

PENGEMBANGAN KURIKULUM PELATIHAN *MINE SURVEYING*

DISERTASI

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Doktor Program Studi
Pengembangan Kurikulum



Promovendus

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**PROGRAM STUDI
PENGEMBANGAN KURIKULUM
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
2019**

Pengembangan Kurikulum Pelatihan *Mine Surveying*

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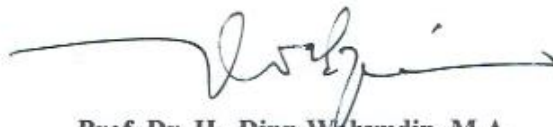
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Pernyataan

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Yang membuat pernyataan,



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ABSTRAK

Syafril Ramadhon Pengembangan Kurikulum Pelatihan *Mine Surveying* (2019).

Mine surveying merupakan salah satu bidang pekerjaan yang menentukan keberhasilan kegiatan pertambangan. Oleh karena itu pengembangan sumber daya manusia di bidang tersebut melalui kegiatan pelatihan merupakan aspek penting yang harus dikelola secara optimal. Namun, terdapat beberapa kesenjangan terkait kurikulum pelatihan *mine surveying* yang sekarang berlaku, yaitu: standar kompetensi yang dijadikan acuan tidak terdapat jenjang pelatihan berdasarkan pendidikan dan pengalaman kerja serta dokumen kurikulum *mine surveying* yang bersifat “*inertia*”. Atas dasar tersebut, penelitian ini bertujuan untuk menghasilkan berbagai kompetensi yang dibutuhkan *mine surveyor* berdasarkan jenjang pendidikan dan pengalaman kerja, pengaruh jenjang pendidikan dan pengalaman kerja terhadap kebutuhan kompetensi *mine surveyor*, konten, strategi pembelajaran serta strategi penilaian yang sesuai untuk pelatihan *mine surveying*. Penelitian dilakukan melalui pendekatan kuantitatif dan kualitatif. Temuan dalam penelitian ini, yaitu: kebutuhan kompetensi *mine surveyor* lulusan pendidikan menengah adalah pada kompetensi yang berkaitan dengan pelaksanaan berbagai jenis aktivitas pengukuran dan aspek pelaksanaan K3, sedangkan kebutuhan kompetensi *mine surveyor* lulusan diploma dan sarjana relatif sama, yaitu berkaitan dengan perencanaan dan pengolahan data pada berbagai jenis kegiatan pengukuran; pelaksanaan K3; pembuatan laporan serta pekerjaan yang bersifat administratif. Konten dikembangkan dengan sekuen logis yang berpijak pada perkembangan ilmu pengetahuan dan teknologi di bidang *mine surveying*. Strategi pembelajaran yang ditetapkan adalah melalui pendekatan pembelajaran yang berpusat pada peserta pelatihan. Adapun strategi penilaian yang ditetapkan adalah berdasarkan performa setiap peserta pelatihan pada setiap kompetensi yang disyaratkan. Rekomendasi untuk penelitian selanjutnya adalah pada aspek implementasi dan evaluasi kurikulum serta analisis kebutuhan *soft skills* di bidang *mine surveying*.

Kata Kunci: *Mine surveying*, kompetensi, *mine surveyor*, kurikulum pelatihan

ABSTRACT

Syafril Ramadhon Mine Surveying Training Curriculum Development (2019).

Mine surveying is one of the work areas determining the success of the mining activities. Consequently, the human resource development in the field through training activities is an important aspect that must be managed optimally. However, there are some gaps related to the current mine surveying training curriculum, which are: the competency standards used as references do not have any training levels based on education and work experience; and mine surveying curriculum document is "inertia". Therefore, this study aims to produce various competencies needed by the mine surveyors in line with their education and work experience levels, the influence of their education and work experience levels on the needs of the mine surveyors' competencies as well as the content, the learning strategy, and the assessment strategy which are appropriate for the mine surveying training. Research is done through quantitative and qualitative approaches. In addition, it is found that the competency needs of the mine surveyors of the high school education graduates are on the competencies related to the implementation of various measurement activities and the implementation aspect of the Occupational Safety and Health, while the competency needs of the mines surveyors of diploma and bachelor graduates are relatively the same, related to the data planning and processing on various measurement activities; the Occupational Safety and Health implementation; the report arrangement; and the administrative work. The content is developed with a logical sequence that builds on the science and technology development in the mine surveying field. The learning strategy determined is the student-centered learning approach. The assessment strategy is according to the performance of each training participant on each competency required. Recommendations for further research are the aspects of curriculum implementation and evaluation and analyzing the soft skill needs in the mine surveying field.

Keywords: Mine surveying, competency standard, mine surveyor, training curriculum

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DAFTAR PUSTAKA

1. Buku dan Artikel Jurnal

- Aboelela, S. W., Larson, E., Bakken, S., Formicola, A., Glied, S. A., Haas, J., & Gebbie, K. M. (2007). Defining Interdisciplinary Research : Conclusions from a. *Health Research and Educational Trust*, 1(March), 329–346. <https://doi.org/10.1111/j.1475-6773.2006.00621.x>
- Albashiry, N. M., Voogt, J. M., & Pieters, J. M. (2015). Improving curriculum development practices in a technical vocational community college: examining effects of a professional development arrangement for middle managers. *Curriculum Journal*, 26(3), 425–451. <https://doi.org/10.1080/09585176.2015.1040041>
- Ali, M. (2003). The Use of Professional Development School for Developing Student-teachers Professional Competencies. In *Proceeding Conference on Computers and Advanced Technology in Education* (pp. 5–18).
- Ali, M. (2015). *Education for National Development A Case Study of Indonesia*. Bandung: UPI PRESS.
- Ali, M. (2017). *Curriculum Development for Sustainability Education*. Bandung: UPI PRESS.
- Ali, M. (2019). *Research Methods in Sustainability Education*. Bandung: UPI PRESS.
- Ali, M., & Hayat, B. (2019). Non-academic factors influencing students' achievement: a study in the Indonesian madrasahs. *International Journal of Learning and Intellectual Capital*, 16(2), 180. <https://doi.org/10.1504/ijlic.2019.098944>
- Ali, M., & Hamied, F. (2019). Pendidikan Tinggi Pada Era Revolusi Industri 4.0. In F. Hamied & K. Komalasari (Eds.), *Ilmu Pendidikan, Pendidikan Bahasa dan Seni di Era Revolusi Industri 4.0* (pp. 99–121). Bandung: UPI PRESS
- Alipour, M., & Shahnavaz, A. (2009). A Study of on the Job Training Effectiveness : Empirical Evidence of Iran. *International Journal of Business Management*, 4(11), 63–68.
- Allen, W. C. (2006). Overview and Evolution of the ADDIE Training System. *Advances in Developing Human Resources*, 8(4), 430–441. <https://doi.org/10.1177/1523422306292942>
- Allison, P., Gray, S., Sproule, J., Nash, C., Martindale, R., & Wang, J. (2015). Exploring contributions of project-based learning to health and wellbeing in secondary education. *Improving Schools*, 18(3), 207–220. <https://doi.org/10.1177/1365480215599298>
- Allsop, D., & Calveley, M. (2009). Miners' identity and the changing face of the labour process within the UK coal mining industry. *Qualitative Research in Accounting & Management*, 6(1/2), 57–69. <https://doi.org/10.1108/11766090910940665>
- Anane, C. A. (2013). Competency Based Training : Quality Delivery For Technical And Vocational Education And Training (TVET) Institutions. *Educational Research International*, 2(2), 117–127. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Attard, A., Di Iorio, E., Geven, K., & Santa, R. (2010). *Student-centred learning -*

Toolkit for students, staff and Higher Education Institutions. Education International. Brussels.

