# Appendix A: ATI16 and ATI22 Items

**22-Item ATI**

|  |  |
| --- | --- |
| No. | Item |
| 1 | In this subject students should focus their study on what I provide them |
| 2 | It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items |
| 3 | In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying |
| 4 | It is important to present a lot of facts to students so that they know what they have to learn for the subject |
| 5 | I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject |
| 6 | In this subject I concentrate on covering the information that might be available from key tests and readings |
| 7 | I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop |
| 8 | In teaching sessions for this subject, I deliberately provoke debate and discussion |
| 9 | I structure my teaching in this subject to help students to pass the formal assessment items |
| 10 | I think an important reason for running teaching sessions in this subject is to give students a good set of notes |
| 11 | In this subject, I provide the students with the information they will need to pass the formal assessments |
| 12 | I should know the answers to any questions that students may put to me during this subject |
| 13 | I make available opportunities for students in this subject to discuss their changing understanding of the subject |
| 14 | It is better for students in this subject to generate their own notes rather than copy mine |
| 15 | A lot of teaching time in this subject should be used to question students' ideas |
| 16 | In this subject my teaching focuses on the good presentation of information to students |
| 17 | I see teaching as helping students develop new ways of thinking in this subject |
| 18 | In teaching this subject it is important for me to monitor students' changed understanding of the subject matter |
| 19 | My teaching in this subject focuses on delivering what I know to the students |
| 20 | Teaching in this subject should help students question their own understanding of the subject matter |
| 21 | Teaching in this subject should include helping students find their own learning resources |
| 22 | I present material to enable students to build up an information base in this subject |

**16-Item ATI**

|  |  |
| --- | --- |
| No. | Item |
| 1 | I design my teaching in this subject with the assumption that most of the students have very little useful knowledge of the topics to be covered |
| 2 | I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for the formal assessment items |
| 3 | In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying |
| 4 | I feel it is important to present a lot of facts to students so that they know what they have to learn for this subject |
| 5 | I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject |
| 6 | I set aside some teaching time so that the students can discuss, among themselves the difficulties that they encounter studying the subject |
| 7 | In this subject I concentrate on covering the information that might be available from a good textbook |
| 8 | I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop |
| 9 | In teaching sessions for this subject, I use difficult or undefined examples to provoke debate |
| 10 | I structure this subject to help students pass the formal assessment items |
| 11 | I think an important reason for running teaching sessions in this subject is to give students a good set of notes |
| 12 | In this subject, I only provide the students with the information that they will need to pass the formal assessments |
| 13 | I feel that I should know the answers to any questions that students may put to me during the subject |
| 14 | I make available opportunities for the students in this subject to discuss their changing understanding of the subject |
| 15 | I feel that it is better for students in this subject to generate their own notes rather than always copy mine |
| 16 | I feel a lot teaching time in this subject should be used to questions students' ideas |

# Appendix B: Complete List of Reviewed Studies

**Use ATI and do not report psychometrics**

Addy, T., Simmons, P., Gardner, G. E., & Albert, J. (2015). A New “Class” of Undergraduate Professors: Examining Teaching Beliefs and Practices of Science Faculty With Education Specialties - ProQuest. *Journal of College Science Teaching*, *44*(3).

Anderson, O., & Finelli, C. (2014). A Faculty Learning Community to Improve Teaching Practices in Large Engineering Courses: Lasting Impacts. In *Proceedings from*. Indianapolis, IN: American Society for Engineering Education.

Baker, L., Chakraverty, D., Columbus, L., Feig, A., Jenks, W., Pilarz, M., … Wesemann, J. (2014). Cottrell Scholars Collaborative New Faculty Workshop: Professional Development for New Chemistry Faculty and Initial Assessment of Its Efficacy. *Journal of Chemical Education*, *91*(11), 1874–1881.

Bartling, J. (2009). Faculty and Administrator Perceptions of Teaching, the Scholarship of Teaching and Learning, and Culture at a Teaching University. *Faculty Scholarship – Education*. Retrieved from http://digitalcommons.olivet.edu/educ\_facp/1

Blitz, J. J., Rooyen, M. van, Cameron, D. A., Pickworth, G. P., & Toit, P. D. (2010). Is temperament a key to the success of teaching innovation? *African Journal of Health Professions Education*, *2*(1), 17–20.

Breytenbach, B. (2013). Exploring the Culture of Learning and Teaching between Two Universities. University of the Witwatersrand. Retrieved from http://146.141.12.21/bitstream/handle/10539/13956/Belinda%20Breytenbach\_research%20report%20final%20September%202013.pdf?sequence=1&isAllowed=y

Budge, K., & Cowlishaw, K. (2012). Student and teacher perceptions of learning and teaching: a case study. *Journal of Further and Higher Education*, *36*(4), 549–565.

