



Assessment Authenticity in Generative-AI-Rich Learning Environments

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Abstract

Higher education is increasingly expected to prepare students not only for employment but also for informed participation in the social, civic, environmental, and institutional challenges affecting their communities. Conventional classroom instruction can develop disciplinary knowledge, yet students may have limited opportunities to apply that knowledge to complex problems involving multiple stakeholders, incomplete evidence, competing interests, contextual constraints, and consequences for real communities. Community-embedded curriculum responds to this limitation by integrating community-defined problems, reciprocal partnerships, interdisciplinary inquiry, collaborative problem solving, structured reflection, and public-facing outcomes within credit-bearing academic learning. A 2020 meta-analysis of community-engaged learning in higher education found statistically significant positive effects on academic, social, and citizenship outcomes, providing contemporary evidence that community engagement can contribute to multiple dimensions of student development. This study develops a Community-Embedded Civic Problem-Solving framework that distinguishes genuine co-design with community partners from projects in which communities are used primarily as sites for student learning. Because no authentic university-community dataset was provided, the quantitative component is explicitly simulation-based. A synthetic dataset of 300 hypothetical university students was constructed across limited, collaborative, and co-designed curriculum-embeddedness levels.

The simulated relationship between curriculum embeddedness and civic problem-solving competence was strongly positive ($r = 0.760$). Students represented in the co-designed category demonstrated higher simulated problem-solving, reflective-learning, and community-responsiveness scores than students in the limited-engagement category. These numerical outcomes are illustrative rather than empirical population estimates. The paper concludes that community-embedded curricula are most educationally and ethically defensible when community priorities influence problem definition, students integrate disciplinary evidence with local knowledge, reciprocal partnerships replace one-directional service, reflection links experience with theory, and community partners participate meaningfully in evaluating the usefulness of student work.

Keywords: community-embedded curriculum; civic problem solving; community-engaged learning; service-learning; experiential education; higher education; civic engagement; community partnerships; problem-based learning



1. Introduction

Higher education has historically carried responsibilities extending beyond disciplinary instruction and professional preparation. Universities contribute to knowledge creation, but they also influence the social, economic, cultural, and civic environments in which they operate. UNESCO has emphasized community engagement and social responsibility as important dimensions of higher education, while its work on lifelong learning reports that community engagement and social responsibility are major drivers of higher-education institutions' participation in wider societal learning. This broader institutional role creates a strong rationale for curricula that connect academic learning with problems experienced outside the university.

Community-engaged learning provides one established foundation for such curriculum design. Rather than treating communities merely as locations for volunteering, well-designed community engagement connects academic learning objectives with community-identified priorities, reciprocal interaction, structured reflection, and practical activity. Foundational service-learning scholarship similarly defines the approach as a credit-bearing educational experience in which organized community activity is intentionally connected with academic reflection and learning. The educational value therefore arises not from participation alone, but from the integration of experience, disciplinary knowledge, reflection, and responsibility.

Recent evidence strengthens the case for this approach. Guanlao's 2025 meta-analysis examined community-engaged learning across college students and found significant positive effects in academic, social, and citizenship domains, with pooled Hedges's g values of approximately 0.344, 0.371, and 0.220 respectively. Contemporary public-health education research likewise reports that community-engaged service learning can support leadership development by encouraging students to value community expertise, authentic relationships, collective decision-making, and self-determination. These findings suggest that community engagement can strengthen learning when it is connected to authentic decision contexts rather than implemented as detached extracurricular service.

However, community-based learning also presents ethical and pedagogical risks. A university can describe a project as community engagement even when faculty define the problem, students control the solution, community partners contribute unpaid labor, and the final product provides little benefit after the academic term ends. Mitchell's distinction between traditional and critical service-learning remains important because critical approaches place greater emphasis on power, social change, authentic relationships, and redistribution of authority between institutions and communities. A community-embedded curriculum should therefore be evaluated not only according to what students learn but also according to whether communities have meaningful influence over what is studied and how outcomes are judged.