- Auster, E. R., & Wylie, K. K. (2006). Creating active learning in the classroom: A systematic approach. *Journal of Management Education*, 30(2), 333–353. <https://doi.org/10.1177/1052562905283346>
- Bahrin, M. A. K., Othman, M. F., Azli, N. H. N., & Talib, M. F. (2016). Industry 4.0: A review on industrial automation and robotic. *Jurnal Teknologi*, 78(6–13), 137–143. <https://doi.org/10.11113/jt.v78.9285>
- Batarliene, N., Čižiuniene, K., Vaičiute, K., Šapalaite, I., & Jarašuniene, A. (2017). The Impact of Human Resource Management on the Competitiveness of Transport Companies. *Procedia Engineering*, 187, 110–116. <https://doi.org/10.1016/j.proeng.2017.04.356>
- Ben-Awuah, E., Richter, O., Elkington, T., & Pourrahimian, Y. (2016). Strategic mining options optimization: Open pit mining, underground mining or both. *International Journal of Mining Science and Technology*, 26(6), 1065–1071. <https://doi.org/10.1016/j.ijmst.2016.09.015>
- Benson, G. S., Finegold, D., & Mohrman, S. (2004). You paid for the skills, now keep them: Tuition-reimbursement and voluntary turnover. *Academy of Management Journal*, 47(3), 315–333. <https://doi.org/10.2307/20159584>
- Bergenhengouwen, G. J., ten Horn, H. F. K., & Mooijman, E. A. M. (1996). Competence development - a challenge for HRM professionals: core competences of organizations as guidelines for the development of employees. *Journal of European Industrial Training*, 20(9), 29–35. <https://doi.org/10.1108/03090599610150282>
- Bertrand, J. T., Brown, J. E., & Ward, V. M. (1992). Techniques for Analyzing Focus Group Data. *Evaluation Review*, 16(2), 198–209. <https://doi.org/10.1177/0193841X9201600206>
- Boahin, P., & Hofman, W. H. A. (2014). Perceived effects of competency-based training on the acquisition of professional skills. *International Journal of Educational Development*, 36, 81–89. <https://doi.org/10.1016/j.ijedudev.2013.11.003>
- Boone, H. N. J., & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension*, 50(2), 30. <https://doi.org/10.1111/j.1365-2929.2004.02012.x>
- Boye Kuranchie-Mensah, E., & Amponsah-Tawiah, K. (2015). Journal of Industrial Engineering and Management Employee Motivation and Work Performance: A Comparative Study of Mining Companies in Ghana. *Journal of Industrial Engineering and Management*, 9(2), 255–309. <https://doi.org/10.3926/jiem.1530>
- Brière, S., Proulx, D., Flores, O. N., & Laporte, M. (2015). Competencies of project managers in international NGOs: Perceptions of practitioners. *International Journal of Project Management*, 33(1), 116–125. <https://doi.org/10.1016/j.ijproman.2014.04.010>
- Brophy, M., & Kiely, T. (2002). Competencies: a new sector. *Journal of European Industrial Training*, 26(2/3/4), 165–176. <https://doi.org/10.1108/03090590210422049>
- Bryman, A. (2007). Barriers to Integrating Quantitative and Qualitative Research. *Journal of Mixed Methods Research*, 1(1), 8–22. <https://doi.org/10.1177/234567890629053>

- Buckley, R., & Caple, J. (2009). *The Theory & Practice of Training 6th Edition*. London and Philadelphia: Kogan Page.
- Campion, M. a, & Odman, R. B. (2011). Doing competencies well: Best practice in competency modelling. *Personnel Psychology*, *64*, 225–262. <https://doi.org/10.1111/j.1744-6570.2010.01207.x>
- Cania, L. (2014). The Impact of Strategic Human Resource Management on Organizational Performance. *Economia. Seria Management*, *17*(2), 373–383.
- Carr, R., Palmer, S., & Hagel, P. (2015). Active learning: The importance of developing a comprehensive measure. *Active Learning in Higher Education*, *16*(3), 173–186. <https://doi.org/10.1177/1469787415589529>
- Caspi, J. (2008). Building a sibling aggression treatment model: Design and development research in action. *Research on Social Work Practice*, *18*(6), 575–585. <https://doi.org/10.1177/1049731508316051>
- Castellan, C. M. (2010). Quantitative and Qualitative Research: A View for Clarity. *International Journal of Education*, *2*(2), 1–14. <https://doi.org/10.5296/ije.v2i2.446>
- Castilla-Gómez, J., & Herrera-Herbert, J. (2015). Environmental analysis of mining operations: Dynamic tools for impact assessment. *Minerals Engineering*, *76*, 87–96. <https://doi.org/10.1016/j.mineng.2014.10.024>
- Cawood, F. T., & Richards, W. J. (2007). A review of the role of the coal mine surveyor in South Africa. *Journal of the Southern African Institute of Mining and Metallurgy*, *107*(2), 109–114.
- Cecil, A., & Krohn, B. (2012). The Process of Developing a Competency-Based Academic Curriculum in Tourism Management. *Journal of Teaching in Travel and Tourism*, *12*(2), 129–145. <https://doi.org/10.1080/15313220.2011.624417>
- Chiu, L. K., Mahat, N. I., Rashid, B., Razak, N. A., & Omar, H. (2016). Assessing Students' Knowledge and Soft Skills Competency in the Industrial Training Programme: The Employers' Perspective. *Review of European Studies*, *8*(1), 123. <https://doi.org/10.5539/res.v8n1p123>
- Cho, Y. S., Maysami, R., Jung, J., Lee, C. C., States, U., & States, U. (2016). *International Journal of Supply and Operations Management*, *3*(1), 1102–1111.
- Chyung, S. Y., Stepich, D., & Cox, D. (2006). Building a Competency-Based Curriculum Architecture to Educate 21st-Century Business Practitioners. *Journal of Education for Business*, *81*(6), 307–314. <https://doi.org/10.3200/JOEB.81.6.307-314>
- Cimatti, B. (2016). Definition, Development, Assessment of Soft Skills and Their Role for The Quality of Organizations and Enterprises. *International Journal for Quality Research*, *10*(1), 97–130.
- Clarke, N. (2003). The politics of training needs analysis. *Journal of Workplace Learning*, *15*(4), 141–153. <https://doi.org/10.1108/13665620310474598>
- Croasmun, J., & Ostrom, L. (2011). Using Likert-Type Scales in the Social Sciences. *Journal of Adult Education*, *40*(1). <https://doi.org/10.1103/PhysRevLett.115.036803>
- Crowson, P. (2011). Economics of The Minerals Industry. In P. Darling (Ed.), *SME Mining Engineering Handbook* (pp. 39–47). United States of America: Society For Mining, Metallurgy, and Exploration, Inc.
- Cukier, W., Hodson, J., & Omar, A. (2015). “Soft” Skills are Hard - A Review of

the Literature. Canada: Social Sciences and Humanities Research Council of Canada.

