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Enhancing Curriculum Quality through Course Review: An Evaluation of the Science, Technology and Society (STS) Program in a Philippine Higher Education Institution

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Abstract:

This study evaluated the Science, Technology and Society (STS) course offered at a higher education institution in Kabankalan City, Philippines, focusing on course specifications, syllabus quality, instructional practices, and the challenges encountered by both teachers and students. Using a descriptive research design, the study engaged 203 respondents composed of external experts, STS instructors, and undergraduate students. Data were collected using validated and reliable review forms and checklists adapted from existing instruments and subjected to quantitative analysis. Findings revealed that the course met high quality standards, with an overall rating of 96.43% from experts and instructors and 96.74% from students, exceeding the 86% quality threshold. Course descriptions, outcomes, and requirements were clearly articulated and aligned with the intended learning outcomes, while teaching methods and assessments demonstrated innovative and learner-centered approaches. However, concerns emerged regarding outdated reference materials, clerical inconsistencies in the syllabus, and inadequate facilities. Students reported cognitive challenges, low motivation, and difficulties with inquiry-based learning, while teachers highlighted limited parental involvement, time constraints, and a lack of targeted professional development opportunities. The study concludes that while the STS course is generally well-implemented, sustained efforts are needed to update instructional materials, strengthen faculty training, improve facilities, and address learner engagement. The findings underscore the importance of continuous curriculum review, student-centered pedagogies, and institutional support systems to enhance the relevance and impact of STS education in higher learning. These insights may inform course enhancements and broader quality assurance strategies in general education across Philippine higher education institutions.

Keywords: Science, Technology and Society (STS), course review, syllabus evaluation, teaching practices, student challenges, curriculum quality, Philippine higher education, outcomes-based education (OBE), quality assurance.

Introduction:

Science, Technology and Society (STS) is a dynamic interdisciplinary course that examines how scientific knowledge and technological innovations shape—and are shaped by—society. It draws on perspectives from history, philosophy, ethics, and the social sciences to contextualize scientific developments within the broader fabric of human life (Habuchi et al., 2019; Pelevin et al., 2023). Rather than treating science and technology as neutral or isolated disciplines, STS highlights their socio-political, cultural, and economic dimensions (Pelevin et al., 2023). Recognizing this need for critical engagement, the Commission on Higher Education (CHED) in the Philippines mandated STS as a core subject in the General Education Curriculum (GEC) through CMO No. 20, series of 2013. As part of the K–12 reform, this course is required of all undergraduate students, regardless of program specialization.

Numerous studies underscore the importance of the STS course in cultivating scientific literacy, civic awareness, and social responsibility among students. When taught effectively, STS strengthens learners' ability to critically analyze the role of science and technology in addressing contemporary issues such as climate change, public health, and digital ethics (Acut & Antonio, 2023; Kamizi & Iksan, 2021; Rachmadtullah et al., 2022). Best practices in STS instruction include the integration of ICT tools and interdisciplinary content, real-world problem-solving tasks, and partnerships with local scientific and technological communities (Rosana et al., 2017). These strategies have been found to enhance student motivation, deepen conceptual understanding, and foster independent, reflective learning (Espinosa & Mangali, 2021; Seabra & Vieira, 2020).

However, despite its promise, the implementation of the STS course continues to encounter challenges. Teachers frequently report difficulties related to insufficient training, limited content mastery in interdisciplinary areas, time constraints, and the complexity of assessing learning outcomes in a course that traverses multiple domains (Egevardt et al., 2021; Nielsen, 2020; Diquito, 2021). Structural issues, such as outdated instructional materials, poor learning environments, and inadequate technological infrastructure, further hinder the course's effectiveness (Chen & Xiao, 2021; Villena & Caballes, 2020; Diana, 2021). In many cases, the lack of support mechanisms, including in-service training and pedagogical resources, leaves teachers underprepared to deliver a course that demands both scientific literacy and social analysis.

