolios in distributed learning environments. *Journal of Universal Computer Science*, 21(8), 1022–1041.
- Maceviciute, E. (2014). Research libraries in a modern environment. *Journal of Documentation*, 70(2), 282–302.
- Mackey, A., and Gass, S. M. (2015). *Second language research: Methodology and design* (2nd ed.). Routledge.
- Macnamara, J. (2006). Media content analysis: Its uses; Benefits and best practice methodology. *Asia Pacific Public Relations Journal*, 6(1), 1–34.
- Madhusudhan, M. (2012). Use of social networking sites by research scholars of the University of Delhi: A study. *International Information and Library Review*, 44(2), 100–113.
- Mahara ePortfolio System. (n.d.). Retrieved from <http://mahara.org>
- Manikandan, S. (2011). Measures of dispersion. *Journal of Pharmacology and Pharmacotherapeutics*, 2(4), 315.
- Marin, A., and Wellman, B. (2011). Social network analysis: An introduction. *Handbook of Social Network Analysis*.
- Markauskaite, L., and Wardak, D. (2015). Research students' conceptions of the role of information and communication technologies in educational technology research. *Australasian Journal of Educational Technology*, 31(4).
- Masud, S., Afrin, M., Choudhury, F. M., and Ahmed, S. I. (2012). VizResearch: Linking the knowledge of people and the people with knowledge. *Proceedings of Procedia Computer Science*, 1416–1425.

- McMillan, S. J. (2000). The microscope and the moving target: The challenge of applying content analysis to the World Wide Web. *Journalism & Mass Communication Quarterly*, 77(1), 80–98.
- Meishar-Tal, H., and Pieterse, E. (2017). Why do academics use academic social networking sites? *The International Review of Research in Open and Distributed Learning*, 18(1).
- Miskon, S., Bandara, W., Fielt, E., and Gable, G. (2010). Understanding shared services: an exploration of the IS literature. *Proceedings of International Journal of E-Services & Mobile Applications*, 373–384.
- Mohamad, A. M. (2014). Using ATLAS.ti 7 for researching the socio-legal implications of ICT adoption in the justice system of the high courts of Malaysia. *Proceedings of ATLAS.ti User Conference 2013 : Fostering Dialog on Qualitative Methods*, 1–17.
- Morgan, E. M., Snelson, C., and Elison-Bowers, P. (2010). Image and video disclosure of substance use on social media websites. *Computers in Human Behavior*, 26(6), 1405–1411.
- Morisaki, K., Tsukai, M., and Namba, Y. (2013). An analysis on unstated concern and stated thought during a discourse in public issue. *Proceedings of Group Decision and Negotiation*, 286–297.
- Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research*, 40(2), 120–123.
- Mostafa, M. M. (2013). More than words: Social networks' text mining for consumer brand sentiments. *Expert Systems with Applications*, 40(10), 4241–4251.
- Muijs, D. (2010). *Doing quantitative research in education with SPSS*. SAGE Publications.
- MYREN Malaysian Research and Education Network. (n.d.). Retrieved from <http://www.myren.net.my/index.php>
- Naderbeigi, F., and Isfandyari-Moghaddam, A. (2018). Researchers' scientific performance in researchgate: The case of a technology university. *Library Philosophy and Practice*.
- National education statistic : Higher education sector 2013*. (2014).
- Nentwich, M. (2003). *Cyberscience: Research in the age of the internet*. Vienna: Austrian Academy of Sciences Press.
- Nentwich, M., and König, R. (2014). Academic goes Facebook? The potential of social network sites in the scholarly realm. *Opening Science: The Evolving Guide on How the Internet is Changing Research, Collaboration and Scholarly Publishing* (pp. 107–124). Cham: Springer International Publishing.
- Neuendorf, K. A. (2002). *The content analysis guidebook*. United States: SAGE Publications.

- Newbold, C., Boyd-Barrett, O., and Bulk, H. Van Den. (2002). *The media book*. Arnold.
- Nickerson, R., Muntermann, J., Varshney, U., and Isaac, H. (2009). Taxonomy development in information systems: Developing a taxonomy of mobile applications. *Proceedings of European Conference in Information Systems*.
- Niyazov, Y., Vogel, C., Price, R., Lund, B., Judd, D., Akil, A., ... Shron, M. (2016). Open access meets discoverability: Citations to articles posted to academia.edu. *PLoS One*, *11*(2), 1–23.
- Nunnally, J. (1978). *Psychometric methods*. New York: McGraw-Hill.
- O’Leary, D. E. (2011). Blog mining-review and extensions: “From each according to his opinion.” *Decision Support Systems*, *51*(4), 821–830.
- Obar, J. A., and Wildman, S. S. (2015). Social media definition and the governance challenge: An introduction to the special issue. *Telecommunications Policy*, *9*(39), 745–750.
- Ortega, J. L. (2015). Disciplinary differences in the use of academic social networking sites. *Online Information Review*, *39*(4), 520–536.
- Othman, M. S., Suhaimi, S. M., Yusuf, L. M., and Mohamad, N. (2012). An analysis of social network categories: Social learning and social friendship. *Social and Behavioral Sciences*, *56*(1), 441–447.
- Paia, P., and Arnott, D. C. (2013). User adoption of social networking sites: Eliciting uses and gratifications through a means–end approach. *Computers in Human Behavior*, *29*(3), 1039–1053.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., and Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 1–12.
- Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research*, *34*(Patton 1990), 1189–1208.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). United States: SAGE Publications.
- Prat, N., Comyn-Wattiau, I., and Akoka, J. (2015). A taxonomy of evaluation methods for information systems artifacts. *Journal of Management Information Systems*, *32*(3), 229–267.
- Procter, R., Williams, R., Stewart, J., Poschen, M., Snee, H., Voss, A., and Asgari-Targhi, M. (2010). Adoption and use of Web 2.0 in scholarly communications. *Philosophical Transactions of the Royal Society*, *368*(1926), 4039–4056.
- Reinhardt, W. (2009). Tracking the dynamics of social communities – Visualising altering word clouds of Twitter groups. *Proceedings of Forthcoming: Special Track on MashUps for Learning at the ICL2009*, 783–788.