- Dagar, V and Yadav, A. (2016). Constructivism : A Paradigm for Teaching and Learning. *Arts and Social Sciences Journal*, 7(4), 1–4. <https://doi.org/10.4172/2151-6200.1000200>
- De Vos, A., De Hauw, S., & Willemse, I. (2015). An integrative model for competency development in organizations: the Flemish case. *International Journal of Human Resource Management*, 26(20), 2543–2568. <https://doi.org/10.1080/09585192.2014.1003078>
- Dehghani, M., Pakmehr, H., & Sani, H. J. (2011). Managerial challenges of curriculum implementation in higher education. *Procedia - Social and Behavioral Sciences*, 15, 2003–2006. <https://doi.org/10.1016/j.sbspro.2011.04.043>
- Deißinger, T., & Hellwig, S. (2011). *Structures and functions of Competency-based Education and Training (CBET): a comparative perspective. Beiträge aus der praxis der beruflichen bildung* (Vol. 14). Mannheim: Human Capacity Development (HCD) for Vocational Education and Training.
- Dellors, J. (1998). *Learning: The Treasure Within*. Australia: UNESCO Publishing
- Doyle, T. (2008). *A Guide to Facilitating Learning in Higher Education*. Virginia: Stylus
- Edgren, G. (2006). Developing a competence-based core curriculum in biomedical laboratory science: A Delphi study. *Medical Teacher*, 28(5), 409–417. <https://doi.org/10.1080/01421590600711146>
- Edzes, A., Hamersma, M., Venhorst, V., & van Dijk, J. (2015). Labour market performance and school careers of low educated graduates. *Letters in Spatial and Resource Sciences*, 8(3), 267–289. <https://doi.org/10.1007/s12076-015-0141-7>
- El-Baz, H. S., & El-Sayegh, S. M. (2010). Competency domain model and the perception of engineering managers in the united arab emirates. *EMJ - Engineering Management Journal*, 22(1), 3–12. <https://doi.org/10.1080/10429247.2010.11431848>
- Elen, J., Clarebout, G., Léonard, R., & Lowyck, J. (2007). Student-centred and teacher-centred learning environments: What students think. *Teaching in Higher Education*, 12(1), 105–117. <https://doi.org/10.1080/13562510601102339>
- Ellis, T. J., & Levy, Y. (2010). A Guide for Novice Researchers: Design and Development Research Methods. *Proceedings of Informing Science & IT Education Conference (InSITE)*, (10), 107–118.
- Elnaga, A., & Imran, A. (2013). The Effect of Training on Employee Performance. *European Journal of Business and Management*, 5(4), 2222–2839. <https://doi.org/10.2991/gecss-14.2014.90>
- Emad, G., & Roth, W. M. (2008). Contradictions in the practices of training for and assessment of competency. *Education + Training*, 50(3), 260–272. <https://doi.org/10.1108/00400910810874026>
- Ennis, M. (2008). A Review of the Literature and The Role of the Employment and Training Administration (ETA). *U.S. Department of Labor*, 1–25. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Eric Soderquist, K., Papalexandris, A., Ioannou, G., & Prastacos, G. (2010). From

- task-based to competency-based. *Personnel Review*, 39(3), 325–346. <https://doi.org/10.1108/00483481011030520>
- Fan, S., Yan, J., & Sha, J. (2017). Innovation and economic growth in the mining industry: Evidence from China's listed companies. *Resources Policy*, 54(August), 25–42. <https://doi.org/10.1016/j.resourpol.2017.08.007>
- Federations of Surveyors. (1991). *Definition of a Surveyor*. Helsinki: FIG Publications
- Froyd, J., & Simpson, N. (2008). Student-Centered Learning: Addressing Faculty Questions about Student-centered Learning. *Course Curriculum, Labour, and Improvement Conference*, (1), 1–11.
- Gammie, E., & Joyce, Y. (2009). Competence-based approaches to the assessment of professional accountancy training work experience requirements: The ICAS experience. *Accounting Education*, 18(4–5), 443–466. <https://doi.org/10.1080/09639280902719465>
- Garland, R. (1991). The mid-point on a rating scale: Is it desirable? *Research Note* 3, 2, 66–70. <https://doi.org/citeulike-article-id:4775464>
- Ghaffari, S., Shah, I., Burgoyne, J., Nazri, M., & Salleh, J. (2017). The Influence of Motivation on Job Performance: A Case Study at Universiti Teknologi Malaysia. *Australian Journal of Basic and Applied Sciences*, 11(4), 92–99.
- Ghilani, C. D., & Wolf, P. R. (2015). *Elementary Surveying: An introduction to Geomatics*.
- Gijbels, D., Dochy, F., Van den Bossche, P., & Segers, M. (2005). Effects of Problem-Based Learning: A Meta-Analysis From the Angle of Assessment. *Review of Educational Research*, 75(1), 27–61. <https://doi.org/10.3102/00346543075001027>
- Grant, J. (2013). Principles of Curriculum Design. *Understanding Medical Education: Evidence, Theory and Practice: Second Edition*, (8), 31–46. <https://doi.org/10.1002/9781118472361.ch3>
- Grant, J. (2013). Principles of Curriculum Design. *Understanding Medical Education: Evidence, Theory and Practice: Second Edition*, (8), 31–46. <https://doi.org/10.1002/9781118472361.ch3>
- Grobler, H. C. I. (2016). Can an examination guarantee competency? In *16TH International Congress for Mine Surveying* (pp. 12–16). Australia.
- Handajani, S., Pratiwi, H., & Mardiyana, M. (2018). The 21st century skills with model eliciting activities on linear program. *Journal of Physics: Conference Series*, 1008(1). <https://doi.org/10.1088/1742-6596/1008/1/012059>
- Harris, R., Guthrie, H., Hobart, B., & Lundberg, D. (1995). *Competency-based Education and Training: Between a Rock and a Whirlpool*. South Yarra: Macmillan Education Australia PTY, Ltd.
- Harrison, R., & Mitchell, L. (2006). Using outcomes-based methodology for the education, training and assessment of competence of healthcare professionals. *Medical Teacher*, 28(2), 165–170. <https://doi.org/10.1080/01421590500271308>
- Hasan, S. H. (2007). Kurikulum Tingkat Satuan Pendidikan. In M. Ali, Sukmadinata, D. Sudjana, & W. Rasyidin (Eds.), *Ilmu dan Aplikasi Pendidikan* (pp. 477–494). Bandung: Pedagogiana Press.
- Hasan, S. H. (2009). *Evaluasi Kurikulum*. Bandung: PT. Remaja Rosdakarya.
- Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic Approach for