Coffey, M., & Gibbs, G. (2002). Measuring Teachers’ Repertoire of Teaching Methods. *Assessment & Evaluation in Higher Education*, *27*(4), 383–390.

Colet, N. (2007). Monitoring professional development of junior teachers in Swiss higher education. Presented at the 2007 EARLI, Budapest: European Association for Research on Learning and Instruction.

Derting, T. L., Ebert-May, D., Henkel, T. P., Maher, J. M., Arnold, B., & Passmore, H. A. (2016). Assessing faculty professional development in STEM higher education: Sustainability of outcomes. *Science Advances*, *2*(3), e1501422.

Derting, T. L., Maher, J. M., Passmore, H. A., Henkel, T. P., Arnold, B., Momsen, J. L., & Ebert-May, D. (2014). Developing Learner-centered future faculty: First IV - A uniquely effective program of professional development. Presented at the 6th Annual Biology Education Research Symposium, Cleveland, OH: National Association of Biology Teachers.

Dimitrov, N. (2012). Disciplinary Communication Competence Among Teaching Assistants: A Research Agenda. In G. Gorsuch, *Working Theories for Teaching Assistant Development: Time-Tested & Robust Theories, Frameworks, & Models for TA & ITA Learning*. Stillwater, OK: New Forums Press Inc.

Drew, L. (2004). The Experience of Teaching Creative Practices: Conceptions and Approaches to Teaching in the Community of Practice Dimension. Presented at the 2nd CLTAD International Conference, Enhancing Curricula: The Scholarship of Learning and Teaching in Art and Design, Barcelona.

Ebert-May, D., Derting, T. L., Henkel, T. P., Maher, J. M., Momsen, J. L., Arnold, B., & Passmore, H. A. (2015). Breaking the Cycle: Future Faculty Begin Teaching with Learner-Centered Strategies after Professional Development. *CBE-Life Sciences Education*, *14*(2), ar22.

Eley, M. G. (2006). Teachers’ Conceptions of Teaching, and the Making of Specific Decisions in Planning to Teach. *Higher Education*, *51*(2), 191–214.

Finelli, C., & Millunchick, J. (2013). The Teaching Circle for Large Engineering Courses: Clearing the Activation Barrier. Presented at the 120th ASEE Annual Conference & Exposition, Atlanta, GA: American Society for Engineering Education.

Fleming, V., Lipscomb, S., Light, G. J., & Nielsen, B. (2004). Teaching for Learning with Technology: A Faculty Development Initiative at a Research University. Northwestern University.

Gibbs, G., & Coffey, M. (2004). The Impact Of Training Of University Teachers on their Teaching Skills, their Approach to Teaching and the Approach to Learning of their Students. *Active Learning in Higher Education*, *5*(1), 87–100.

González, C. (2011). The relationship between approaches to teaching, approaches to e-teaching and perceptions of the teaching situation in relation to e-learning among higher education teachers. *Instructional Science*, *40*(6), 975–998.

Gordon, C. J. (2000). *Encouraging the Development of Deeper Learning and Personal Teaching Efficacy: Effects of Modifying the Learning Environment in a Preservice Teacher Education Program* (Dissertation). University of Sydney, Sydney, Australia.

Hardin, C. (2011). *The Born Versus Made Debate: An Examination Of Community College Instructors’ Beliefs And Teaching Practices* (Dissertation). University of Central Florida, Orlando, FL.

Hashim, M., & de Graaff, E. (2013). The Effectiveness of Problem-based Learning Approach on Students’ Skills in Technical Vocational Education and Training (TVET) Specifically on Programming Course Using a Computerized Numerical Control (CNC) Simulator. In K. Mohd-Yusof, M. Arsat, M. T. Borhan, E. de Graaf, A. Kolmos, & F. A. Phang, *PBL Across Cultures* ((Eds), pp. 126–130). Aalborg: Aalborg Universitesforlag.

Hickman, T. (2010). *Culture Change: Defining and Measuring Student-centered Teaching*. University of Toledo, Toledo, OH.

Hood, J. (2009). *Improvement In Teaching: The Impact Of A Formative Assessment Strategy On Teaching Intentions And Strategies* (Dissertation). Lewis & Clark College, Portland, OR. Retrieved from http://pqdtopen.proquest.com/doc/305081236.html?FMT=AI

Jacobs, J. C. G., Luijk, S. J. V., Berkel, H. V., Vleuten, C. P. M. V. der, Croiset, G., & Scheele, F. (2012). Development of an instrument (the COLT) to measure conceptions on learning and teaching of teachers, in student-centred medical education. *Medical Teacher*, *34*(7), e483–e491.

Kjellgren, K. I., Hendry, G., Hultberg, J., Plos, K., Rydmark, M., Tobin, G., & Säljö, R. (2008). Learning to learn and learning to teach — Introduction to studies in higher education. *Medical Teacher*, *30*(8), e239–e245.