- Reinhardt, W., Varlemann, T., and Moi, M. (2009). Artefact-actor-networks as tie between social networks and artefact networks. *Proceedings of 2009 5th International Conference on Collaborative Computing: Networking, Applications and Worksharing*.
- Reinhardt, W., Varlemann, T., Moi, M., and Wilke, A. (2010). Modeling, obtaining and storing data from social media tools with Artefact-Actor-Networks. *Proceedings of 18th ABIS workshop*.
- Reinhardt, W., Wilke, A., Moi, M., Drachsler, H., and Sloep, P. (2012). Mining and visualizing research networks using the artefact-actor-nNetwork approach. *Computational Social Networks* (pp. 233–267). Springer London.
- Richthammer, C., Netter, M., Riesner, M., Sanger, J., and Pernul, G. (2014). Taxonomy of social network data types. *Journal on Information Security*, 11(1), 1–17.
- Rohani, V. A., and Ow, S. H. (2012). A framework for e-content generation, management and integration in MYREN network. *Lecture Notes in Electrical Engineering (LNEE)* (pp. 293–298).
- Rowlands, I., Nicholas, D., Russell, B., Canty, N., and Watkinson, A. (2011). Social media use in the research workflow. *Learned Publishing*, 24(3), 183–195.
- Ruiz-Calleja, A., Dennerlein, S., Ley, T., and Lex, E. (2016). Visualizing workplace learning data with the SSS dashboard. *Proceedings of International Workshop on Learning Analytics Across Physical and Digital Spaces*, 79–86.
- Ruiz-Calleja, A., Dennerlein, S., Tomberg, V., Pata, K., Ley, T., Theiler, D., and Lex, E. (2015). Supporting learning analytics for informal workplace learning with a social semantic infrastructure. *Design for Teaching and Learning in a Networked World* (pp. 634–637). Springer.
- Salahshour, M., Dahlan, H. M., Iahad, N. A., and Nilashi, M. (2017). The role of demographic factors on academic social networking sites use behaviour from academic researchers perspective. *Journal of Soft Computing and Decision Support Systems*, 4(4), 11–16.
- Scarmozzino, E., Corvello, V., and Grimaldi, M. (2017). Entrepreneurial learning through online social networking in high-tech startups. *International Journal of Entrepreneurial Behavior & Research*, 23(3), 406–425.
- Scheidt, L. A., and Wright, E. (2004). Common Visual Design Elements of Weblogs. *Into the Blogosphere: Rhetoric, Community, and Culture of Weblogs*. Retrieved from [http://conservancy.umn.edu/bitstream/handle/11299/172810/Scheidt-Wright\\_Common\\_Visual\\_Design\\_Elements\\_of\\_Weblogs.pdf?sequence=1&isAllowed=y](http://conservancy.umn.edu/bitstream/handle/11299/172810/Scheidt-Wright_Common_Visual_Design_Elements_of_Weblogs.pdf?sequence=1&isAllowed=y)
- Scheliga, K., and Friesike, S. (2014). Putting open science into practice: A social dilemma? *First Monday*, 19(9).
- Schneider, S. M., and Foot, K. a. (2004). The web as an object of study. *New Media & Society*, 6(1), 114–122.

