



Developing and analysing an authentic technical proposal writing assignment through the lens of an authenticity framework: Implications for practice

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Abstract

This paper presents an analysis of an authentic writing assessment to externalise the knowledge, skills, and attitudes necessary for developing such assessments. Specifically, the paper examines a technical proposal writing assignment developed and used as a continual assessment in an undergraduate engineering course by employing an authentic assessment framework as the analytical lens. The findings showed that the framework can serve as a valuable guide in developing authentic writing assessments. Further, it became evident that achieving functional authenticity in all dimensions may not always be viable. Developing fully functionally authentic writing assessments/assignments for beginners is not always advisable, as completing such assignments may lead to cognitive overload. Therefore, it is recommended that both the dimensions of authenticity and students' ability levels be considered when analysing, developing, and using authentic writing assessments and assignments. Indeed, striking the right balance between authenticity and students' cognitive capacity is crucial for creating optimal learning experiences.

Keywords: Artefact analysis; authentic assessments and assignments; authenticity framework; latent and functional authenticity; technical proposal writing; writing assessment.

Introduction

It is widely acknowledged that assessment plays a significant role in shaping both learning and teaching processes (Preston et al., 2020). As Gibbs (1992) metaphorically stated, "the tail wags the dog." This raises the question of how to carefully design assessment practices to ensure that they effectively guide students' learning journeys. Authentic assessment (i.e., the assessment that resembles professional practice) could be the solution as it has the potential to motivate students to actively learn the essential knowledge, skills, and attitudes (i.e., competencies) required for their future professional lives (Gulikers et al., 2006). Previous research has made significant contributions to understanding authentic assessment, with Gulikers et al. (2004) presenting a five-

dimensional framework. These scholars, along with other researchers (e.g., Bachman, 1990; Bachman & Palmer, 1996; Kohnen, 2013; Wargo, 2020; Weir, 2005), acknowledge that authenticity is a continuum, and the authenticity level of an assessment is determined by how closely each dimension of the assessment resembles real-world practice.

Furthermore, the authenticity of an assessment is also influenced by its implementation (Ghosh et al., 2021). For example, if real-world tasks involve seeking advice and feedback from experts, the assessment should reflect this real-world implementation to approach authenticity. Previous research has identified the dimensions of authenticity and examined the relationship between students' perception of assessment authenticity and their study approaches, development of generic skills, and academic grades (e.g., Gulikers et al., 2004, 2006). This paper aims to advance prior research by utilising the findings of previous studies to develop and analyse an authentic writing assignment. Specifically, in this paper, the author analyses a technical proposal writing assignment that was developed and implemented in a critical thinking and communication skills module for first-year undergraduate engineering students. The aim is to provide insights into developing and implementing authentic writing assignments.

Authentic assessment and construct and consequential validity

The assessment paradigm has shifted from traditional standardised tests, which focused on assessing discrete points of knowledge, to a new approach that emphasises the integration of knowledge, skills, and attitudes in performing real-life tasks in realistic contexts. The functions of assessment in this new paradigm include stimulating learning, promoting competency development, and evaluating students' performance (Gulikers et al., 2006). Therefore, assessment is no longer decontextualised and focused on discrete points; instead, it is performance-based, integrated, and contextualised (Birenbaum, 2003).

Authenticity is crucial for achieving both construct and consequential validity in assessment.

The construct validity of a competency-based assessment relies on its ability to measure the competencies required for real-life task performance in real-life situations. In essence, when the assessment requires the same competencies that target tasks do, and there is a correspondence between the assessment and target task performance situations, it is more likely to effectively assess the intended competencies (Messick, 1994). Additionally, assessment entails unintended and intended consequences (Schuwirth & Van der Vleuten, 2004). By designing and implementing authentic assessments and aligning assessment, instruction, and learning (Biggs, 1996), the consequential validity of the assessment can be enhanced, leading to more desirable outcomes. In other words, designing and implementing authentic assessment and aligning authentic assessment, instruction, and learning are essential to enhance the consequential validity of the assessment, as these practices can stimulate the development of the competencies that students will need to perform real-life tasks in their professional practices.