- Human Resource Management in Industry 4.0. *Procedia CIRP*, 54, 1–6. <https://doi.org/10.1016/j.procir.2016.05.102>
- Hickey, W. (2007). *Energy and Human Resource Development in Developing Countries Towards Effective Localization*. New York: Palgrave Macmillan.
- Hodge, S. (2016). After competency-based training: deepening critique, imagining alternatives. *International Journal of Training Research*, 14(3), 171–179. <https://doi.org/10.1080/14480220.2016.1261432>
- Hoffmann, T. (1999). The meanings of competency. *Journal of European Industrial Training*, 23(6), 275–286. <https://doi.org/10.1108/03090599910284650>
- Holton, E. F., Coco, M. L., Lowe, J. L., & Dutsch, J. V. (2006). Blended Delivery Strategies for Competency-Based Training. *Advances in Developing Human Resources*, 8(2), 210–228. <https://doi.org/10.1177/1523422305286153>
- Howard, C. R., Gladding, S. P., Kiguli, S., Andrews, J. S., & John, C. C. (2011). Development of a competency-based curriculum in global child health. *Academic Medicine*, 86(4), 521–528. <https://doi.org/10.1097/ACM.0b013e31820df4c1>
- Hu, P. (2007). Theorizing Strategic Human Resource Development: Linking Financial Performance and Sustainable Competitive Advantage. *International Studies*.
- Hurd, A. R., & McLean, D. D. (2004). An analysis of the perceived competencies of CEOs in public park and recreation agencies. *Managing Leisure*, 9(2), 96–110. <https://doi.org/10.1080/13606710410001709626>
- Ibrahim, R., Boerhannoeddin, A., & Bakare, K. K. (2017). The effect of soft skills and training methodology on employee performance. *European Journal of Training and Development*, 41(4), 388–406. <https://doi.org/10.1108/EJTD-08-2016-0066>
- Ibrahim, R., dan Ali, M. (2007). Teori Evaluasi Pendidikan Pendidikan. Dalam Ali, M., Ibrahim, R., Sukmadinata, N., S., Sudjana, D., dan Rasjidin, W (Penyunting). *Ilmu dan Aplikasi Pendidikan*. Bandung: Pedagogiana Press.
- Idowu, Y., Muir, E., & Easton, G. (2016). Problem-based learning case writing by students based on early years clinical attachments: a focus group evaluation. *JRSM Open*, 7(3), 205427041562277. <https://doi.org/10.1177/2054270415622776>
- International Labor Organization. (2016). *Updated Guidelines for Development of Regional Model Competency Standards*. Bangkok.
- Jarosz, A. (2011). Mine Surveying. In P. Darling (Ed.), *SME Mining Engineering Handbook* (Third, pp. 731–742). United States of America: Society For Mining, Metallurgy, and Exploration, Inc.
- Jeou-Shyan, H., Hsuan, H., Chih-Hsing, L., Lin, L., & Chang-Yen, T. (2011). Competency analysis of top managers in the Taiwanese hotel industry. *International Journal of Hospitality Management*, 30(4), 1044–1054. <https://doi.org/10.1016/j.ijhm.2011.03.012>
- Johnson, A. (2004). *Plane and Geodetic Surveying: The Management of Control Networks*. London: Spon Press.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative Learning: Improving University Instruction by Basing Practice on Validated Theory. *Journal of Excellence in College Teaching*, 25, 85–118.

<https://doi.org/10.1080/19397030902947041>

- Johnson, W. G. (2007). College & Undergraduate Libraries The Application of Learning Theory to Information Literacy. *College & Undergraduate Libraries*, 14(4)(October 2014), 103–120. <https://doi.org/10.1080/10691310802128435>
- Kaufman, R., A. (1972). *Educational System Planning*. New Jersey: Prentice-Hall, Inc.
- Keiler, L. S. (2018). Teachers' roles and identities in student-centered classrooms. *Keiler International Journal of STEM Education*, 5(34), 1–20. <https://doi.org/doi.org/10.1186/s40594-018-0131-6>
- Kelley, K., Clark, B., Brown, V., & Sitzia, J. (2003). Good practice in the conduct and reporting of survey research. *International Journal for Quality in Health Care*, 15(3), 261–266. <https://doi.org/10.1093/intqhc/mzg031>
- Khan, R. A. G., Khan, F. A., & Khan, M. A. (2011). Impact of Training and Development on Organizational Performance. *Global Journal of Management and Business Research*, 11(7), 63–69. <https://doi.org/10.1017/CBO9781107415324.004>
- Kim, E., & Horii, H. (2015). A Study on an Assessment Framework for the Novelty of Ideas Generated by Analogical Thinking. *Procedia - Social and Behavioral Sciences*, 195, 1396–1406. <https://doi.org/10.1016/j.sbspro.2015.06.435>
- Kim, Y., & Park, H. (2014). An Investigation of the Competencies Required of Airline Cabin Crew Members: The Case of a Korean Airline. *Journal of Human Resources in Hospitality and Tourism*, 13(1), 34–62. <https://doi.org/10.1080/15332845.2013.807393>
- King, B., Goycoolea, M., & Newman, a. (2017a). Optimizing the open pit-to-underground mining transition. *European Journal of Operational Research*, 257(1), 297–309. <https://doi.org/10.1016/j.ejor.2016.07.021>
- Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating Training Programs*. San Francisco: Berrett-Koehler Publishers, Inc.
- Klenowski, V. (2010). Curriculum evaluation: Approaches and methodologies. *International Encyclopedia of Education*, 335–341. <https://doi.org/10.1016/B978-0-08-044894-7.00069-5>
- Knowles, M., C. (1997). Improving Organizational Effectiveness Through Organizational Analysis. *Australian Psychologist*, Vol. 32, No. 3, pp: 197-201.
- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267–277. <https://doi.org/10.1177/1365480216659733>
- Komba, S. C., & Mwandaji, M. (2015). Reflections on the Implementation of Competence Based Curriculum in Tanzanian Secondary Schools. *Journal of Education and Learning*, 4(2), 73–80. <https://doi.org/10.5539/jel.v4n2p73>
- Kotur, B. R., & Anbazhagan, S. (2014). Education and Work-Experience -Influence on the Performance. *IOSR Journal of Business and Management Ver. III*, 16(5), 2319–7668.
- Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory Into Practice*, 41(4), 212–218. <https://doi.org/10.1207/s15430421tip4104>
- Krishnan, S., Gabb, R., & Vale, C. (2011). Learning Cultures of Problem-Based Learning Teams. *Australasian Journal of Engineering Education*, 17(2), 67–78. <https://doi.org/10.1080/22054952.2011.11464057>

- Kuboja, J. M., & Ngussa, B. M. (2015). Conceptualizing the Place of Technology in Curriculum Formation: A View of the Four Pillars of Curriculum Foundations. *International Journal of Academic Research in Progressive Education and Development*, 4(2). <https://doi.org/10.6007/IJARPED/v4-i2/1728>
- Kufaine, N., & Chitera, N. (2013). Competency based education and training in technical education problems and perspectives. *International Journal of Vocational and Technical Education*, 5(3), 37–41. <https://doi.org/10.5897/IJVTE2013.0119>
- Kulkarni, P. (2013). A Literature Review on Training & Development and Quality of Work Life. *International Refereed Research Journal*, IV(2), 136–143. <https://doi.org/10.3860/ber.v20i2.1909>
- Kum, F. D., Cowden, R., & Karodia, A. M. (2014). the Impact of Training and Development on Employee Performance: a Case Study of Escon Consulting. *Singaporean Journal of Business Economics and Management Studies*, 3(3), 72–105. <https://doi.org/10.4236/jhrss.2015.34025>
- Kumm, S., & Laverentz, D. M. (2017). Concept-Based Curriculum Evaluation: 5-Year Process. *Teaching and Learning in Nursing*, 12(4), 242–245. <https://doi.org/10.1016/j.teln.2017.06.004>
- Labant, S., Staňková, H., & Weiss, R. (2013). Geodetic Determining of Stockpile Volume of Mineral Excavated in Open Pit Mine/ Geodetické Určenie Objemu Vytťažiteľných Zásob Nerastu V Povrchovom Lome. *GeoScience Engineering*, 59(1), 30–40. <https://doi.org/10.2478/gse-2014-0049>
- Latan, H. (2014). *Aplikasi Analisis Data Statistik Untuk Ilmu Sosial Sains dengan IBM SPSS*. Bandung: Alfabeta.
- Lau, D. C.-M. (2001). Analysing the curriculum development process: three models. *Pedagogy, Culture & Society*, 9(1), 29–44. <https://doi.org/10.1080/14681360100200107>
- Laurila, P. (2018). Mine Surveying in Finland: Education and Professional Practices. In *International Federation of Surveyors*. Istanbul: FIG.
- Lee, G., A. (2011). Management, Employee Relations, and Training. In P. Darling (Ed.), *SME Mining Engineering Handbook* (pp. 317–330). United States of America: Society For Mining, Metallurgy, and Exploration, Inc.
- Lemley, J. B., Schumacher, G., & Vesey, W. (2014). What Learning Environments Best Address 21st-Century Students' Perceived Needs at the Secondary Level of Instruction? *NASSP Bulletin*, 98(2), 101–125. <https://doi.org/10.1177/0192636514528748>
- Leung, W.-C. (2002). Learning in practice Competency based medical training : review. *Bmj*, 325, 693–696. <https://doi.org/10.1136/bmj.325.7366.693>
- Li, Y. W. (2016). Transforming Conventional Teaching Classroom to Learner-Centred Teaching Classroom Using Multimedia-Mediated Learning Module. *International Journal of Information and Education Technology*, 6(2), 105–112. <https://doi.org/10.7763/IJiet.2016.V6.667>
- Lin, Y. C., & Jacobs, R. L. (2008). The perceptions of human resource development professionals in taiwan regarding their working relationships with subject matter experts (smes) during the training design process. *Human Resource Development International*, 11(3), 237–252. <https://doi.org/10.1080/13678860802102526>