Krause, S., Middleton, J., A., Judson, E., Ernzen, J., Beeley, K., & Chen, Y.-C. (2015). Factors Impacting Retention and Success of Undergraduate Engineering Students. Presented at the 122nd ASEE Annual Conference & Exposition, Seattle, WA: American Society for Engineering Education.

Lasry, N., Charles, E., & Whittaker, C. (2014). When teacher-centered instructors are assigned to student-centered classrooms. *Physical Review Special Topics - Physics Education Research*, *10*(1), 10116.

Lasry, N., Charles, E., Whittaker, C., Dedic, H., & Rosenfield, S. (2012). Changing Classroom Designs: Easy; Changing Instructors’ Pedagogies: Not So Easy…. Presented at the 2012 Physics Education Research Conference, Philadelphia, PA: American Institute of Physics. Retrieved from http://s3.amazonaws.com/academia.edu.documents/41421606/Changing\_Classroom\_Designs\_Easy\_Changing20160122-6350-wxyctk.pdf?AWSAccessKeyId=AKIAJ56TQJRTWSMTNPEA&Expires=1468969549&Signature=Oj76n%2BUecU%2F%2Fy7ZKSEF8v2Vi%2FBw%3D&response-content-disposition=inline%3B%20filename%3DChanging\_classroom\_designs\_Easy\_Changing.pdf

Light, G., Calkins, S., Luna, M., & Drane, D. (2009). Assessing the Impact of a Year-Long Faculty Development Program on Faculty Approaches to Teaching. *International Journal of Teaching and Learning in Higher Education*, *20*(2), 168–181.

Lueddeke, G. R. (2003). Professionalising Teaching Practice in Higher Education: A study of disciplinary variation and “teaching-scholarship.” *Studies in Higher Education*, *28*(2), 213–228.

Lund, T. J., & Stains, M. (2015). The importance of context: an exploration of factors influencing the adoption of student-centered teaching among chemistry, biology, and physics faculty. *International Journal of STEM Education*, *2*(13), 1–21.

McCabe, B., Pantazidou, M., & Phillips, D. (2012). *Shaking the Foundations of Geo-engineering Education*. CRC Press.

McKenna, A. F., Yalvac, B., & Light, G. J. (2009). The Role of Collaborative Reflection on Shaping Engineering Faculty Teaching Approaches. *Journal of Engineering Education*, *98*(1), 17–26.

Middleton, J., A., Krause, S., Beeley, K., Judson, E., Ernzen, J., & Chen, Y.-C. (2015). Examining Relationships and Patterns in Pedagogical Beliefs, Attitudes and Classroom Practices for Faculty of Undergraduate Engineering, Math and Science Foundational Courses. Presented at the 122nd ASEE Annual Conference & Exposition, Seattle, WA: American Society for Engineering Education.

Middleton, J. A., Krause, S., Beeley, K., Judson, E., Ernzen, J., & Culbertson, R. (2015). Examining the relationship between faculty teaching practice and interconnectivity in a social network. In *IEEE Frontiers in Education Conference (FIE), 2015. 32614 2015* (pp. 1–7).

Nevgi, A., & Löfström, E. (2015). The development of academics’ teacher identity: Enhancing reflection and task perception through a university teacher development programme. *Studies in Educational Evaluation*, *46*, 53–60.

Pedrosa‐de‐Jesus, M. H., & Lopes, B. da S. (2011). The relationship between teaching and learning conceptions, preferred teaching approaches and questioning practices. *Research Papers in Education*, *26*(2), 223–243.

Postareff, L., Katajavuori, N., Lindblom‐Ylänne, S., & Trigwell, K. (2008). Consonance and dissonance in descriptions of teaching of university teachers. *Studies in Higher Education*, *33*(1), 49–61.

Potter, M., Kustra, E., Ackerson, T., & Prada, L. (2015). The Effects of Long-Term Systematic Educational Development on the Beliefs and Attitudes of University Teachers. *Higher Education Quality Council of Ontario*, 1–63.

Rijst, R. van der, & Gevel, K. van de. (2012, July). *Faculty sense of teacher efficacy in relation with their approaches to teaching*. Presented at the International Consortium on Educational Development, Bangkok.

Rodgers, R., Christie, J., & Wideman, M. (2014). The Effects of a Required Faculty Development Program on Novice Faculty Self-Efficacy and Teaching. Higher Education Quality Council of Ontario.

Runcan, P., Raţă, G., & Gavreliuc, A. (2014). *Applied Social Sciences: Psychology, Physical Education and Social Medicine*. Cambridge Scholars Publishing.

Salaiman, W. S. W., Rahman, W. R. A., & Dzulkifli, M. A. (2010). Relationship between Critical Thinking Dispositions, Perceptions towards Teacher, Learning Approaches and Critical Thinking Skills among University Students. *International Journal of Behavioral Science (IJBS)*, *3*(1).

