USING AUTHENTIC ASSESSMENT TO ENHANCE SEAFARER STUDENT ENGAGEMENT AND THEIR ABILITY TO TRANSFER LEARNING

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Abstract. Past research shows that seafarer employers are critical of some of the assessment methods adopted by the educators at maritime education and training institutes (METs) to assess the competence of seafarers. The criticisms included the failure to develop and assess the holistic skills required to deploy competence in a range of contexts. Moreover, the decontextualized scenarios used in assessment methods disengage students from the learning process as they fail to recognize the significance of learning to the real-world. This paper argues that seafarer students can be engaged through authentic assessments conducted in real-world contexts that will test their ability to put theoretical knowledge developed in classrooms to practical settings resembling workplace scenarios. The arguments are based on the theories of constructivism and self-efficacy that underpin the concept of authentic assessment. The theories are used to explain greater student engagement through involvement in the process of knowledge construction that also develops metacognitive skills for the transfer of learning to different contexts. The theoretical arguments are supported with empirical evidence from past research to provide a robust justification for the use of authentic assessment in seafarer training to obtain similar outcomes.

Key words: seafarer, authentic assessment, student engagement, learning transfer

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1　AUTHENTIC ASSESSMENT PROMOTE STUDENT ENGAGEMENT

Student interviews during the course review of deck officers (Australian Maritime College (AMC), 2011) carried out in the Australian Maritime College (AMC) revealed that seafarer students felt disengaged with traditional assessments when used for assessing their competence to perform workplace tasks.

Traditional assessment methods such as pen and paper testing, oral exams, and multiple choice questions (MCQs) may be effective in assessing lower order cognition skills of memorising and ability to regurgitate which is necessary but not sufficient for performing in workplaces such as ships, where a higher level of cognition is required to assimilate, analyse and structure (Wiggins, 1990) information for decision making and problem solving. For example, Table 1 shows how seafarer assessments may use a combination of traditional and authentic assessments to assess competence to perform STCW tasks to workplace standards.

However, an ethnographic case study involving a small sample of 16 students carried out by Emad and Roth (2007) in a Canadian maritime institute, revealed that students were aware of the fact that traditional exams comprised mainly of the questions which were drawn from a question bank. Over time they could predict the range of questions and prepare accordingly. Such assessments that lack innovation in design can encourage memorizing to pass examinations instead of the deployment of critical thinking and problem-solving skills that are essentially required at every workplace.

Assessments designed to assess professional competence of seafarers to perform real-world tasks should ideally create similar scenarios for student performance. For example, student interviews at the AMC (AMC, 2011) revealed their preference for assessments that are contextually similar to challenges found at workplace, in order to relate classroom learning to professional practice. Lack of contextual similarity in learning and assessment makes it difficult for students to relate how skills and knowledge developed in classrooms can be applied in workplace contexts (Findlay, 2013). It also raises the questions of validity where students start to question the relevance of the assessments and the competence it purports to assess, thus disengaging students. Assessments that are designed in real-world contexts are defined as authentic assessments (Wiggins, 1990; Archbald, 1991; Gulikers, Bastiaens, and Kirschner, 2004; Darling-Hammond and Snyder, 2000).

Meaningful contexts through real-world scenarios create high level of student engagement and commitment. For example, interview of six students in a study by Richards Perry (2011) revealed students' preference for meaningful and relevant learning experiences; and authentic learning. The convenience sample was kept to a low number of six students to gain a greater depth of inquiry through an extensive interview protocol. However, to be engaged in learning, students will not only require meaningful contexts but also to be active participants in the knowledge construction process that precedes the assessments (Hart et al., 2011). Although the uniqueness of authentic assessment lies in the setting of tasks in real-world contexts, drawing upon the literature (Wiggins, 1990; Archbald, 1991; Darling-Hammond and Snyder, 2000; Gulikers et al., 2004; Gulikers, 2006), authentic assessment herein will encompass:

tasks *resulting in outcomes* in a *real world context* that require an *integration of competence* to solve *forward looking questions* and *ill-structured problems*; **processes** that require *performance criteria to be provided beforehand* and *evidence of competence to be collected by the student*; and **outcomes** that result in *valid and reliable student performance, contextual and multiple evidence of competence, higher student engagement, and transfer of skills to different contexts.*