In response, scholars advocate for research-informed teaching strategies that bridge theoretical knowledge with lived experience. Culturally responsive teaching, which draws from learners' socio-cultural contexts, and problem-based learning approaches, which anchor lessons in real-world scenarios, have shown significant impact in increasing engagement and learning retention (Brown, 2017; Roberts et al., 2022; Mensah & Larson, 2018). The use of digital platforms and online resources also enhances learning by allowing students to access diverse perspectives and data sources, consistent with Siemens' Connectivism Learning Theory (Rahman et al., 2021; Hendricks, 2019; Ayanwale et al., 2023). These approaches position students as active participants in knowledge creation and critical inquiry.

Students, meanwhile, face their own set of barriers to learning in STS. These include difficulty in grasping abstract concepts, disconnection between course content and real-life applications, and lack of academic support systems (Novianti et al., 2022; Kartini et al., 2022; Castro & Morales, 2017). Behavioral challenges such as short attention spans, low interest, and negative perceptions of the subject and its instructors are also prevalent (Febliza & Yulis, 2018; Sakpla et al., 2023; Huda et al., 2024). These issues suggest a need to design more engaging, context-sensitive curricula that not only deliver content but also build students' confidence and curiosity about the interactions of science, technology, and society.

This research was conducted in a higher education institution located in Kabankalan City, a second-class component city in Negros Occidental, Philippines. The institution offers various undergraduate and graduate programs and caters to a diverse student population from urban and rural areas. Like many public institutions, it faces challenges related to instructional capacity, resource limitations, and infrastructure gaps—making it an ideal site for evaluating the practical implementation of nationally mandated general education courses like STS. The absence of a formal review of the institution's STS syllabus since the course's adoption further underscores the need for a systematic assessment.

Thus, this study aims to evaluate the STS course offerings in terms of course specification and syllabus design during the first semester of Academic Year 2024–2025. It also seeks to identify best practices and the challenges faced by both teachers and students in its implementation. Ultimately, the study hopes to propose enhancements to the course syllabus that align with CHED requirements, integrate current best practices, and respond to the local context of higher education delivery in Kabankalan City.

Review of Related Literature

The Science, Technology and Society (STS) course is recognized as a vital component of general education in higher learning institutions worldwide. It aims to equip students with the capacity to critically examine the interplay between scientific knowledge, technological innovations, and societal transformation (Habuchi et al., 2019; Pelevin & Vasiliev, 2023). In the Philippines, this course was institutionalized under Commission on Higher Education (CHED) Memorandum Order (CMO) No. 20, series of 2013, as a mandatory offering across all undergraduate programs. The course seeks to foster intellectual and civic competencies by contextualizing science and technology within ethical, historical, and socio-political frameworks.

Several studies confirm the value of the STS course in developing critical thinking, scientific literacy, and social awareness. For instance, Villena and Caballes (2020) observed that integrating STS with contemporary issues enhances student engagement and knowledge application. Acut and Antonio (2023) found that students exposed to STS instruction demonstrate improved learning outcomes, especially when the course content is connected to local and global challenges. Likewise, Kamizi and Iksan (2021) emphasized that contextualizing scientific concepts using real-world examples deepens student understanding and makes learning more meaningful.

Effective teaching practices in STS involve a range of strategies that prioritize active, student-centered learning. Rosana et al. (2017) highlighted the benefits of incorporating ICT tools, real-life scenarios, and collaborative learning activities into STS instruction. These approaches are not only engaging but also reflective of modern pedagogical paradigms. Seabra and Vieira (2020) argued that experiential learning—such as fieldwork and site visits—reinforces classroom knowledge and promotes critical inquiry. Furthermore, Espinosa and Mangali (2021) noted that integrating social and cultural contexts into instruction enhances students' ability to relate abstract concepts to their lived experiences.

Despite these advantages, numerous challenges persist in the delivery of the STS course. Teachers often face structural and instructional constraints, including limited instructional time, lack of teaching materials, and insufficient training on interdisciplinary pedagogies (Egevardt et al., 2021; Chen & Xiao, 2021). Lee (2022) and Diquito (2021) pointed out that teachers struggle with effectively addressing socio-scientific issues due to inadequate preparation and content knowledge. Moreover, Solis-Foronda and Marasigan (2021) emphasized the need for better pedagogical content knowledge to support the multifaceted goals of the course.