Previous studies (e.g., Herrington & Herrington, 1998) showed that students prefer assessment tasks that closely resemble real-life tasks and help them acquire skills applicable to their future professions. They value assessments that prepare them for their professional lives beyond the school setting. Recognising the importance of authenticity in enhancing the validity of assessment and its positive impacts on students' learning, Gulikers et al. (2004) have developed the Five-Dimensional Framework (5DF) for authentic assessment. According to Gulikers et al. (2004), authenticity in assessment is a multidimensional construct that exists on a continuum. They propose that the authenticity of an assessment is determined by the extent to which its five dimensions align with those of the target tasks performed in professional settings. These dimensions include the task, the physical context, the social context, the form of the assessment, and the criteria used for evaluation. Together, these dimensions form the framework for authentic assessment. The task dimension relates to the content being assessed, the physical context dimension pertains to the assessment environment, the social context dimension considers the interaction possibilities and constraints during the assessment, the form dimension focuses on the assessment method, and the criteria dimension addresses the valued characteristics of performance. In a subsequent study, Gulikers et al. (2006) found that students' perceptions of authentic assessment were positively and significantly correlated with their study approach, development of general skills, and grades.

Latent and functional authenticity

Scholars have distinguished latent and functional authenticity (Kohnen, 2013; Wargo, 2020), which correspond to interactional authenticity and situational authenticity in language assessment, respectively (Bachman, 1990; Bachman & Palmer, 1996). Latently authentic assessments/assignments require students to utilise metacognitive and cognitive processes similar to those necessary for real-life

task completion. On the other hand, functional authenticity necessitates authenticity across all dimensions. In writing assessments/assignments, students may find functionally authentic tasks more engaging compared to latently authentic tasks, as the former involve addressing real-world concerns and influencing real-world audiences. This difference in the depth and breadth of student engagement may result in noticeable differences in the quality of the written genres produced by the students. For instance, a writing assignment completed for a module to obtain grades with the lecturer as the audience may have limited functional/situational authenticity. However, in certain circumstances, due to resource constraints and students' ability levels, a latently authentic assessment is more advisable. This is particularly relevant for beginners, as fully functional authentic assessments can lead to cognitive overload for them (Sweller et al., 1998).

The context

The technical proposal assignment analysed in this paper was designed for mandatory university-wide four-credit critical thinking and communicating (CTC) modules for first-year undergraduate students in Singapore. These modules focus on developing students' critical reflection, critical reading, writing, and presentation competencies. The Paul-Elder framework (Paul & Elder, 2019) was incorporated into the module to teach critical thinking skills explicitly. Specific materials, assignment briefs, and resources were created and curated for the CTC modules. The instructional materials and activities were designed to scaffold students' acquisition of the necessary knowledge, skills, and attitudes (competencies) required to successfully complete the assignments. By employing authentic assignments and aligning instruction and learning with them (Biggs, 1996), efforts were made to enhance the desired outcomes of the assessment and improve its consequential validity. Another important reason for using authentic assignments was the rise of generative artificial intelligence (see Ifelebuegu, 2023; Rudolph et al., 2023a, 2023b).

To approach the implementation authenticity of the assessments (Ghosh et al., 2021), students were provided with the opportunities to give and receive feedback and utilise available resources, mirroring the practices in professional settings. The technical proposal assignment was one of the four assignments included in the continual assessment. The students were required to submit a soft copy of their assignment to the designated assessment folders by the specified deadline. Students were informed that their assignments would undergo scrutiny by the Turnitin software, and severe penalties would be imposed for cases of plagiarism and collusion.

There were four assignments for the module: critical reflection, reader response, technical proposal, and oral presentation of the technical proposal. The technical proposal assignment for one of the undergraduate engineering programmes is analysed and discussed in this paper. Prior invaluable studies informed the analysis of the assignment (Bachman, 1990; Bachman & Palmer, 1996; Ghosh et al., 2021; Gulikers et al., 2004; Gulikers et al., 2006;

Kohnen, 2013; Wargo, 2020; Weir, 2005). However, the five-dimensional framework (Gulikers et al., 2004, 2006) that conceptualises authenticity as a continuum was adopted as the main analytic lens.

The technical proposal

The technical proposal assignment analysed in this study can be considered an authentic assessment as it requires students to apply the competencies necessary for writing technical proposals in a real workplace situation (see Appendix). In this paper, the authenticity of the assessment/assignment is defined based on its resemblance to the criterion situation across five dimensions (Gulikers et al., 2004, 2006). The following section discusses the authenticity of the technical proposal assignment in detail.