Table 1 Extract from the STCW Code'95 for the function of navigation at the operational level

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Respond to a distress signal at sea	Search and Rescue Knowledge of the contents of the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual	Examination and assessment of evidence obtained from practical instruction or approved simulator training, where appropriate	The distress or emergency signal is immediately recognized Contingency plans and instructions in standing orders are implemented and complied with

Ability to respond to distress signals to workplace standards should be assessed via authentic assessments	Knowledge-based components of competence may be assessed via traditional pen and paper, MCQs, or oral examinations

Traditionally, seafarer education has been teacher-centric where students have been passive receivers of knowledge (Lewarn, 2002). This does not allow seafarer students to become active participants in the learning process. In active learning, students are not only mere receivers of knowledge but also involved in the construction of it. According to the learning theory of constructivism, construction of knowledge allows students to develop a deeper understanding of the learning content. Authentic pedagogical practices are influenced by the constructivist philosophy of student-centred learning where students create meaningful knowledge in real-world tasks (Morrissey, 2014), thus engaging students in the learning process. For example, a study by Quartuch (2011) showed that the use of authentic assessments allows students to become civically engaged demonstrating key content knowledge, critical thinking, and understanding complex issues from multiple perspectives. However, these findings are reliant on a small sample of 11 students from a 12th grade college preparatory American Government and Economics class in a large urban high school in eastern Pennsylvania.

Seafarer students are expected to achieve learning outcomes driven by the Standards of Training, Certification, and Watchkeeping (STCW) Code. However, lack of descriptive outcomes in the Code (Ghosh et al., 2014a) and traditional teaching practices often do not provide the students with clear expectations of learning standards to be achieved. In authentic assessment, the teacher provides a roadmap of the entire subject to be learned while allowing students to construct their understanding of the topic. Having standards of performance provided beforehand, would provide opportunities to seafarer students to reflect on their learning and carry out self-assessments of their thinking and practices towards achievement of the required standards. As learning progresses, learners assume increasingly more control over the sequence in which they want to engage their learning (Schell, 2000) and gain mastery over knowledge and skills learnt through strategic and critical thinking (Fredricks and McColskey, 2012) For example, a study by Findlay (2013) revealed that relationship between student-teacher based on the qualities of authenticity, belief, empowerment, and life-long learning, enhances student motivation and engagement. While the student and teacher relationship in authentic teaching was found to create a positive learning environment; belief, empowerment, and life-long learning was promoted through student reflection and self-assessment achieved through self-efficacy in the constructivist view of learning.

'Meaningful reflection' allows individuals to reflect on acquired knowledge in different situations encouraging them to become life-long learners (Schon, 1983).

The technical term for this type of reflective process is metacognition (Scott, 2000). Metacognitive reflection and self-assessment teaches students to identify the gaps between their current competence and those required by educators or employers at the workplace (Boud and Walker, 1998).

This is a key requirement for transfer of learning to take place (McCarthy, 2013).

2 AUTHENTIC ASSESSMENT PROMOTE TRANSFER OF LEARNING

Official investigations and analysis of marine accidents have revealed that seafarers assessed as competent in the use of particular skills in a context have failed to apply them in another (Pecota and Buckley, 2009). Although reliant on a small sample, a study that comprised of a series of seventeen interviews with employers in the UK, Philippines, and Singapore, Sampson et al. (2011) discovered that employers were critical of some of the current assessment methods in use for seafarer assessment. The interviewees were fleet personnel managers from both owner operator companies and of ship management companies, involved in the employment of seafarers largely from countries like India, Myanmar, and Philippines and from Eastern Europe. According to the employers, current assessments assess a limited range of job specific skills (Cox, 2009; Cross, 2007), in settings that provide insufficient cues to the students on how the competence acquired in classrooms can be used in different contexts.