- Liu, C., Gao, J. X., Yu, X. X., Zhang, J. X., & Zhang, a. B. (2015). Mine surface deformation monitoring using modified GPS RTK with surveying rod: initial results. *Survey Review*. <https://doi.org/10.1179/1752270614Y.0000000092>
- Lunenburg, F. C. (2011). Key Components of a Curriculum Plan : Objectives , Content , and Learning Experiences. *Schooling*, 2(1), 2–5.
- Mabey, C. (2003). Reframing Human Resource Development. *Human Resource Development Review*, 2(4), 430–452. <https://doi.org/10.1177/1534484303258042>
- Mahmoudi, S., Jafari, E., Nasrabadi, H. A., & Liaghatdar, M. J. (2012). Holistic education: An Approach for 21 Century. *International Education Studies*, 5(3), 178–186. <https://doi.org/10.5539/ies.v5n3p178>
- Mann, J. E., Amerine, L. B., Waldron, K., Wolcott, M. D., & McLaughlin, J. E. (2017). Pharmacist perceptions of competency: Identifying priority areas for a competency program development at an academic medical center. *Research in Social and Administrative Pharmacy*. <https://doi.org/10.1016/j.sapharm.2017.07.008>
- Mansfield, R. S. (1996). Building competency models: Approaches for HR professionals. *Human Resource Management*, 35(1), 7–18. [https://doi.org/10.1002/\(SICI\)1099-050X\(199621\)35:1<7::AID-HRM1>3.0.CO;2-2](https://doi.org/10.1002/(SICI)1099-050X(199621)35:1<7::AID-HRM1>3.0.CO;2-2)
- Marsh, C. J. (2004). *Key Concepts for Understanding Curriculum* (Third Edition). New York: RoutledgeFalmer.
- Martin, B. O., Kolomitro, K., & Lam, T. C. M. (2014). Training Methods. *Human Resource Development Review*, 13(1), 11–35. <https://doi.org/10.1177/1534484313497947>
- Martin, F. (2011). Instructional Design and the Importance of Instructional Alignment. *Community College Journal of Research and Practice*, 35(12), 955–972. <https://doi.org/10.1080/10668920802466483>
- Mcevoy, G. M., Hayton, J. C., Warnick, A. P., Mumford, T. V., Hanks, S. H., & Blahna, M. J. (2005). A competency-based model for developing human resource professionals. *Journal of Management Education*, 29(3), 383–402. <https://doi.org/10.1177/1052562904267538>
- Meghe, B., Bhise, V., P., & Muley, A. (2013). Evaluation of Training and Development Practices in SMEs: An Empirical Study. *Prabandhan: Indian Journal of Management*, 6(4), 19–30. <https://doi.org/http://www.indianjournalofmanagement.com/archives.html>
- Mitchell, B. (2016). Curriculum Construction and Implementation. *International Journal of Liberal Arts and Social Science*, Vol. 4, No. 4, pp. 45-56.
- Moffatt, S., White, M., Mackintosh, J., & Howel, D. (2006). Using quantitative and qualitative data in health services research - what happens when mixed method findings conflict? [ISRCTN61522618]. *BMC Health Services Research*, 6, 28. <https://doi.org/10.1186/1472-6963-6-28>
- Mugisha, W., & Mugimu, C. (2015). Application of Learning Theories in Curriculum Development and Implementation of the MLT Diploma Programme in Uganda. *British Journal of Education, Society & Behavioural Science*, 5(3), 256–275. <https://doi.org/10.9734/BJESBS/2015/11603>
- Muianga, X., Klomsri, T., Tedre, M., & Mutimucuo, I. (2018). From Teacher-Oriented to Student-Centred Learning: Developing an ICT-Supported

- Learning Approach at the Eduardo Mondlane University, Mozambique. *TOJET: The Turkish Online Journal of Educational Technology*, 17(2), 46–54.
- Mulcahy, D. (2000). Turning the contradictions of competence: Competency-based training and beyond. *Journal of Vocational Education and Training*, 52(2), 259–280. <https://doi.org/10.1080/13636820000200120>
- Muogbo, U. S. (2013). The influence of motivation on employees' performance: a study of some selected firms in Anambra State. *AFRREV IJAH: An International Journal of Arts and Humanities*, 2(3), 134–151.
- Nafukho, F. M., Hairston, N. R., & Brooks, K. (2004). Human capital theory: Implications for human resource development. *Human Resource Development International*, 7(4), 545–551. <https://doi.org/10.1080/1367886042000299843>
- Nazli, N. N. N. N., Sipon, S., & Radzi, H. M. (2014). Analysis of Training Needs in Disaster Preparedness. *Procedia - Social and Behavioral Sciences*, 140, 576–580. <https://doi.org/10.1016/j.sbspro.2014.04.473>
- Newman, A. M., Rubio, E., Caro, R., Weintraub, A., & Eurek, K. (2010). A review of operations research in mine planning. *Interfaces*, 40(3), 222–245. <https://doi.org/10.1287/inte.1090.0492>
- Ng, T. W. H., & Feldman, D. C. (2009). How broadly does education contribute to job performance? *Personnel Psychology*, 62(1), 89–134. <https://doi.org/10.1111/j.1744-6570.2008.01130.x>
- Nikolov, R., Shoikova, E., & Kovatcheva, E. (2014). *Competence Based Framework for Curriculum Development Competence Based Framework for Curriculum Development Pictet: EQF-based professional ICT training for Russia and Kazakhstan*.
- Nilasari, Y., & Dasining. (2018). Curriculum Development Based on INQF and Business/Industries Sector for Improvement Competency of Basic Pattern Making Students at Vocational High School. *IOP Conference Series: Materials Science and Engineering*, 336(1). <https://doi.org/10.1088/1757-899X/336/1/012029>
- Noe, R., A. (2010). *Employee Training and Development Fifth Edition*. New York: The McGraw-Hill Companies.
- Norton, L. (2004). Using assessment criteria as learning criteria: A case study in psychology. *Assessment and Evaluation in Higher Education*, 29(6), 687–702. <https://doi.org/10.1080/0260293042000227236>
- Nybø, G. (2004). Personnel development for dissolving jobs: Towards a competency-based approach? *International Journal of Human Resource Management*, 15(3), 549–564. <https://doi.org/10.1080/0958519042000181250>
- OECD. (2019). Adult education level (indicator). doi: 10.1787/36bce3fe-en (Accessed on 30 July 2019)
- O.Nyumba, T., Wilson, K., Derrick, C. J., & Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, 9(1), 20–32. <https://doi.org/10.1111/2041-210X.12860>
- O'Neill, G., & McMahon, T. (2005). Student-Centred Learning: What Does it Mean for Students and Lecturers? *Emerging Issues in the Practice of University Learning and Teaching*, 27–36.