Task

In the framework, an authentic task is defined “as a task that resembles the criterion task with respect to the integration of knowledge, skills, and attitudes, its complexity, and its ownership” (Gulikers et al., 2004, p. 71). The technical proposal assignment involved a task that is commonly performed by engineers when writing a technical proposal. Students were required to identify a significant problem within a specific system, design, process, procedure, or protocol. They then had to review existing solutions, analysing their strengths and weaknesses. Finally, students were expected to propose a solution and develop a method to test its superior efficiency compared to the existing solutions. These activities closely mirror the process followed by engineers in real-world technical proposal writing. The students were given the freedom to choose their own topic, identify a problem within that topic, conduct a literature review, analyse existing solutions, and propose a new solution along with a method to evaluate its efficiency to give them a sense of ownership over the task. Some individuals contend that assessment authenticity is not entirely objective and is contingent upon students’ perceptions of the assessment’s connection to real-life situations, its relevance to their future professional success, and its value in facilitating the acquisition of transferable knowledge, skills and attitudes. However, from the author’s perspective, student perception represents an individual difference dimension that varies among students and evolves over time. To bolster this facet of authenticity, educators could consider assisting students in recognising the authenticity of the task at hand and its pertinence to their academic pursuits and future careers. A significant concern related to the task dimension of the technical proposal assignment is the students’ level of discipline-specific content knowledge. As first-year students, some may struggle to generate innovative solutions and employ effective methods to evaluate the efficacy of their proposed solutions. This concern is consistent with the literature, which suggests that fully functionally authentic tasks can overwhelm beginners and lead to cognitive overload (Sweller et al., 1998).

Physical context

The authenticity of an assignment or assessment, in terms of its physical context, refers to the degree to which the physical conditions, availability of relevant and irrelevant sources, materials, and time resemble those of the criterion situation (Gulikers et al., 2006). The technical proposal is typically written within an office-based physical context, where individuals have access to computers, the internet, and library resources. Students were trained on how to conduct effective library searches to locate relevant articles and received lessons on how to write different sections of the proposal. They were expected to independently distinguish between materials that were pertinent to their proposal and those that were irrelevant. In terms of time, the development and composition of proposals often happen over time, allowing for iterative refinement. In the case of the students, they were given a six-week timeframe to complete and submit their proposals. In a real-world work environment, engineers have the advantage of accessing sites and laboratories to investigate the problems they intend to solve. The students were in their first year of studies, and opportunities for internships and access to labs and sites are typically provided in other discipline-specific modules.

Social context

The social context of authenticity emphasises the similarity between the social processes involved in completing professional tasks and the corresponding assessment or assignment. If the target task is typically performed individually, then the assessment should also be conducted individually. Conversely, if the task is typically completed collaboratively, then the assessment or assignment should be designed to be team-based (Gulikers et al., 2006). The technical proposal assignment was designed as a team-based task to mirror the social processes involved in the development and writing of technical proposals in real-life contexts. In such situations, individuals often present their proposals and receive feedback from others. For the technical proposal assignment, students received peer and instructor feedback. They were then given opportunities to revise and enhance their proposals before submitting the final versions. The approach of providing students with multiple opportunities to revise and refine their work based on feedback received also aligns with the implementation authenticity proposed by Ghosh et al. (2021).

Assessment result or form

The assessment result or form refers to the outcome of the assessment or assignment, which should closely resemble a product or performance that professionals are typically asked to produce or perform (Gulikers et al., 2006). The product/performance should provide the assessor with sufficient data regarding the intended underlying competencies (Darling-Hammond & Snyder, 2000). If a single product/performance does not provide sufficient information about the relevant competencies, a series of assessments or assignments should be completed by the students (Darling-

Hammond & Snyder, 2000). Additionally, it is beneficial for students to present their work to an audience, similar to what professionals typically do, to demonstrate the authenticity of their mastery of knowledge, skills, and attitudes (Wiggins, 1989). The written text of the technical proposal closely resembled the proposals that professionals typically write. It provided ample information about the target competencies. Moreover, students were required to present their proposals to other students and respond to queries from both their peers and the lecturer to demonstrate that their mastery was genuine. However, it is important to note that in real-world contexts, the audience for technical proposals is typically supervisors or professionals who evaluate the quality of the proposal, rather than fellow students or lecturers. In this regard, the assignment can be considered latently authentic as it required students to utilise metacognitive and cognitive processes similar to those used when presenting authentic professional tasks to genuine audiences.

Criteria and standards

The criteria used should accurately reflect the underlying competencies necessary for successfully performing the target tasks in real-life situations, and the levels assigned to the criteria should correspond to the progressive development of these competencies (Darling-Hammond & Snyder, 2000). In most professional contexts, employees are typically aware of the criteria used to assess their performance. Similarly, it is essential for students to gain a deeper understanding of the marking criteria for performance outcomes in advance. The technical proposal was assessed by using a rubric with content, organisation, and language use criteria and five levels of development, namely exemplary, proficient, competent, developing, and beginning. To approach real-life situation scenarios, the lecturer unpacked the rubric for students to learn the criteria and developmental levels and strive for their best performance.