Students who are able to frequently reflect on their learning to recognize gaps in their own construction of knowledge and improve on them, begin to grasp cues on applying the same knowledge (developed in a specific context) to different contexts (Leberman, 1999) causing a transfer of learning (Donovan, Bransford, and Pellegrino, 1999) Authentic assessment are formative assessments that provide students with frequent opportunities to reflect (Herrington, Reeves, and Oliver, 2010), acting as a "pit stop" where students and assessors can reflect on the application of their skills (Curry, Caplan, and Knuppel, 1994) in a particular context and identify additional training requirements for different contexts.

Metacognitive reflection and self-assessment during construction of knowledge have been shown to increase the degree to which students will transfer to new situations without the need for explicit prompting (Bransford, Brown, and Cocking, 2000) For example, a study by Sator (2000) showed that metacognitive reflection as a thinking skill was evoked by all the reflection exercises in the Skills Transfer learning

module of a bridging online course. The course was part of an online co-operative education (learning strategy that provides a structured method for bridging academic learning with practical experiences in the workplace) preparatory curriculum where the 28 participating students revealed strong evidence of metacognitive reflection in strategies adopted for successful transfer. The study involved a qualitative content-analysis of online discussion to understand if the thinking skills exhibited were consistent with the understanding of bridging techniques that support transfer of learning.

Seafaring assessments are usually summative carried out at the end of the learning period, not allowing the students to engage in deep reflection during the assessment process. Implementing formative authentic assessments would allow seafarer students to engage in metacognitive reflection to recognize the gaps that exist in their understanding. As gaps are recognized and become significant to students, they may locate, apply, and connect previous learning as well as new knowledge (Scott, 2000) and skills causing transfer of learning.

According to the self-efficacy theory by Bandura (1977), construction of knowledge as promoted by authentic assessment, develops critical thinking skills enabling students to re-evaluate their learning, causing behavioural changes that promote positive growth in cognitive development which can be used to assimilate, analyse, and structure information for decision making and problem solving as required on ships. For example, through a survey of 2567 participants in the graduate studies in education program, Saunders et al. (2001) found positive correlations between authentic assessment and adult learner's cognitive skills. Cognitive development through self-efficacy provides students with the belief and confidence to transfer newly acquired knowledge and skills (Merriam and Leahy, 2005). Learners draw on and extend previously learned knowledge and develop their own cognitive maps to interconnect facts, concepts and principles. As learning progresses, understanding becomes integrated and structured leading students to gain mastery over content (Scott, 2000). Past research suggests that the students' ability to transfer is enhanced when they are able to use the deep understanding of the learning content to interconnect facts and apply it to different contexts (Mestre, 2002).

However, according to the constructivism theory of learning, transfer can be enhanced when learning is contextualized in authentic tasks designed in meaningful contexts (Ertmer and Newby, 1993). Decontextualized learning does not allow students to recognize the connectedness of learning and application of skills developed to the real world which may have a negative impact on transfer (Mbawo, 1995). Due to complexity in recreating ships as workplace on land-based maritime

educations and training institutes (METs), most of the learning and assessment in seafarer education takes place in decontextualized scenarios. Transfer is more likely to occur when instructional and application settings are nearly identical (Schell, 2000).

Authentic assessments conducted in real world contexts will provide 'cues' to students on strategies to adopt when performing in the real world. For example, in a study by Herrington and Herrington (1998), six pre-service teachers were assessed at the workplace to study their ability to transfer skills and knowledge developed through authentic pedagogical practices in classrooms. Interviews revealed that all six students had successfully used strategies without the need of prompting from the supervising teacher and attributed their use to the authentic teaching and assessment. Although the findings were derived from a small sample, the emphasis on meaningful authentic contexts in learning being necessary in preparing students for professional practices was highlighted. Contextualised authentic tasks may not recreate all the conditions of ships as a workplace but may replicate the complexities and challenges faced by seafarers in the real-world.