Schellhase, K. (2009). *Are Approaches To Teaching And/Or Student Evaluation Of Instruction Scores Related To The Amount Of Faculty Formal Educational Coursework?* (Dissertation). University of Central Florida, Orlando, FL.

Stains, M., Pilarz, M., & Chakraverty, D. (2015). Short and Long-Term Impacts of the Cottrell Scholars Collaborative New Faculty Workshop. *Journal of Chemical Education*, *92*, 1466−1476.

Stes, A., & Petegem, P. V. (2014). Profiling approaches to teaching in higher education: a cluster-analytic study. *Studies in Higher Education*, *39*(4), 644–658.

Stes, A., Verdurmen, C., & Petegem, P. V. (2012). Onderwijsaanpak: docentprofielen in het hoger onderwijs. Presented at the ORD 2012, Wageningen. Retrieved from http://www.wur.nl/upload\_mm/4/4/5/49a5ab6e-a591-423d-aa7c-ae93e6b804ea\_261annstes.pdf

Stevensen, C., & Harris, G. K. (2014). Instruments for Characterizing Instructors’ Teaching Practices: A Review. *NACTA Journal*, (June), 102–108.

Taylor, K. L., & Znajda, S. K. (2015). Demonstrating the impact of educational development: The case of a course design collaborative. *Studies in Educational Evaluation*, *46*, 39–46.

Teviotdale, W., & Clancy, D. (2014). Implementing a change initiative within a university department of accountancy and finance to improve teacher practice and student learning. Presented at the Higher Education Close Up Research Making a Difference, Bailrigg: Lancaster University.

Timan, A. (2013). *Promoting equity in introductory physics: An identity perspective on learning physics and learning to teach* (Thesis). Queens’ University, Kingston, Ontario.

Trenholm, S., Alcock, L., & Robinson, C. (2016). The Instructor Experience of Fully Online Tertiary Mathematics: A Challenge and an Opportunity. *Journal for Research in Mathematics Education*, *47*(2), 147–161.

Wilkesmann, U., & Lauer, S. (2015). What affects the teaching style of German professors? Evidence from two nationwide surveys. *Zeitschrift Für Erziehungswissenschaft*, *18*(4), 713–736.

Wilkesmann, U., & Schmid, C. J. (2011). The impacts of new governance on teaching at German universities. Findings from a national survey. *Higher Education*, *63*(1), 33–52.

Williams, C., Walter, E., Henderson, C., & Beach, A. (2015). Describing undergraduate STEM teaching practices: a comparison of instructor self-report instruments. *International Journal of STEM Education*, *2*(18).

**Use ATI and report psychometrics**

Andersen, M. (2011). *Knowledge, Attitudes, and Instructional Practices of Michigan Community College Math Instructors: The Search for a KAP Gap in Collegiate Math* (Dissertation). Western Michigan University, Kalamazoo, MI.

Arenas, E. (2009). How teachers’ attitudes affect their approaches to teaching international students. *Higher Education Research & Development*, *28*(6), 615–628.

Badia Garganté, A., Meneses, J., & Monereo, C. (2014). Affective Dimension of University Professors about their Teaching: An Exploration through the Semantic Differential Technique. *Universitas Psychologica*, *13*(1), 161–173.

Beausaert, S. A. J., Segers, M. S. R., & Wiltink, D. P. A. (2013). The influence of teachers’ teaching approaches on students’ learning approaches: The student perspective. *Educational Research*, *55*(1), 1–15.

Brownlee, J., Schraw, G., & Berthelsen, D. (2012). *Personal Epistemology and Teacher Education*. Routledge.

Case, J. M., & Huisman, J. (2015). *Researching Higher Education: International Perspectives on Theory, Policy and Practice*. Routledge.

Chen, J., & Brown, G. T. L. (2016). Tensions between knowledge transmission and student-focused teaching approaches to assessment purposes: Helping students improve through transmission. *Teachers and Teaching*, *22*(3), 350–367.

Chong, T., Abdullah, M., Roslan, S., & Daud, S. (2013). Relations between Teaching Approaches based on Students’ Perception and Students’ Adopted Learning Approaches. Retrieved from http://www.curtin.edu.my/tl2015/tl2013/PDF/Relations%20between%20Teaching%20Approaches%20based%20on%20Students%E2%80%99%20Perception%20and%20Students%E2%80%99%20Adopted%20Learning%20Approaches.pdf

Fernández Castillo, E., García Ortiz, Y., & Torres López, R. (2015). Análisis factorial y confiabilidad del Cuestionario de Enfoques de Enseñanza. *Edumecentro*, *7*(4), 146–161.

Finn, K. (2010, May 1). *A survey of college math professors’ reported instructional strategies in courses in which prospective teachers enroll* (Dissertation). University of Iowa, Iowa City, IA.