https://doi.org/http://www.aishe.org/readings/2005-1/oneill-mcmahon-Tues_19th_Oct_SCL.html

- Ogundare, John, O. (2016). *Precision Surveying: The Principles and Geomatics Practice*. New Jersey: John Wiley & Sons, Inc.
- Oinam, D. S. (2017). Student- Centered Approach to Teaching and Learning in Higher Education for Quality Enhancement. *IOSR Journal of Humanities and Social Science*, 22(06), 27–30. <https://doi.org/10.9790/0837-2206132730>
- Oliva & Gordon. 2013. *Developing the Curriculum*. USA: Pearson.
- Omar, D. (2018). Focus group discussion in built environment qualitative research practice. *IOP Conference Series: Earth and Environmental Science*, 117(1). <https://doi.org/10.1088/1755-1315/117/1/012050>
- Ornstein, A. C., & Hunkins, F. P. (2009). *Curriculum: Foundations, Principles, and Issues* (5th ed.). United States of America: Pearson Education Inc.
- Ouinones, M. A., & Ford, J. K. (1995). The Relationship Between Work Experience and Job Performance: a Conceptual and Meta-analytic Review. *Personnel Psychology*, 48, 887–911. <https://doi.org/10.1097/MCC.0000000000000364>
- Ovesná, G., Staňková, H., Plánka, L., & Wlochová, A. (2017). The history of mine surveying and mining maps. *Geodesy and Cartography*, 43(3), 118–123. <https://doi.org/10.3846/20296991.2017.1371651>
- Packard, T. (2014). How Competent are Competencies? *Human Service Organizations Management, Leadership and Governance*, 38(4), 313–319. <https://doi.org/10.1080/23303131.2014.937953>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Palmer, R. (1999). The Identification of Organizational and Individual Training and Development Needs. Dalam Wilson, J., P. (Editor). *Human Resource Development*. London: Kogan Page.
- Paloniemi, S. (2006). Experience, competence and workplace learning. *Journal of Workplace Learning*, 18(7–8), 439–450. <https://doi.org/10.1108/13665620610693006>
- Papulova, Z., & Gazova, A. (2016). Role of Strategic Analysis in Strategic Decision-Making. *Procedia Economics and Finance*, 39(November 2015), 571–579. [https://doi.org/10.1016/S2212-5671\(16\)30301-X](https://doi.org/10.1016/S2212-5671(16)30301-X)
- Peyvand Robati, A., & Singh, D. (2013). Competencies required by special librarians: An analysis by educational levels. *Journal of Librarianship and Information Science*, 45(2), 113–139. <https://doi.org/10.1177/0961000613476728>
- Priyadarshini, R. R. G., & Dave, D. (2012). Competency-based Training Needs Assessment Model. *Management and Labour Studies*, 37(3), 195–207. <https://doi.org/10.1177/0258042X13484834>
- Rafiq, M. (2015). Training Evaluation in an Organization using Kirkpatrick Model: A Case Study of PIA. *European Journal of Business and Management Online*, 7(25), 2222–2839. <https://doi.org/10.4172/2169-026X.10001>
- Randolph, M. (2011). Current Trends in Mining. In P. Darling (Ed.), *SME Mining Engineering Handbook* (pp. 11–19). United States of America: Society For

- Mining, Metallurgy, and Exploration, Inc.
- Rao, K. L. N., & Shah, H. (2012). Exploring training needs for old and new age middle managers. *Vision: The Journal of Business Perspective*, 16(1), 37–43. <https://doi.org/10.1177/097226291201600104>
- Rausch, E., Sherman, H., & Washbush, J. B. (2002). Defining and assessing competencies for competency-based, outcome-focused management development. *Journal of Management Development*, 21(3), 184–200. <https://doi.org/10.1108/02621710210420264>
- Richey, R. C., & Klein, J. D. (2007). *Design and Development Research. Handbook of Research on Educational Communications and Technology*. New Jersey: Lawrence Erlbaum Associates, Inc. https://doi.org/10.1007/978-1-4614-3185-5_12
- Robles, M. M. (2012). Executive Perceptions of the Top 10 Soft Skills Needed in Today's Workplace. *Business Communication Quarterly*, 75(4), 453–465. <https://doi.org/10.1177/1080569912460400>
- Roberson, L., Kulik, C. T., & Pepper, M. B. (2003). Using needs assessment to resolve controversies in diversity training design. *Group and Organization Management*, 28(1), 148–174. <https://doi.org/10.1177/1059601102250028>
- Roberts, P. B. (2006). Analysis: The Defining Phase of Systematic Training. *Advances in Developing Human Resources*, 8(4), 476–491. <https://doi.org/10.1177/1523422306293014>
- Rowley, N., & Green, J. (2015). Just-in-time Teaching and Peer Instruction in the Flipped Classroom to Enhance Student Learning. *Education in Practice*, 2(1), 14–17.
- Royal, K. D., Ellis, A., Ensslen, A., & Homan, A. (2010). Rating scale optimization in survey research: An application of the Rasch rating scale model. *Journal of Applied Quantitative Methods*, 5(4), 607–617.
- Rusman. (2012). *Manajemen Kurikulum*. Jakarta: PT. RajaGrafindo Persada.
- Rusman. (2015). Curriculum Implementation at Elementary Schools: A Study on “Best Practices” Done by Elementary School Teachers in Planning, Implementing, and Evaluating the Curriculum. *Journal of Education and Practice*, 6(21), 106–112.
- Rusman. (2015). *Pembelajaran Tematik Terpadu: Teori, Praktik, dan Penilaian*. Jakarta: PT. RajaGrafindo Persada.
- Rusman, & Riyana, C. (2018). *Manajemen Kurikulum Pendidikan & Pelatihan*. Bandung: Sekolah Pasca Sarjana Universitas Pendidikan Indonesia.
- Saavedra, A. R., & Opfer, V. D. (2012). *Teaching and Learning 21st Century Skills: Lessons from the Learning Sciences*. Asia Society.
- Sadulloh, U. (2015). *Pengantar Filsafat Pendidikan*. Bandung: Alfabeta.
- Sahu, H. B., Prakash, N., & Jayanthu, S. (2015). Underground Mining for Meeting Environmental Concerns – A Strategic Approach for Sustainable Mining in Future. *Procedia Earth and Planetary Science*, 11, 232–241. <https://doi.org/10.1016/j.proeps.2015.06.030>
- Salleh, H., & Fung, W. P. (2014). Primjena building information modelinga: Analiza na osnovi interesnih skupina. *Gradjevinar*, 66(8), 705–714. <https://doi.org/10.14256/JCE.1007.2014>
- Sanjaya, W. (2008). *Kurikulum dan Pembelajaran*. Jakarta: Kencana Prenada Media Grup.