3   THE WAY FORWARD

Students engaged in analysing their own work against pre-established standards of achievement can provide critical feedback to teachers on how engaged the students are (Munns and Woodward, 2006). Concurrently, provision of clear expectations on standards of performance beforehand also allows educators to adopt appropriate pedagogical practices to guide students towards achievement of the desired outcomes (Archbald, 1991), which may improve learning practices. Improving learning practices may allow educators to meet student needs for higher engagement. Students engage in different ways and at times the expectations are not met due to a narrow vision of engagement held by educators (Trygstad, 2010). What may be authentic for educators may not be authentic for students. Educators may require additional training to develop their ability to create authentic assessments that reflect contemporary workplace needs.

In creating authentic ship-based or contextually similar scenarios to assess seafarer competence, educators must investigate the current needs of the employers and workplace expectations.

Student engagement lies more with pedagogical strategies. Contemporary pedagogy that treats students as stakeholders in the educational process may enhance student engagement. Education system must consult those that are designed to serve (Ozimek, 2000). This may allow educators to improve student

perceptions of authenticity and in the process enhance engagement that may result from it. Students should be consulted in developing rubrics that provide clear outcomes intended to achieve from the learning process. Students will not only feel involved as an integral part of the learning process but will also provide valuable feedback that may improve the pedagogical practices and the outcomes resulting from it. Educators may also require additional training to develop their ability to create rubrics which can be used for instruction as well as assessment.

Authentic assessment research so far has not investigated its impact on seafarer training outcomes (Ghosh et al., 2014b). Future research needs to investigate if authentic assessments reflecting ships as workplace or contextually similar scenarios can be recreated in METs; and if such practices enhance the ability of seafarer students to transfer their learning from classrooms and simulators to workplace contexts.

Most of the studies used in this paper reveal findings based on a small sample of research participants. Future research needs to corroborate these findings using a larger sample of participants.

4 CONCLUSIONS

The literature examined in this paper indicates that students are engaged when they are able to develop a deep understanding and mastery of the learning content. This occurs through meaningful reflection and self-assessment; actively involved in the construction of knowledge; and form a deep connectedness of learning with real-world applications. In this way, student engagement can be used as an indicator to measure the quality of learning and teaching in universities.

Traditional learning and assessment methods in seafarer education are largely failing to engage the students in learning; and developing their ability to transfer learning acquired in classrooms to workplace settings. This paper presents a shift from teacher-centric education as currently practiced in seafarer education to learner-centric authentic pedagogical practices, as a possible solution. Student-centred education allows the students to be part of the knowledge construction process where they are fully aware of the learning expectations from the beginning of the learning period. This reduces uncertainty with assessment practices and creates higher student engagement. High student engagement promotes deep understanding of learning content and motivation to master skills and knowledge. Students develop a higher cognition to relate previous learning and newly acquired knowledge to apply in different contextual settings, which may assist in transfer of competence. The ability of students

to perform workplace tasks is then not limited to specific classroom or simulator scenarios, as found currently with seafarer students.

However, contexts of learning and assessment needs to be meaningful for students to relate classroom learning to real-world practices as decontextualized scenarios make transfer nearly impossible. Such meaningful contexts can be achieved through real-world scenarios in authentic assessment. Future research needs to establish if authentic assessment in seafarer training can enhance student engagement and their ability to transfer learning to different contexts, making graduates more competitive in a global shipping world. As most of the studies used in this paper reveal findings based on a small sample of research participants, future research on authentic assessment in the area of seafarer training needs to consider larger number of respondents.

REFERENCES

[1] ARCHBALD, D. A. 1991. Authentic assessment: Principles, practices, and issues. *School Psychology Quarterly,* 6**,** 279-293.

[2] AUSTRALIAN MARITIME COLLEGE (AMC) 2011. REPORT ON THE REVIEW OF THE NATIONAL CENTRE FOR PORTS & SHIPPING DECK OFFICER COURSES. Tasmania: AMC.

[3] BANDURA, A. 1977. Self-efficacy: Toward a Unifying Theory of Behavioural Change. *Psychological Review,* 84**,** 191-215.