Goh, P. S. C., Wong, K. T., & Hamzah, M. S. G. (2014). The Approaches to Teaching Inventory: A Preliminary Validation of the Malaysian Translation. *Australian Journal of Teacher Education*, *39*(1).

González, C. (2010). University Teachers’ Experiences of Teaching in Blended Learning Environments. Retrieved from https://ses.library.usyd.edu.au/handle/2123/6401

Han, J., Yin, H., & Wang, W. (2015). Exploring the relationship between goal orientations for teaching of tertiary teachers and their teaching approaches in China. *Asia Pacific Education Review*, *16*(4), 537–547.

Hanbury, A., Prosser, M., & Rickinson, M. (2008). The differential impact of UK accredited teaching development programmes on academics’ approaches to teaching. *Studies in Higher Education*, *33*(4), 469–483.

Hong, Y.-F. (2005). *The Impact of Teachers’ Approaches to Teaching and Students’ Learning Styles on Students’ Approaches to Learning in College Online Biology Courses Committee:* (Dissertation). University of Texas at Austin, Austin, TX.

Hu, Y., Rijst, R. van der, Veen, K. van, & Verloop, N. (2014). And never the two shall meet. *Higher Education*, *68*(4), 607–622.

Kaye, L. K., & Brewer, G. (2013). Teacher and Student-Focused Approaches: Influence of Learning Approach and Self-Efficacy in a Psychology Postgraduate Sample. *Psychology Learning & Teaching*, *12*(1), 12–19.

Kek, M., & Huijser, H. (2011). Exploring the combined relationships of student and teacher factors on learning approaches and self‐directed learning readiness at a Malaysian university. *Studies in Higher Education*, *36*(2), 185–208.

Kemp, S. (2008). Teachers’ meanings: transcending the cultural context. *Journal of Further and Higher Education*, *32*(3), 251–262.

Kemp, S. J. (2013). Exploring the use of learner-focused teaching approaches in different academic disciplines. *Journal of Further and Higher Education*, *37*(6), 804–818.

Kim, D. (2002). *The Relationships Between Teachers’ Approaches To Teaching, Students’ Perceptions Of Course Experiences, And Students’ Approaches To Studying In Electronic Distance Learning Environments* (Dissertation). University of Georgia, Athens, GA.

Kreber, C. (2005). Reflection on teaching and the scholarship of teaching: Focus on science instructors. *Higher Education*, *50*(2), 323–359.

Leung, M., Lu, X., Chen, D., & Lu, M. (2008). Impacts of Teaching Approaches on Learning Approaches of Construction Engineering Students: A Comparative Study between Hong Kong and Mainland China. *Journal of Engineering Education*, *97*(2), 135–145.

Mak, B., & Chik, P. (2011). Differences in perceived approaches to learning and teaching English in Hong Kong secondary schools. *Educational Review*, *63*(2), 195–218.

Monroy, F., González-Geraldo, J. L., & Hernández-Pina, F. (2014). A psychometric analysis of the Approaches to Teaching Inventory (ATI) and a proposal for a Spanish version (S-ATI-20). *Anales de Psicología / Annals of Psychology*, *31*(1), 172–183.

Montenegro Maggio, H., & González Ugaldeb, C. (2013). Análisis factorial confirmatorio del cuestionario: “Enfoques de Docencia Universitaria”(Approaches to Teaching Inventory, ATI-R). *Estudios Pedagógicos (Valdivia)*, *39*(2), 213–230.

Nevgi, A., Tella, S., & Nishimura, S. (2010). University teachers’ approaches to teaching and their pedagogical use of ICTs: A comparative case study of Finland, Japan, and India. *US-China Education Review*, *7*(7).

Postareff, L. (2007). *Teaching in Higher Education From Content-focused to Learning-focused Approaches to Teaching* (Dissertation). University of Helinski, Helinski, Finland. Retrieved from https://helda.helsinki.fi/bitstream/handle/10138/19882/teaching.pdf?sequence=1

Postareff, L., Lindblom-Ylänne, S., & Nevgi, A. (2007a). A follow-up study of the effect of pedagogical training on teaching in higher education. *Higher Education*, *56*(1), 29–43.

Postareff, L., Lindblom-Ylänne, S., & Nevgi, A. (2007b). The effect of pedagogical training on teaching in higher education. *Teaching and Teacher Education*, *23*(5), 557–571.

Raiche, G., Langevin, M., Riopel, M., & Mauffette, Y. (2006). Étude exploratoire de la dimensionnalité et des facteurs expliqués par une traduction française de l’Inventaire des approches d’enseignement de Trigwell et Prosser dans trois universités québécoises. *Mesure Et Évaluation En Éducation*, *29*(2), 41–61.