- Sarabdeen, J. (2013). Learning Styles and Training Methods. *Communications of the IBIMA, 2013*, 1–9. <https://doi.org/10.5171/2013.311167>
- Sawyer, D., B. (2004). *Fundamental Aspects of Interpreter Education Curriculum and Assessment*. Amsterdam and Philadelphia: John Benjamins Publishing Company.
- Schmidt, F. L., Hunter, J. E., Outerbridge, A. N., & Goff, S. (1988). Joint Relation of Experience and Ability With Job Performance: Test of Three Hypotheses. *Journal of Applied Psychology, 73*(1), 46–57. <https://doi.org/10.1037/0021-9010.73.1.46>
- Schubert, W., H. (1986). *Curriculum Perspective, Paradigm, and Possibility*. New York: Macmillan Publishing Company.
- Schumacher, G., & Risco, K. (2017). Nurse Practitioner Program Curriculum Development: A Competency-based Approach. *Journal for Nurse Practitioners, 13*(2), e75–e81. <https://doi.org/10.1016/j.nurpra.2016.10.014>
- Setiani, F., & Rasto. (2016). Mengembangkan Soft Skill Siswa Melalui Proses Pembelajaran. *Jurnal Pendidikan Manajemen Perkantoran, 1*(1), 170–176. <https://doi.org/http://dx.doi.org/10.23736/S0022-4707.16.06347-7>
- Shahbazi, M., Sohn, G., Théau, J., & Ménard, P. (2015). UAV-based point cloud generation for open-pit mine modelling. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 40*(1W4), 313–320. <https://doi.org/10.5194/isprsarchives-XL-1-W4-313-2015>
- Shi, J. F., Song, W. D., Zhang, J. C., & Zhang, D. M. (2008). The application of modern surveying technology in mining survey*. *Journal of Coal Science and Engineering, 14*(2), 283–286. <https://doi.org/10.1007/s12404-008-0061-x>
- Siddique, C. M. (2004). Job analysis: A strategic human resource management practice. *International Journal of Human Resource Management, 15*(1), 219–244. <https://doi.org/10.1080/0958519032000157438>
- Smith, A., & Smith, E. (2007). The role of training in the development of human resource management in australian organisations. *Human Resource Development International, 10*(3), 263–279. <https://doi.org/10.1080/13678860701515208>
- Smith, E. (2010). A review of twenty years of competency-based training in the Australian vocational education and training system. *International Journal of Training and Development, 14*(1), 54–64. <https://doi.org/10.1111/j.1468-2419.2009.00340.x>
- Soto, S. T. (2015). An Analysis of Curriculum Development. *Theory and Practice in Language Studies, 5*(6), 1129. <https://doi.org/10.17507/tpls.0506.02>
- Srikanth, P. B., & Jomon, M. G. (2015). Perception of Managerial Competency Needs: An Indian Perspective. *South Asian Journal of Human Resources Management, 2*(2), 139–170. <https://doi.org/10.1177/2322093715599277>
- Sukartini, S., P., dan Baihaqi, M., I., F. (2007). Teori Psikologim Pendidikan. Dalam Ali, M., Ibrahim, R., Sukmadinata, N., S., Sudjana, D., dan Rasjidin, W (Penyunting). *Ilmu dan Aplikasi Pendidikan*. Bandung: Pedagogiana Press.
- Sukmadinata, N., S., dan Ibrahim, R. (2007). Teori Kurikulum. Dalam Ali, M., Ibrahim, R., Sukmadinata, N., S., Sudjana, D., dan Rasjidin, W (Penyunting). *Ilmu dan Aplikasi Pendidikan*. Bandung: Pedagogiana Press (Halaman 98).
- Sukmadinata. (2014). *Pengembangan Kurikulum Teori dan Praktik*. Bandung: PT.

Remaja Rosdakarya.

- Sullivan, R. S. (1996). The Competency-Based Approach to Training. *U.S. Agency for International Development*, 5(2), 1–9. <https://doi.org/10.1002/9781118328941.ch1>
- Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *International Journal of Academic Research in Management (IJARM)*, 5(3), 28–36. <https://doi.org/10.2139/ssrn.3205040>
- Terry, K., Stirling, C., Bull, R., & Fassett, D. (2017). An overview of the ways nurses understand and utilise the existing Australian Competency Standards for Registered Nurses. *Collegian*, 24(2), 109–116. <https://doi.org/10.1016/j.colegn.2015.10.003>
- Titus, H. H. (1959). *Living Issues in Philosophy* (3rd ed.). New York: American Book Company.
- Ton, T. G. N., Gladding, S. P., Zunt, J. R., John, C., Nerurkar, V. R., Moyer, C. A., ... Kolars, J. C. (2015). The development and implementation of a competency-based curriculum for training in global health research. *American Journal of Tropical Medicine and Hygiene*, 92(1), 163–171. <https://doi.org/10.4269/ajtmh.14-0398>
- Tuxworth, E. (1989). Competence Based Education and Training: Background and Origin. Dalam Burke, J. (Penyunting). *Competency Based Education and Training*. London, New York, Philadelphia: The Falmer Press.
- Uhm, M., Lee, G., & Jeon, B. (2017). An analysis of BIM jobs and competencies based on the use of terms in the industry. *Automation in Construction*, 81(March), 67–98. <https://doi.org/10.1016/j.autcon.2017.06.002>
- Van den Bergh, L., Ros, A., & Beijaard, D. (2014). Improving Teacher Feedback During Active Learning: Effects of a Professional Development Program. *American Educational Research Journal*, 51(4), 772–809. <https://doi.org/10.3102/0002831214531322>
- Vathanophas, Vichita; Thai-ngam, J. (2007). Competency Requirements for Effective Job Performance in The Thai Public Sector. *Contemporary Management Research*, 3(1), 45–70. <https://doi.org/http://dx.doi.org/10.7903/cmr.49>
- Velciu, M. (2017). Job matching as a new challenge for work performance. *Balkan Region Conference on Engineering and Business Education*, 3(1), 14–19. <https://doi.org/10.1515/cplbu-2017-0003>
- Voorhees, R., A., dan Voorhees, A., B. (2017). Principles for Competency Based Education. Dalam Reigeluth, C., M., Beatty, B., J., dan Myers, R., D. (Penyunting). *Instructional-Design Theories and Models the Learner-Centered Paradigm of Education*. New York: Routledge.
- Vredenburg, D., & Shea-VanFossen, R. (2010). Human nature, organizational politics, and human resource development. *Human Resource Development Review*, 9(1), 26–47. <https://doi.org/10.1177/1534484309343094>
- Wahyudin, D. (2014). *Manajemen Kurikulum*. Bandung: PT. Remaja Rosdakarya.
- Wahyudin, D. (2016). Manajemen Kurikulum Dalam pendidikan Profesi Guru (Studi Kasus di Universita Pendidikan Indonesia). *Jurnal Kependidikan*, 46(2), 259–270.
- Wahyudin, D., Rusman, & Rahmawati, Y. (2017). Penguatan Life Skills dalam