The present study develops Community-Embedded Curriculum for Civic Problem Solving as a model in which students address locally meaningful problems through sustained interaction with community partners, disciplinary evidence, collaborative inquiry, iterative solution development, and structured reflection. The concept is intentionally broader than volunteer service. Civic problem solving includes diagnosing a public problem, understanding stakeholders, interpreting evidence, recognizing trade-offs, generating feasible alternatives, communicating across differences, and evaluating whether a proposed response is socially and contextually appropriate. Because no real participant or community-



project dataset was supplied, the quantitative component uses a transparent simulation of 300 hypothetical students. The study therefore provides a methodological framework for future empirical validation without presenting synthetic outcomes as completed community research.

2. Objectives of the Study

2.1 To Develop a Community-Embedded Curriculum Framework

The first objective is to identify the curricular components required to move from occasional community exposure toward sustained community-embedded learning. These components include community-informed problem definition, reciprocal partnership, integration of disciplinary and local knowledge, iterative project development, collaborative decision-making, structured reflection, and community-facing outcomes. UNESCO's recent work on community-based learning in higher education similarly emphasizes connections between higher education, civil society participation, and locally grounded learning.

2.2 To Examine the Relationship Between Curriculum Embeddedness and Civic Problem-Solving Competence

The second objective is to demonstrate through simulation whether progressively deeper community embeddedness could be associated with higher civic problem-solving competence. The analytical model also considers reflective learning and responsiveness to community priorities because technically sophisticated solutions may still be inappropriate when students fail to understand local knowledge, constraints, or stakeholder perspectives.

2.3 To Identify Conditions for Reciprocal and Ethical University-Community Partnerships

The third objective is to distinguish authentic community-embedded learning from extractive forms of student engagement. The study emphasizes reciprocity, shared problem definition, realistic project scope, recognition of community expertise, continuity planning, and community participation in evaluation. Mitchell's critical service-learning framework and contemporary community-engaged leadership research both support moving beyond charity-oriented models toward more reciprocal and power-conscious partnerships.

3. Review of Literature

3.1 Community-Engaged Learning and Civic Development

Community-engaged learning has a substantial intellectual history within experiential education, service-learning, civic education, and place-based learning. Eyler and Giles' influential work examined how service-learning can combine cognitive learning with affective and civic development, drawing upon national research and student interviews across institutions. Their work helped establish the importance of structured reflection and the connection between experience and academic understanding. Bringle and Hatcher subsequently contributed to institutional models of service-learning and emphasized that community engagement should be embedded within educational structures rather than treated as isolated volunteering. Their institutionalization work defines service-learning as a course-based, credit-bearing activity connected with identified community needs and academic reflection. This distinction



remains useful because a community-embedded curriculum should influence learning outcomes, assessment, instructional activities, and reflection rather than appear as an optional extension of the course.

The strongest recent synthesis comes from Guanlao's 2025 meta-analysis of community-engaged learning among college students. The study identified positive pooled effects across academic, social, and citizenship outcomes, although effect sizes varied across outcome domains and studies. This evidence suggests that community engagement can contribute to civic development while also improving forms of academic learning, undermining the assumption that civic education necessarily competes with disciplinary rigor.

AAC&U similarly treats experiences connecting academic study with real-world issues as high-impact learning practices and provides VALUE rubrics for assessing complex learning outcomes such as problem solving, critical thinking, communication, and ethical reasoning. These assessment approaches are relevant because civic problem solving is multidimensional and cannot be adequately measured through course satisfaction alone.

3.2 From Service Delivery to Community Co-Design

Community engagement varies substantially in depth. At one end, students may briefly participate in a community activity designed largely by the university. At the other, community partners participate in identifying problems, defining priorities, contributing knowledge, evaluating proposed solutions, and deciding whether student outputs are useful.

Mitchell's critical service-learning framework provides a particularly important theoretical distinction.

Critical service-learning places stronger emphasis on social change, redistribution of power, authentic relationships, and examination of structural conditions than traditional service-oriented models. This distinction is central to the concept of curriculum embeddedness because physical presence in a community does not necessarily imply shared authority.