Rosário, P., Núñez, J. C., Ferrando, P. J., Paiva, M. O., Lourenço, A., Cerezo, R., & Valle, A. (2013). The relationship between approaches to teaching and approaches to studying: a two-level structural equation model for biology achievement in high school. *Metacognition and Learning*, *8*(1), 47–77.

Rosário, P., Núñez, J. C., Valle, A., Paiva, O., & Polydoro, S. (2012). Approaches to Teaching in High School when Considering Contextual Variables and Teacher Variables // Enfoques de enseñanza en Bachillerato en función de variables contextuales y del docente. *Journal of Psychodidactics*, *18*(1). Retrieved from http://www.ehu.eus/ojs/index.php/psicodidactica/article/view/6215

Rosário, P., Núñez, J. C., Vallejo, G., Paiva, O., Valle, A., Fuentes, S., & Pinto, R. (2014). Are teachers’ approaches to teaching responsive to individual student variation? A two-level structural equation modeling. *European Journal of Psychology of Education*, *29*(4), 577–601. http://doi.org/10.1007/s10212-014-0214-9

Shindell, D. (2011, December 1). *Factors which influence the use of active learning strategies by nursing faculty* (Dissertation). University of Nevada Las Vegas, Las Vegas, NV.

Simon, E., & Pleschová, G. (2012). *Teacher Development in Higher Education: Existing Programs, Program Impact, and Future Trends*. Routledge.

Stes, A., Coertjens, L., & Petegem, P. V. (2009). Instructional development for teachers in higher education: Impact on teaching approach. *Higher Education*, *60*(2), 187–204.

Stes, A., Gijbels, D., & Petegem, P. V. (2007). Student-focused approaches to teaching in relation to context and teacher characteristics. *Higher Education*, *55*(3), 255–267.

Stes, A., Maeyer, S. D., & Petegem, P. V. (2009). Approaches to teaching in higher education: Validation of a Dutch version of the Approaches to Teaching Inventory. *Learning Environments Research*, *13*(1), 59–73.

Torenbeek, M., Jansen, E., & Hofman, A. (2009). How first year students perceive the fit between secondary and university education: the effect of teaching approaches. *Effective Education*, *1*(2), 135–150.

Trenholm, S. (2013). *Adaptation of tertiary mathematics instruction to the virtual medium: approaches to assessment practice* (Thesis). Loughborough University, Loughborough, England.

Wilkesmann, U. (2013). Effects of Transactional and Transformational Governance on Academic Teaching: Empirical evidence from two types of higher education institutions. *Tertiary Education and Management*, *19*(4), 281–300.

Zhang, L. (2004). Do university students’ thinking styles matter in their preferred teaching approaches? *Personality and Individual Differences*, *37*(8), 1551–1564.

Zhang, L.-F. (2001). Approaches and Thinking Styles in Teaching. *The Journal of Psychology*, *135*(5), 547–561.

# Appendix C: Additional 19 Models Discovered

|  |  |  |
| --- | --- | --- |
| **Model** | **Structure** | **ATI instrument** |
| *Factor* | *Items* |
| 10 | One Factor | 2,3,4,6,7,8,9,10,11,12,13,14,15,16 | ATI16 |
| 11 | CCSF  | 3+6+7+8+9+14+15+16 |
| ITTF | 2+4+7+10+11+12+13 |
| Error covariance terms | 2&10, 9&12, 3&6 |
| 12 | Conceptual change | 8,16 |
| Focus on test scale | 2,10 |
| Discussion among student scale | 6,14 |
| Discussion between students and teacher | 3,9 |
| Information transmission | 4,7 |
| Focus on notes scale | 11,15 |
| 13 | CCSF | 3,6,8,9,14,15,16 |
| ITTF | 2,7,11,12,13 |
| 14 | CCSF | 2,7,12 |
| ITTF | 3,6,9,14,15,16 |
| 15 | CCSF scale |  |
|  CCSF (intention) subscale | 8,15,16 |
|  CCSF (strategy) subscale | 3,6,9,14 |
| ITTF scale |  |
|  ITTF (intention) subscale | 2,4,11,13 |
|  ITTF (strategy) subscale | 7,10,12 |
| 16 | CCSF scale |  |
|  CCSF (intention) subscale | 8,15,16 |
|  CCSF (strategy) subscale | 3,6,9,14 |
| ITTF scale |  |
|  ITTF (intention) subscale | 2,4,11 |
|  ITTF (strategy) subscale | 7,10,12 |
| 17 | Student focused | 3,8,9,14,16 |
| Teacher focused | 2,4,12 |
| 18 | CCSF | 3,6,8,14 |
| ITTF | 2,4,7,10,11,12,13 |
| 19 | CCSF | 3,5,7,8,13,14,15,17,18,21 | ATI22 |
| ITTF | 1,2,4,6,9,10,11,12,16,19,22 |
| Error covariance terms | 6&14, 3&9, 10&12, 11&15, 2&10, 22&21 |
| 20 | CCSF | 5,7,8,13,14,17,21 |
| ITTF | 1,2,3,4,9,11,12,16,19,22 |
| 21 | CCSF scale |  |
|  Making meaning subscale | 7,13,17,21 |
|  Student-led discussion subscale | 5,8,14 |
| ITTF scale |  |
|  Information transmission subscale | 1,16,19 |
|  Focused on notes subscale | 9,11,12 |
|  Focused on tests subscale | 3,4,22 |
| 22 | Teacher focused | 1,4,6,9,12,22 |
| Student focused | 5,14,18,21 |
| 23 | CCSF | 3,5,7,8,12,13,14,16,18 |
| ITTF | 1,2,4,6,9,10,11,15,17 |
| 24 | CCSF | 1,2,4,6,9,10,11,12,16,19,22 |
| ITTF | 3,7,8,13,14,15,18 |
| 25 | CCSF | 3,5,7,8,13,14,15,17,18,20,21 |
| ITTF | 1,4,6,9,10,11,12,16,19,22 |
| 26 | Conceptual change | 3,9,13,15,16,20,22 |
| Information transmission | 5,7,8,10,17,18 |
| Focused on group discussion | 2,11,14,19 |
| Focused on tests | 1,6,12,21 |
| 27 | CCSF | 3,5,7,8,13,14,15,17,18,20,21,22 |
| ITTF | 1,2,4,6,9,10,11,12,16,19 |
| 28 | CCSF | 3,5,7,8,13,14,16,17,19,20 |
| ITTF | 1,2,4,6,9,10,11,12,15,18 |