- Schoder, D., Gloor, P. a., and Metaxas, P. T. (2012). Social media and collective intelligence—Ongoing and future research streams. *Künstliche Intelligenz*, 27(1), 9–15.
- Schreier, M. (2012). *Qualitative content analysis in practice*. Sage Publications.
- Scopus - Document search. (n.d.). Retrieved from <https://www.scopus.com/>
- Scott, J. (2011). Social network analysis: developments, advances, and prospects. *Proceedings of Social Network Analysis and Mining*, 21–26.
- Scott, J., and Carrington, P. J. (2017). *The SAGE handbook of social network analysis*. SAGE publications.
- Shanahan, M. C. (2016). Workplace access to journals : Is it sufficient to support quality healthcare practice in medical imaging workers? *Internet Journal of Allied Health Sciences and Practice*, 14(1), 1–10.
- SJR - Journal Search. (n.d.). Retrieved from <http://www.scimagojr.com/journalsearch.php>
- Smit, B. (2002). Atlas.ti for qualitative data analysis. *Perspectives in Education*, 20(September), 65–76.
- Snelson, C. L. (2016). Qualitative and mixed methods social media research: A review of the literature. *International Journal of Qualitative Methods*, 15(1), 1–15.
- Talib, O. (2013). *Asas penulisan tesis penyelidikan & statistik*. Selangor: Penerbit Universiti Mutra Malaysia.
- Tang, J., Zhang, J., Yao, L., Li, J., Zhang, L., and Su, Z. (2008). Arnetminer: extraction and mining of academic social networks. *Proceedings of 14th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 990–998. ACM.
- Tashakkori, A., and Charles, T. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. *Applied social research method series* (Vol. 5). United States: Sage Publications.
- Tashakkori, A., and Creswell, J. W. (2007). Editorial: The new era of mixed methods. *Journal of Mixed Methods Research*, 1(1), 3–7.
- Teddlie, C., and Tashakkori, A. (2003). Major issues and controversions in the use of mixed methods in the social and behavioral sciences. *Handbook of Mixed Methods in Social & Behavioral Research* (pp. 3–50). United States: Sage Publications.
- Teddlie, C., and Tashakkori, A. (2010). Overview of contemporary issue in mixed methods research. *SAGE Handbook of Mixed Methods in Social & Behavioral Research* (2nd ed., pp. 1–41). SAGE Publications.
- The Facebook Graph API 2.0. (n.d.). Retrieved from <http://developers.facebook.com/docs/graph-api>

- Thelwall, M., and Kousha, K. (2015). ResearchGate: Disseminating, communicating, and measuring Scholarship? *Journal of the Association for Information Science and Technology*, 66(5), 876–889.
- Today At Build—New Possibilities With The Office platform. (n.d.). Retrieved from <https://blogs.office.com/2015/04/29/today-at-build-new-possibilities-for-the-office-platform/>
- Tran, H. T. T., and Corner, J. (2016). The impact of communication channels on mobile banking adoption. *International Journal of Bank Marketing*, 34(1), 78–109.
- Ullmann, T. D., Wild, F., Scott, P., Duval, E., Parra, G., Reinhardt, W., ... Gillet, D. (2010). A science 2.0 infrastructure for technology-enhanced learning. *Proceedings of 5th Conference on Technology Enhanced Learning.*, 590–595.
- Urbaniak, G. C., and Plous, S. (n.d.). Research Randomizer (Version 4.0).
- Valdez, A. C., Schaar, A. K., and Ziefle, M. (2012). State of the (net)work address developing criteria for applying social networking to the work environment. *Work*, 41(SUPPL.1), 3459–3467.
- Van, C., Costa, D., Abbott, P., Mitchell, B., and Krass, I. (2012). Community pharmacist attitudes towards collaboration with general practitioners: development and validation of a measure and a model. *BMC Health Services Research*.
- Vasiliauskaite, Z. (2015). Help-seeking and perceived helpfulness of formal help sources for victims of domestic violence: An exploratory study. *European Scientific Journal*, 11(26).
- Wan Ahmad, W. M., Razali, R., and Yao, L. (2014). Social networking dramework for MyGRANTS research portal. *Australian Journal of Basic and Applied Sciences*, 8(April), 185–191.
- Ward, J., Bejarano, W., and Dudás, A. (2015). Scholarly social media profiles and libraries: A review. *LIBER Quarterly*. Igitur, Utrecht Publishing and Archiving Services.
- Wasserman, S., and Faust, K. (1994). *Social network analysis : methods and applications*. *American Ethnologist* (Vol. 24).
- Weare, C., and Lin, W. (2000). Content analysis of the World Wide Web - Opportunities and challenges. *Social Science Computer Review*.
- Weaver, J., and Tarjan, P. (2013). Facebook linked data via the graph API. *Semantic Web*, 4, 245–250.
- Web of Science. (n.d.). Retrieved from <https://apps.webofknowledge.com>
- Weber, R. P. (1990). *Basic content analysis*. Sage (2nd ed.). Sage Publications, Inc.
- Whitehill, J. M., Brockman, L. N., and Moreno, M. A. (2013). “Just talk to me”: communicating with college students about depression disclosures on Facebook. *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*, 52(1), 122–127.



- Yang, T. A., and Kim, D. J. (2010). A comparative analysis of online social networking sites and their business models (pp. 2010–2012).
- Zhang, Y., and Wildemuth, B. M. (2009). Qualitative analysis of content. *Applications of Social Research Methods to Questions in Information and Library Science* (pp. 308–319). Libraries Unlimited.
- Zhao, S., Grasmuck, S., and Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, 24(5), 1816–1836.