The integration of innovative teaching methodologies has been identified as a potential solution to these challenges. Research-based pedagogies such as culturally responsive teaching and problem-based learning provide promising

frameworks for STS instruction (Brown, 2017; Mensah & Larson, 2018; Roberts et al., 2022). These approaches, grounded in students' cultural experiences and real-world contexts, enable learners to become co-constructors of knowledge and critical analysts of science-related societal issues. Technological integration also remains vital. Rahman et al. (2021) and Crabtree and Stephan (2022) argued that the digitalization of learning environments can expand access to diverse knowledge sources, promote collaborative inquiry, and strengthen the relevance of STS content.

Siemens' (2005) Connectivism Learning Theory provides further theoretical grounding for integrating technology and networks into education. This theory posits that learning occurs across a range of connected systems and emphasizes the ability to find, evaluate, and apply knowledge through digital means (Hendricks, 2019; Ayanwale et al., 2023). In the context of STS, connectivism supports the use of online databases, interactive modules, and virtual simulations to engage students and build interdisciplinary competence.

On the learner side, students also encounter various difficulties in the STS course. Research by Febliza and Yulis (2018), Kartini et al. (2022), and Dhar et al. (2023) revealed cognitive and behavioral issues, including low achievement, difficulty understanding materials, and short attention spans. Mutya and Ramas (2022) added that students often fail to see the relevance of STS to their personal and professional lives, which contributes to low motivation. Moreover, Rosana et al. (2017) and Sakpla et al. (2023) found that students sometimes develop negative perceptions of the course and its instructors, a trend exacerbated by passive learning environments and limited opportunities for independent exploration.

Despite widespread agreement on the importance of the STS course, there is a lack of institutional-level research examining its content, delivery, and outcomes—particularly in provincial colleges and universities in the Philippines. This gap underscores the need for localized assessments of STS curriculum implementation. By reviewing the course specifications, teaching practices, and learner experiences, institutions can more effectively align their STS offerings with national standards and contemporary best practices.

Methodology

This study employed a descriptive research design to systematically examine the course specifications and syllabus of the Science, Technology and Society (STS) subject. Descriptive research allows for an accurate portrayal of the characteristics of a phenomenon without manipulation of variables, making it appropriate for curriculum reviews that aim to evaluate perceptions, content, and implementation practices (Aggarwal & Ranganathan, 2019). The study explored how external and internal reviewers assessed the STS course's relevance, coherence, and instructional delivery, as well as identified the challenges and best practices related to its teaching and learning.

A total of 203 respondents participated in the study, consisting of five external reviewers, seven faculty members, and 191 students. The external reviewers were selected through purposive sampling and included experts in the fields of science and technology who had experience teaching STS. Internal reviewers were composed of students and teachers from one higher education institution in Kabankalan City during the first semester of the academic year 2024–2025. Stratified random sampling was used to ensure that students from different academic programs and year levels were adequately represented.

The data gathering tool was a five-part research instrument that included a combination of original items developed by the researcher and items adapted from Alic and Bual (2021). Part one collected demographic data; part two covered the course review form, which assessed course specifications such as description, outcomes, requirements, and references, as well as syllabus elements including clerical errors, sequencing of topics, content alignment, redundancies, time allocation, teaching methodology, and assessment. Part three focused on identifying the best practices observed among STS teachers, while parts four and five addressed the challenges experienced by teachers and students, respectively.

To ensure content validity, the instrument underwent expert evaluation using Lawshe's Content Validity Ratio, yielding a score of 0.829, which was interpreted as valid. Reliability testing was conducted through a pilot study with non-respondents, and the resulting Fleiss Kappa coefficient of 0.7 indicated substantial agreement (McHugh, 2012). With these established metrics, the instrument was deemed both valid and reliable for evaluating the STS course.