# Appendix D: Coefficient alpha for All Models Similar to Original



The preceding figure is a reproduction of Figure 2 in the manuscript except that it also included 15 additional models that were similar to, but not exact replicas of the original CCSF and ITTF Scales. For example, Model 14 only contains 9 out of the original ATI16 items under CCSF and ITTF scales. Because it’s not the exact same items, the estimate of reliability will be affected, although they purport to measure similar scales.

# Appendix E: CFA Fit Statistics

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | N | 2 | df | p | 2/df | CFI | TLI | RMSE | RMSEA.low | RMSEA.high | p | SRMR | AIC | BIC |
| 1 | 267 | 444.358 | 76 | 0 | 5.847 | 0.458 | 0.351 | 0.135 | 0.123 | 0.146 | 0 | 0.143 | 10907.46 | 11061.71 |
| 2 | 267 | 376.685 | 71 | 0 | 5.305 | 0.55 | 0.423 | 0.127 | 0.115 | 0.139 | 0 | 0.134 | 10839.58 | 11011.77 |
| 3 | 267 | 456.818 | 208 | 0 | 2.196 | 0.802 | 0.78 | 0.067 | 0.059 | 0.075 | 0 | 0.074 | 16148.98 | 16389.32 |
| 22 | 267 | 421.79 | 77 | 0 | 5.478 | 0.492 | 0.4 | 0.13 | 0.118 | 0.141 | 0 | 0.131 | 10874.87 | 11025.54 |
| 24 | 267 | 377.088 | 72 | 0 | 5.237 | 0.551 | 0.432 | 0.126 | 0.114 | 0.138 | 0 | 0.137 | 10842.86 | 11011.46 |
| 27 | 267 | 406.843 | 202 | 0 | 2.014 | 0.837 | 0.813 | 0.062 | 0.053 | 0.07 | 0.011 | 0.071 | 16102.59 | 16364.46 |
| 30 | 267 | 276.088 | 53 | 0 | 5.209 | 0.595 | 0.495 | 0.126 | 0.112 | 0.14 | 0 | 0.12 | 9238.131 | 9370.859 |
| 32 | 267 | 35.758 | 25 | 0.075 | 1.43 | 0.973 | 0.952 | 0.04 | 0 | 0.067 | 0.693 | 0.037 | 7367.364 | 7510.854 |
| 33 | 267 | 414.884 | 118 | 0 | 3.516 | 0.662 | 0.61 | 0.097 | 0.087 | 0.107 | 0 | 0.103 | 12637.26 | 12823.8 |
| 34 | 267 | 348.672 | 95 | 0 | 3.67 | 0.729 | 0.658 | 0.1 | 0.089 | 0.111 | 0 | 0.102 | 11838.16 | 11985.24 |
| 35 | 267 | 97.099 | 34 | 0 | 2.856 | 0.75 | 0.67 | 0.083 | 0.065 | 0.102 | 0.002 | 0.074 | 7628.7 | 7739.905 |
| 36 | 267 | 510.736 | 134 | 0 | 3.811 | 0.613 | 0.558 | 0.103 | 0.094 | 0.112 | 0 | 0.132 | 13642.93 | 13840.23 |
| 37 | 267 | 77.291 | 51 | 0.01 | 1.516 | 0.947 | 0.931 | 0.044 | 0.023 | 0.062 | 0.689 | 0.056 | 8804.627 | 8944.53 |
| 38 | 267 | 128.154 | 26 | 0 | 4.929 | 0.545 | 0.369 | 0.121 | 0.102 | 0.141 | 0 | 0.106 | 6877.004 | 6977.447 |
| 40 | 267 | 312.652 | 60 | 0 | 5.211 | 0.627 | 0.515 | 0.126 | 0.112 | 0.14 | 0 | 0.13 | 9978.346 | 10089.55 |
| 41 | 267 | 98.751 | 19 | 0 | 5.197 | 0.612 | 0.428 | 0.125 | 0.102 | 0.15 | 0 | 0.109 | 6172.129 | 6261.81 |
| 43 | 267 | 242.615 | 134 | 0 | 1.811 | 0.873 | 0.854 | 0.055 | 0.044 | 0.066 | 0.207 | 0.065 | 13241.54 | 13438.84 |
| 44 | 267 | 415.501 | 188 | 0 | 2.21 | 0.809 | 0.786 | 0.067 | 0.059 | 0.076 | 0 | 0.074 | 15435.61 | 15665.2 |
| 45 | 267 | 655.531 | 183 | 0 | 3.582 | 0.598 | 0.539 | 0.098 | 0.091 | 0.106 | 0 | 0.123 | 15701.34 | 15948.86 |
| 46 | 267 | 422.43 | 203 | 0 | 2.081 | 0.825 | 0.801 | 0.064 | 0.056 | 0.072 | 0.003 | 0.073 | 16121.72 | 16380 |
| 51 | 267 | 471.609 | 208 | 0 | 2.267 | 0.79 | 0.767 | 0.069 | 0.061 | 0.077 | 0 | 0.078 | 16163.38 | 16403.72 |
| 53 | 267 | 261.071 | 43 | 0 | 6.071 | 0.495 | 0.354 | 0.138 | 0.123 | 0.154 | 0 | 0.135 | 8744.797 | 8866.763 |
| 54 | 267 | 561.649 | 169 | 0 | 3.323 | 0.648 | 0.604 | 0.093 | 0.085 | 0.102 | 0 | 0.125 | 15000.01 | 15218.83 |