- Implementasi Kurikulum 2013 pada SMA (Sekolah Menengah Atas) di Jawa Barat. *Mimbar Pendidikan*, 1(Maret), 65–80.
- Wang, G., Guo, G., Zha, J., & Liu, B. (2011). The development process and prospects of mine surveying in China. *Applied Mechanics and Materials*. <https://doi.org/10.4028/www.scientific.net/AMM.71-78.1311>
- Weber, M. R., Finley, D. A., Crawford, A., & Rivera, D. (2009). An Exploratory Study Identifying Soft Skill Competencies in Entry-Level Managers. *Tourism and Hospitality Research*, 9(4), 353–361. <https://doi.org/10.1057/thr.2009.22>
- Weigel, T., Mulder, M., & Collins, K. (2007). The concept of competence in the development of vocational education and training in selected EU member states: A critical analysis. *Journal of Vocational Education & Training*, 59(1), 67–88. <https://doi.org/10.1080/13636820601145549>
- Werner, J., M. dan DeSimone, R., L. (2012). *Human Resource Development, Sixth Edition*. USA: South-Western Cengage Learning.
- Wickramasinghe, V. M. (2006). Training objectives, transfer, validation and evaluation: A Sri Lankan study. *International Journal of Training and Development*, 10(3), 227–247. <https://doi.org/10.1111/j.1468-2419.2006.00256.x>
- Wickramasinghe, V., & de Zoyza, N. (2009). An assessment of managerial competency needs: Empirical evidence from a Sri Lankan telecommunication service provider. *International Journal of Human Resource Management*, 20(12), 2547–2567. <https://doi.org/10.1080/09585190903363854>
- Wikle, T. A., & Fagin, T. D. (2015). Hard and Soft Skills in Preparing GIS Professionals: Comparing Perceptions of Employers and Educators. *Transactions in GIS*, 19(5), 641–652. <https://doi.org/10.1111/tgis.12126>
- Wilkinson, D., & Birmingham, P. (2003). *Using Research Instruments A Guide For Researchers* (Vol. 91). London and New York: Taylor & Francis.
- Winskill, R. (2000). Is competency based training/education useful for workplace training. *Contemporary Nurse: A Journal for the Australian Nursing Profession*, 9(2), 115–119. <https://doi.org/10.5172/conu.2000.9.2.115>
- Wong, L. P. (2008). Focus group discussion: a tool for health and medical research. *Singapore Medical Journal*, 49(3), 256–260; quiz 261. <https://doi.org/http://smj.sma.org.sg/4903/4903me1.pdf>
- Wu, H., Hsiao, C., Wu, L., Lin, H., & Huang, H. (2012). Investigating the learning-theory foundations of game-based learning: a meta-analysis. *Journal of Computer Assisted Learning*, 28, 265–279. <https://doi.org/10.1111/j.1365-2729.2011.00437.x>
- Wu, J. L. (2013). The study of competency-based training and strategies in the public sector: Experience from Taiwan. *Public Personnel Management*, 42(2), 259–271. <https://doi.org/10.1177/0091026013487124>
- Yamazaki, Y. (2014). Using a competency approach to understand host-country national managers in Asia. *International Journal of Human Resource Management*. Taylor & Francis. <https://doi.org/10.1080/09585192.2013.872164>
- Yilmaz, K. (2011). The Cognitive Perspective on Learning: Its Theoretical Underpinnings and Implications for Classroom Practices. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 84(5), 204–212. <https://doi.org/10.1080/00098655.2011.568989>

- Youndt, M. A., Subramaniam, M., & Snell, S. A. (2004). Intellectual capital profiles: an examination of investments and returns. *Journal of Management Studies*, 41(2), 335–361. <https://doi.org/10.1111/j.1467-6486.2004.00435.x>
- Young, M., & Conboy, K. (2013). Contemporary project portfolio management: Reflections on the development of an Australian competency standard for project portfolio management. *International Journal of Project Management*, 31(8), 1089–1100. <https://doi.org/10.1016/j.ijproman.2013.03.005>
- Zais, R., S. (1976). *Curriculum Principles and Foundations*. New York: Harper & Row Publishers.
- Zapata Ros, M., & Lizenberg, N. (2006). Sequencing of contents and learning objects - part II. *RED: Revista de Educación a Distancia*, (14), 2.
- Zohrabi, M. (2013). Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings. *Theory and Practice in Language Studies*, 3(2), 254–262. <https://doi.org/10.4304/tpls.3.2.254-262>

2. Peraturan Perundangan

- Peraturan Presiden Republik Indonesia Nomor 8 Tahun 2012 tentang Kerangka Kualifikasi Nasional Indonesia
- Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 13 Tahun 2015 tentang Rencana Strategis Kementerian Energi dan Sumber Daya Mineral Tahun 2015-2019
- Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 21 Tahun 2015 tentang Penetapan dan Pemberlakuan Standar Kurikulum Pendidikan dan Pelatihan Bidang Mineral dan Batubara
- Peraturan Menteri Tenaga Kerja dan Transmigrasi Republik Indonesia Nomor 3 Tahun 2016 tentang Tata Cara Penetapan Standar Kompetensi Kerja Nasional Indonesia
- Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 13 Tahun 2016 tentang Organisasi dan Tata Kerja Kementerian Energi dan Sumber Daya Mineral
- Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 42 Tahun 2016 tentang Standardisasi Kompetensi Kerja di Bidang Pertambangan Mineral dan Batubara
- Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 22 Tahun 2017 tentang Pendidikan Vokasi dan Pelatihan Berbasis Kompetensi yang *Link and Match* dengan Badan Usaha dan/atau Bentuk Usaha Tetap Bidang Energi dan Sumber Daya Mineral
- Keputusan Menteri Tenaga Kerja dan Transmigrasi Republik Indonesia Nomor KEP. 180/ MEN/ V/ 2009 tentang Penetapan Standar Kompetensi Kerja Nasional Indonesia Sektor Mineral, Batubara, dan Panas Bumi Sub Sektor Pertambangan Mineral dan Batubara Bidang Survei Tambang Sub Bidang Pemetaan Tambang Terbuka

3. Sumber *Online* dan Bentuk Lain

Badan Pusat Statistika. (2019). *Penduduk Berumur 15 Tahun Ke Atas Menurut Pendidikan Tertinggi yang Ditamatkan*. Diakses dari: <https://www.bps.go.id/statictable/2016/04/05/1909/penduduk-berumur-15-tahun-ke-atas-menurut-pendidikan-tertinggi-yang-ditamatkan-dan-jenis-kegiatan-selama-seminggu-yang-lalu-2008-2018.html>

Department of Mines and Petroleum Government of Western Australia. (t.t). *Authorised Mine Surveyor's Certificate Grades 1 and 2*. Diakses dari: http://www.dmp.wa.gov.au/Documents/Safety/MSH_COE_FS_AuthorisedMineSurveyor.pdf.

Direktorat Jenderal Mineral dan Batubara. (2017). *Capaian Sub Sektor Mineral dan Batubara Tahun 2017 dan Outlook 2018*. Jakarta.

Qualifications Subcommittee of Mine Surveyors of the Chamber of Mines of Namibia. (2006). *Rules Governing the Certification of Namibian Mine Surveyors*. Windhoek. Diakses dari: http://www.chamberofmines.org.na/index.php/download_file/view/81/182/.

South African Geomatics Council. (2013). *Notes for Guidance for Registration as a Professional Mine Surveyor*. Johannesburg. Diakses dari: https://sagc.org.za/pdf/Registration%20Notes%20Forms/professional/mine/NOTES_Prof_Mine_Surveyor_2019.pdf.

South African Geomatics Council. (2013). *Registration of Mine Surveyors, Mine Survey Technician & Candidates*. Johannesburg. Diakses dari: https://sagc.org.za/pdf/Registration%20Notes%20Forms/technologist%20Surveyors/mine/NOTES_Mine_Surveyor_2019.pdf.

The International Society for Mine Surveying. (t.t). *Mine Surveying*. Diakses dari: <http://www.ism-minesurveying.org/mine-surveying.html>.