Before administering the instruments, formal requests and informed consent were obtained from all participants. External reviewers were contacted individually and provided with a clear overview of the study's purpose and their role. Internal reviewers, including faculty and students, were oriented following administrative approval. The instruments were distributed online via email and social media platforms such as Facebook Messenger. Completed responses were retrieved, downloaded, and organized for statistical analysis.

Data were analyzed using descriptive statistics. Frequency counts, percentages, and means were computed to interpret the responses to the course review items. For the checklist-based items on best practices and challenges, frequency and rank analysis were used to identify the most prominent trends in teaching and learning experiences.

The study strictly adhered to ethical research principles, ensuring voluntary participation, informed consent, and confidentiality in line with the Data Privacy Act of 2012. Participants were made aware of their right to withdraw at any point without repercussions. No sensitive or identifiable information was disclosed, and all raw data were secured and destroyed after analysis. The research was conducted transparently, with no conflicts of interest, and the findings are intended for peer-reviewed publication and open access sharing with the host institution. The researcher, a licensed professional teacher with academic qualifications in general science education, was deemed competent to conduct the study ethically and responsibly.

Results

The course review of the Science, Technology and Society (STS) subject in a higher education institution in Kabankalan City yielded results affirming the course's alignment with quality standards. Evaluations from both external experts and internal faculty reviewers resulted in an overall course rating of 96.43%, exceeding the global quality benchmark of 86% as outlined by Gregory et al. (2020), Paniagua (2019), and Jackson & Montgomery College (2023). The course specification earned a near-perfect score of 98.61%, and the syllabus components scored 94.25%, reflecting a robust alignment with CMO No. 20, s. 2013. These high scores across core components such as course description, outcomes, and requirements affirm that the course materials were clearly stated, attainable, and aligned with intended learning outcomes (Al-Shargabi, 2019; Jiang & Pardos, 2020; Li et al., 2024). The references section, while still strong at 94.45%, received slightly lower scores, highlighting an opportunity to further improve the accessibility and relevance of course materials (van Dyk & Adrianatos, 2022; VanScoy et al., 2021).

The evaluation of the course syllabus revealed similar strengths. Sub-areas such as topic sequencing (91.67%), content (100%), additional topics (97.22%), redundancy (91.67%), time allocation (91.67%), and methodology and assessment (100%) collectively demonstrated high-quality instructional planning and coherence (Jones & Zhu, 2022; Alic & Bual, 2021). Despite this, clerical accuracy received a modest rating of 87.50%, indicating minor areas for improvement likely due to time constraints or oversight (Ratminingsih et al., 2022). Research highlights the use of AI-driven proofreading and curriculum mapping tools as viable solutions to minimize such errors (Gupta et al., 2019; Khansir, 2022). The alignment between content, methodology, and assessment indicates that the syllabus facilitates constructive learning experiences and appropriately measures course outcomes (Segbenya et al., 2023; Subramani & Iyappan, 2018; Erciyes, 2020).

Feedback from students reinforced the findings of expert and faculty reviewers. The overall course rating based on student responses reached 96.74%, with the course specification earning 97.28% and the syllabus 96.19%. Students highly rated the clarity of the course description (99.13%), outcomes (97.38%), requirements (96.69%), and references (95.99%). These ratings reflect a perception that the course is well-articulated, accessible, and aligned with academic goals (Libo-on & Valencia, 2020; Chee et al., 2022). While students expressed satisfaction with content organization and additional topics, clerical errors again emerged as a relatively weak point at 89.53%, suggesting a recurring area that could benefit from systematic proofreading.

In terms of teaching practices, faculty members highlighted several best practices contributing to the course's success. All teachers (100%) emphasized fostering student interest, improving problem-solving skills, and helping students grasp complex socio-scientific issues as their most effective strategy, aligning with Viehmann et al. (2024). Equally noted were practical integration of STS concepts, the use of ICT, and innovative pedagogy (Sha et al., 2022; Aydın & Kasli, 2019). However, fewer teachers (42.86%) reported impacts on students' psychomotor and affective development, and only 28.57% participated in STS-related professional development, suggesting the need to expand continuing education and collaboration with scientific communities (Seabra & Vieira, 2020; De Guzman, 2022).