# Appendix F: 4- and 5-Factor EFA Results

**EFA – 4 Factor Solution**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Factor1** | **Factor2** | **Factor3** | **Factor4** |
| 9 | 0.835 | 0.31 | -0.316 |  |
| 11 | 0.685 |  |  |  |
| 6 | 0.597 |  |  |  |
| 4 | 0.581 |  |  |  |
| 2 | 0.528 |  |  |  |
| 10 | 0.519 |  |  |  |
| 1 | 0.402 |  |  |  |
| 12 | 0.39 |  |  |  |
| 16 | 0.354 |  |  |  |
| 19 | 0.322 |  |  |  |
| 22 |  |  |  | 0.389 |
| 13 |  | 0.496 |  |  |
| 5 |  | 0.76 |  |  |
| 17 |  |  | 0.73 |  |
| 8 |  | 0.652 | 0.314 |  |
| 3 |  | 0.529 |  |  |
| 15 |  | 0.445 | 0.426 |  |
| 14 |  |  |  |  |
| 20 |  |  | 0.577 |  |
| 7 |  |  | 0.594 |  |
| 18 |  |  | 0.502 |  |
| 21 |  |  |  | 0.989 |
| Var | 0.141 | 0.238 | 0.335 | 0.392 |

**EFA – 5 Factor Solution**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item** | **Factor1** | **Factor2** | **Factor3** | **Factor4** | **Factor5** |
| 9 | 1.05 |  |  |  | 0.869 |
| 11 | 0.784 |  |  |  | 0.377 |
| 4 | 0.654 |  |  |  |  |
| 6 | 0.612 |  |  |  |  |
| 10 | 0.597 |  |  |  |  |
| 2 | 0.579 |  |  |  |  |
| 1 | 0.49 |  |  |  |  |
| 16 | 0.446 |  |  |  |  |
| 12 | 0.439 |  |  |  |  |
| 19 | 0.381 |  |  |  |  |
| 17 |  | 0.788 |  |  |  |
| 20 |  | 0.688 |  |  |  |
| 7 |  | 0.604 |  |  |  |
| 18 |  | 0.587 |  |  |  |
| 15 |  | 0.454 | 0.333 |  |  |
| 21 |  | 0.441 |  | 0.304 |  |
| 8 |  |  | 0.573 |  |  |
| 14 |  |  |  |  |  |
| 13 |  |  | 0.406 |  |  |
| 5 |  |  | 0.783 |  |  |
| 3 |  |  | 0.542 |  |  |
| 22 |  |  |  | 1.008 |  |
| Var. | 0.186 | 0.304 | 0.380 | 0.436 | 0.490 |