[4] BOUD, D. & WALKER, D. 1998. Promoting Reflection in Professional Courses: the challenge of context. *Studies in Higher Education,* 23**,** 191-206.

[5] BRANSFORD, J. D., BROWN, A. L. & COCKING, R. R. 2000. Learning and Transfer. *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

[6] COX, Q. N. MET and Industry – Gaps to be bridged. *In:* LOGINOVSKY, V., ed. MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation, 19-21 September 2009 Saint-Petersburg. Admiral Makarov State Maritime Academy, 171-181.

[7] CROSS, S. J. Competence Based Learning and Evaluation: Developments and Non-Developments in MET. IFSMA 33rd Annual General Assembly, 24-25 May 2007 Antwerp, Belgium.

[8] CURRY, D. H., CAPLAN, P. & KNUPPEL, J. 1994. Transfer of Learning and Adult Learning (TOTAL). *Journal of Continuing Social Work,* 6**,** 8-14.

[9] DARLING-HAMMOND, L. & SNYDER, J. 2000. Authentic Assessment of Teaching in Context. *Teaching and Teacher Education,* 16**,** 523-545.

[10] DONOVAN, M. S., BRANSFORD, J. D. & PELLEGRINO, J. W. 1999. *How people learn: Bridging research and practice,* Washington, DC, National Academy Press.

[11] EMAD, G. & ROTH, W. M. Evaluating the Competencies of Seafarers: Challenges in current practice. *In:* PELTON, T., REIS, G. & MOORE, K., eds. Proceedings of the University of Victoria Faculty of Education Research Conference - Connections'07, 2007 Victoria, BC, Canada. University of Victoria, 71-76.

[12] ERTMER, P. A. & NEWBY, T. J. 1993. "Behaviorism, Cognitivism, Constructivism: Comparing Critical Features From an Instructional Design Perspective". *Performance Improvement Quaterly,* 6**,** 50-72.

[13] FINDLAY, L. A. E. 2013. *A Qualitative Investigation Into Student and Teacher Perceptions of Motivation and Engagement in the Secondary Mathematics Classroom.* Bachelor of Arts/Bachelor of Teaching Honours, Avondale College of Higher Education.

[14] FREDRICKS, J. A. & MCCOLSKEY, W. 2012. The Measurement of Student Engagement: A Comparative Analysis of Various Methods and Student Self-report Instruments. *In:* S.L.CHRISTENSON (ed.) *Handbook of Research on Student Engagement.* Springer Science+Business Media.

[15] GHOSH, S., BOWLES, M., RANMUTHUGALA, D. & BROOKS, B. On a lookout beyond STCW: Seeking standards and context for the authentic assessment of seafarers. *In:* RANMUTHUGALA, D. & LEWARN, B., eds. IAMU AGA 15 Looking Ahead: Innovation in Maritime Education, Training and Research, 27-30 October 2014a Launceston,Tasmania. Australian Maritime College, 77-86.

[16] GHOSH, S., BOWLES, M., RANMUTHUGALA, D. & BROOKS, B. 2014b. Reviewing seafarer assessment methods to determine the need for authentic assessment. *Australian Journal of Maritime & Ocean Affairs,* 6**,** 49-63.

[17] GULIKERS, J. T. M. 2006. *Authenticity is in the Eye of the Beholder:Beliefs and perceptions of authentic assessment and the influence on student learning.* PhD, OpenUniversiteit Nederland.

[18] GULIKERS, J. T. M., BASTIAENS, T. J. & KIRSCHNER, P. A. 2004. A five-dimensional framework for authentic assessment. *ETR&D-Educational Technology Research and Development,* 52**,** 67-86.

[19] HART, C., HAMMER, S., COLLINS, P. & CHARDON, T. 2011. The real deal: using authentic assessment to promote student engagement in the first and second years of a regional law program. *Legal Education Review,* 21**,** 97-121.

[20] HERRINGTON, J. & HERRINGTON, A. 1998. Authentic assessment and multimedia: How university students respond to a model of authentic assessment. *Higher Education Research and Development Society of Australasia,* 17**,** 305-322.