The review also identified key challenges teachers face. The most prominent issues were inadequate facilities (71.43%) and lack of parental involvement (71.43%), both of which restrict the effectiveness of STS instruction (Hardiana et al., 2023). Time constraints (57.14%) and lack of training opportunities (42.86%) further compounded instructional difficulties, while a smaller proportion cited difficulty in teaching socio-scientific issues, unfamiliar content, and creating assessments. These findings underscore the necessity of improving infrastructure, engaging stakeholders, and offering ongoing teacher training (Adewole & Abraham, 2024; Tesorio & Cañizares, 2018).

Students, on the other hand, reported cognitive challenges as the most common barrier to learning STS, with 63.87% acknowledging difficulty understanding key concepts. This was followed by inadequate learning materials and focus issues (39.27%), insufficient facilities (32.46%), and difficulty with guided inquiry tasks (22.51%) (Kalman & Lattery, 2018; Rukmana, 2018; Mazidah et al., 2023). Additional concerns included perceived subject difficulty, lack of motivation, teacher competence, and negative attitudes, with 7.33% of students expressing dissatisfaction toward

their teachers or the subject (Maison et al., 2021; Benson & Tjprc, 2020). These findings reveal the multidimensional challenges learners face and highlight the need for enhanced pedagogical approaches, teacher development, and more engaging course delivery strategies.

Overall, the STS course received strong approval from all stakeholders and meets established national and international benchmarks. Nonetheless, attention to minor syllabus errors, increased investment in teacher training, facility upgrades, and enhanced student engagement strategies could strengthen the program's delivery and impact even further.

Discussion

The findings of this study affirm the strength and relevance of the Science, Technology and Society (STS) course as implemented in a higher education institution in Kabankalan City. With a high overall quality rating from both external and internal reviewers—96.43% from experts and teachers, and 96.74% from students—the course is demonstrably aligned with recognized quality assurance standards (Gregory et al., 2020; Paniagua, 2019; Jackson & Montgomery College, 2023). These results not only support the institution's compliance with CHED's outcomes-based quality assurance framework (CMO No. 46, s. 2012; CMO No. 20, s. 2013) but also highlight the institution's commitment to sustaining high standards in general education instruction.

The clarity and completeness of the course specification—particularly in the articulation of the course description, outcomes, and requirements—reflect good curriculum planning and alignment with intended learning outcomes, consistent with findings by Al-Shargabi (2019) and Jiang and Pardos (2020). Students and faculty alike acknowledged the accessibility and measurability of course objectives, which echoes Libo-on and Valencia's (2020) view that well-structured syllabi improve instructional delivery and student performance. However, the slightly lower ratings for reference materials suggest a need for continuous updating of resources to ensure students are exposed to current, peer-reviewed, and contextually appropriate literature (VanScoy et al., 2021; van Dyk & Adrianatos, 2022).

Syllabus components such as topic sequencing, teaching methodology, and assessment received high marks, demonstrating that course implementation is aligned with educational best practices. The high student approval of these areas, particularly content coherence and additional topics, supports research advocating for learner-centered, flexible syllabi design (Botifar et al., 2019; Jones & Zhu, 2022). However, clerical errors emerged as a consistent area for improvement. While these did not appear to impede learning outcomes significantly, their correction could strengthen the institution's reputation for academic rigor (Gupta et al., 2019; Zakaria, 2023).

The study also illuminated best practices among STS faculty. Notably, all teachers emphasized fostering critical thinking and student engagement through socio-scientific issues—an approach supported by Viehmann et al. (2024) and Cleofas (2021). The integration of Information and Communication Technology (ICT) into instruction and the use of practical applications further align with Aydın and Kasli's (2019) recommendation for experiential, technology-supported learning. Nonetheless, the relatively low engagement in STS-specific professional development points to an important area for institutional investment. Continuous faculty development, particularly in interdisciplinary teaching and assessment strategies, remains essential for improving student outcomes (Seabra & Vieira, 2020; De Guzman, 2022).