Conclusion

The users of artefacts, such as authentic assignments and assessments, typically internalise the knowledge, skills, and attitudes embedded in these artefacts. This internalisation can later be externalised and applied in the development of new artefacts (McAvina, 2016). By engaging with analyses of these artefacts, prospective and novice users can expedite the process of externalising the knowledge and skills embedded in them. This practice, in turn, can enable the users to apply the artefacts more effectively and potentially create new ones. This paper aims to externalise the knowledge, skills, and attitudes necessary for developing and implementing authentic writing assignments and assessments. Its objective is to facilitate the analysis of existing assignment and assessment tasks, their implementation, and the development of new ones. To achieve this goal, a technical proposal assessment is analysed in this paper by using the Five-Dimensional Framework (5DF) for authentic assessment (Gulikers et al., 2004) as the primary analytical lens. The analysis of the technical proposal assignment through the lens of the authenticity framework highlights the value of using this framework as a guide for developing authentic

writing assignments and assessments suitable for students' ability levels.

Further, it became evident that achieving functional authenticity in all dimensions may not always be viable and that developing fully functional authentic writing assignments/assessments for beginners is not always advisable, as performing such assignments may lead to cognitive overload for them (Sweller et al., 1998). Therefore, it is recommended that educators consider both the dimensions of authenticity and students' ability levels when analysing, developing, and using authentic writing assessments and assignments. Indeed, striking an appropriate balance between authenticity and students' cognitive capacity is crucial for creating optimal learning experiences.

The paper contributes to the understanding, development, and implementation of authentic assessments and assignments in the context of writing. It explores how to use an authenticity framework as a valuable guide to design and develop authentic assignments that mirror real-world technical communication scenarios. It provides a worked example of applying the authenticity framework as a systematic approach for evaluating the authenticity of writing tasks, materials, and assessments. This paper may benefit instructors and curriculum designers by providing insights into creating meaningful and relevant instructional and assessment materials and experiences for students. Additionally, the findings and insights from the paper might be relevant and applicable to contexts beyond technical proposal writing. The applied authenticity framework and pedagogical implications can be adapted and applied to other genres and domains that can extend the reach and impact of the paper, benefiting a broader range of educators.

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Appendix

Critical thinking and communicating assignment: Writing technical proposals

Overview

Type: Team-based Project (Groups of 4-5 Students)

Weighting: 30%

Due: Week 13

Learning outcomes

This assignment provides you with an opportunity to showcase your knowledge, skills, and attitudes in technical proposal writing. You will be writing a proposal addressed to your lecturer, who will play the role of a corporate audience. You should write in the academic tone and style and cite sources following the APA 7th edition guidelines.

Task

For this assignment, you are tasked to work on a team project to identify and elaborate on a specific system/design/process/procedure/protocol that needs improvements. Then, perform secondary research and write a literature review about the specific system/design/process/procedure/protocol and solutions that are currently available to improve it. Next, select one or a combination of existing solutions or develop a solution. In the Body of your technical proposal, explain your solution and the rationales for your decision and the specific objectives that you would like to achieve by the improved system/design/process/ procedure/protocol. You should also discuss the contributions of your solution to sustainability as compared to those of the current system/design/process/ procedure/protocol in the body of your proposal. In the Methods section, elaborate on and justify the method(s) that you propose to evaluate the efficiency and sustainability of the proposed improved system/design/process/ procedure/protocol.

Based on the selected topic by the team, write a proposal of not more than 2000 words (from the Introduction through the Conclusion) with the following sections:

1. Introduction
2. Literature Review
3. Body
4. Methods
5. Conclusion

Submission

Please ensure that your assignment is typed in either Times New Roman, Arial, or Calibri font, size 12, with double spacing between lines. Please submit an electronic copy of your assignment to the designated assignment Dropbox folder before the deadline mentioned earlier. It is important to note that your assignment will be subject to an automated check using Turnitin software, and any instances of plagiarism or collusion will result in severe penalties. The softcopy of your assignment should include your proposal, and the file should be named as follows: (assignment name) _ (group name) _ (names of group members).

For late submissions of any assignment without incurring penalties, a written application must be submitted prior to the deadline. If the right for a late submission is not granted, the assignment may still be submitted up to 4 days after the original deadline, but with a penalty of 15% per day. Please note that submissions made 4 days after the original deadline will not be awarded any marks.

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