[21] HERRINGTON, J., REEVES, T. C. & OLIVER, R. 2010. *A guide to authentic e-learning,* United Kingdom, Taylor & Francis.

[22] LEBERMAN, S. I. 1999. *The transfer of learning from the classroom to the workplace:A New Zealand case study.* Doctor of Philosophy PhD, Victoria University.

[23] LEWARN, B. 2002. Seafarer training–does the system defeat competence? *Proceedings of International Association of Maritime Universities 3rd General Assembly*.

[24] MBAWO, E. 1995. Strategies for enhancing transfer of training in the workplace. *Training and Management Development Methods,* 9**,** 729-744.

[25] MCCARTHY, G. 2013. Authentic assessment - key to learning. *In:* E. DOYLE, P. BUCKLEY & C. CARROLL (eds.) *Innovative Business School Teaching – Engaging the Millennial Generation.* United Kingdom: Routledge.

[26] MERRIAM, S. B. & LEAHY, B. 2005. Learning Transfer: A Review of the Research in Adult Education and Training. *PAACE Journal of Lifelong Learning,* 14**,** 1-24.

[27] MESTRE, J. 2002. Transfer of Learning: Issues and Research Agenda. *Report of a Workshop held at the National Science Foundation.* Virginia: University of Massachusetts-Amherst.

[28] MORRISSEY, P. E. 2014. *Investigating how an Authentic Task can Promote Student Engagement when Learning about Australian History.* Doctor of Education PhD, University of Wollongong.

[29] MUNNS, G. & WOODWARD, H. 2006. Student engagement and student self-assessment: the REAL framework. *Assessment in Education,* 13**,** 193-213.

[30] OZIMEK, D. J. 2000. *Student Learning, Retention, and Transfer From Trignometry to Physics.* Master of Science, Kansas State University.

[31] PECOTA, S. R. & BUCKLEY, J. J. Training Paradigm Assisted Accidents:Are We Setting our Students Up For Failure? *In:* LOGINOVSKY, V., ed. MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation, 19-21 September 2009 Russia. Admiral Makarov State Maritime Academy, 192-204.

[32] QUARTUCH, M. J. 2011. *Is Authentic Enough? Authentic Assessment and Civic Engagement.* Master of Education, Moravian College.

[33] RICHARDS PERRY, G. D. 2011. *Student Perceptions of Engagement in Schools: A Deweyan Analysis of Authenticity in High School Classrooms.* Doctor of Philosophy PhD, Georgia State University.

[34] SAMPSON, H., GEKARA, V. & BLOOR, M. 2011. Water-tight or sinking? A consideration of the standards of the contemporary assessment practices underpinning seafarer licence examinations and their implications for employers. *Maritime Policy & Management: The flagship journal of international shipping and port research,* 38**,** 81-92.

[35] SATOR, A. 2000. *An Exploration of Transfer of Learning Opportunities in an Online Co-Operative Prepatory Curriculum.* Master of Arts, Simon Fraser University.

[36] SAUNDERS, N. G., SAUNDERS, G. A. & BATSON, T. 2001. Assessment and the Adult Learner: Does Authentic Assessment Influence Learning? *Annual Meeting of the Mid-Western Educational Research Association.* Chicago, IL.

[37] SCHELL, J. W. 2000. Think about Authentic Learning and Then Authentic Assessment. *In:*CUSTER, R. L. (ed.) *Using Authentic Assessment in Vocational Education.* Columbus: Center on Education and Training for Employment.

[38] SCHON, D. 1983. *The reflective practitioner: how professionals think in action,* Boston, Area Publishing.

[39] SCOTT, J. 2000. Authentic Assessment Tools. *In:* R.L.CUSTER (ed.) *Using Authentic Assessment in Vocational Education.* Columbus: Center on Education and Training for Employment College of Education.

[40] TRYGSTAD, P. 2010. *Student Engagement and Student Voices.* Doctor of Philosophy PhD, University of North Carolina.

[41] WIGGINS, G. 1990. The case for authentic assessment. *Practical Assessment, Research and Evaluation,* 2.