On the other hand, significant challenges persist. Teachers cited lack of facilities, insufficient parental involvement, and time constraints as barriers to effective instruction—findings echoed by Hardiana et al. (2023), Permana et al. (2023), and Adewole and Abraham (2024). The identified gap in teacher training and difficulty in teaching socio-scientific issues point to the need for more structured, STS-focused capacity-building programs. Similarly, students reported cognitive barriers, poor motivation, and difficulties with guided inquiry tasks, which align with the findings of Kartini et al. (2022), and Mazidah et al. (2023). These findings suggest that while the curriculum is fundamentally sound, improvements in delivery, instructional support, and student engagement could significantly enhance learning experiences.

Moreover, the results point to the broader implications of curriculum design and review in Philippine higher education. The incorporation of periodic course reviews, as endorsed by Zimmerman et al. (2020) and McInnes et al. (2024), is not merely a compliance activity but a means to foster continuous improvement. Aligning STS instruction with evolving societal needs, integrating technology, and ensuring quality assessment are essential to sustaining relevance in the general education curriculum. With CHED emphasizing outcome-based education (Sarol, 2021), this study contributes valuable insights for both policy and practice.

In summary, the STS course, as evaluated in this study, demonstrates strong curricular integrity and effective delivery, but like any academic program, it also reveals opportunities for refinement. Enhancing reference materials, strengthening faculty training, upgrading facilities, and improving student engagement strategies can further elevate the quality of STS education and ensure its lasting impact on learners navigating the complex interplay of science, technology, and society.

Conclusion and Recommendations:

This study evaluated the Science, Technology and Society (STS) course offered in a higher education institution in Kabankalan City, focusing on course specifications, syllabus content, best teaching practices, and challenges encountered by both instructors and students. The findings confirmed that the course meets—and in many areas surpasses—the expected quality standards for general education courses, as outlined by CHED and other international benchmarks for course design and implementation. With an overall rating of over 96% from both expert and student evaluations, the STS course was found to be well-structured, pedagogically sound, and relevant to the goals of outcomes-based education.

The strength of the course lies in the clarity of its course description, well-defined learning outcomes, alignment of course requirements with instructional objectives, and the effective use of innovative teaching methods. The positive assessment from both internal and external reviewers indicates that the course contributes meaningfully to students' understanding of the interconnection between scientific knowledge, technological advancement, and societal challenges. However, areas such as clerical accuracy, reference updating, and availability of facilities were noted as concerns requiring action. These, along with reported student difficulties in cognitive processing and motivation, and teachers' limited exposure to continuous professional development programs, highlight key areas for improvement.

Given these findings, the following recommendations are proposed:

1. Establish a systematized periodic review process of the STS course to ensure it remains updated, contextually relevant, and aligned with emerging scientific and societal issues. This includes revising outdated references and addressing clerical inconsistencies.
2. Organize targeted in-service training and professional development workshops for STS instructors, particularly on interdisciplinary teaching strategies, assessment design, and the handling of socio-scientific issues. Collaboration with science and technology experts can deepen pedagogical content knowledge.
3. Invest in improved access to current STS-related resources, both digital and print, and upgrade instructional facilities such as laboratories, libraries, and multimedia-equipped classrooms to support experiential learning.
4. Incorporate active learning strategies such as project-based learning, guided inquiry, and ICT integration to address student difficulties in focus, motivation, and concept internalization. This also requires training faculty in differentiated instruction to cater to diverse learners.
5. Develop outreach programs to increase parental involvement in supporting student learning in general education courses, particularly those with interdisciplinary implications like STS.
6. Implement structured feedback systems from students and faculty to continuously assess the effectiveness of teaching methods and learning outcomes. These insights can guide timely interventions in instruction.

The study suggests that by addressing these areas, the STS course can better fulfill its interdisciplinary purpose, equipping students not only with academic competence but with the critical awareness to navigate and influence a rapidly evolving scientific and technological world. The outcomes of this study may serve as a model for other institutions undertaking similar course reviews as part of their broader quality assurance efforts.

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