Recent community-engaged service-learning research in public-health leadership reaches a similar conclusion. Chu's 2020 study describes community engagement as an opportunity to decenter student or institutional self-interest, recognize community expertise, and develop more collective forms of decision-making. Kaliappen's 2020 work similarly describes community-engaged service learning as a mechanism for integrating theoretical knowledge with practical application and strengthening civic engagement and social responsibility.

Place-based education also supports this orientation. Recent research examining local community projects argues that integration of classroom and community learning can develop practical problem-solving skills, social responsibility, belonging, and agency. These findings suggest that meaningful civic learning occurs when students learn *with* communities rather than merely *about* them.

3.3 Reflection, Collaborative Inquiry, and Civic Problem Solving

Real civic problems differ substantially from textbook problems because their boundaries are often uncertain. Stakeholders may disagree over what the problem actually is, evidence can be incomplete, proposed interventions can produce unequal effects, and the technically most efficient solution may be socially unacceptable.



Project-based learning provides one useful pedagogical structure because students can move iteratively from problem identification to planning, testing, implementation, and reflection. Recent school-university collaboration research describes project-based learning as an iterative problem-solving process extending from identification of real-world issues through action planning, testing, and reflection. Community-embedded curriculum adds a civic dimension by requiring those activities to occur in dialogue with affected stakeholders.

Reflection is essential because experience does not automatically produce learning. Students need structured opportunities to compare community experience with disciplinary concepts, reconsider assumptions, analyze power relationships, evaluate evidence, and identify limitations in their initial proposals. Eyler and Giles' research specifically emphasizes the educational function of connecting service experience with academic and civic learning.

A further research opportunity concerns the mechanisms connecting community-engagement quality with social outcomes. A 2026 study of service-learning examines whether sense of community helps explain relationships between service-learning quality, prosocial behavior, and social responsibility. This emerging evidence suggests that future curriculum research should measure not only participation but also relational quality, perceived reciprocity, belonging, and the extent to which students understand themselves as participants in a shared civic environment.

4. Research Methodology

4.1 Research Design and Synthetic Sample

The study adopts a simulation-based quantitative research design supported by community-engaged-learning scholarship. No university students were recruited, no community organization supplied project records, and no civic intervention was implemented. All numerical observations in the analysis are synthetic and demonstrate a future empirical design.

A synthetic sample of 300 hypothetical university students was generated. Each student received a Community-Embedded Curriculum Score ranging from 0 to 100. Higher values represent greater curricular integration of community-defined problems, partner participation, reciprocal decision-making, interdisciplinary evidence, structured reflection, and public-facing project outcomes.

For descriptive analysis, students were divided into three simulated categories:

- Limited Embeddedness represents primarily classroom-based projects with occasional community exposure or consultation.
- Collaborative Embeddedness represents sustained interaction with community partners and regular use of community knowledge during project development.
- Co-Designed Embeddedness represents projects in which community partners participate meaningfully in defining problems, setting priorities, assessing feasibility, reviewing student proposals, and evaluating outcomes.
- These classifications are analytical constructs developed for the simulation and should not be interpreted as formal categories established by UNESCO, AAC&U, or any individual scholar.



4.2 Proposed Measurement Framework

A future empirical investigation should collect evidence from students and community partners rather than relying exclusively on student self-report. Project artifacts, partner evaluations, reflective assignments, problem-solving rubrics, and follow-up evidence concerning the use of project outputs would strengthen measurement validity.

Table 1: Proposed Questionnaire for Community-Embedded Civic Learning

Item	Proposed Questionnaire Statement	Primary Construct
Q1	Community partners have meaningful input into defining the problem that students are expected to address.	Shared problem definition
Q2	I use both disciplinary evidence and knowledge contributed by community members when analyzing the problem.	Knowledge integration
Q3	I can identify multiple stakeholders, competing interests, constraints, and possible unintended consequences before recommending a solution.	Civic problem analysis
Q4	Community feedback influences how our team revises or evaluates proposed solutions.	Reciprocal collaboration
Q5	After completing a community project, I can explain how my assumptions changed and what I would do differently in future civic problem solving.	Reflective civic learning

Before empirical use, the questionnaire should undergo expert review, pilot testing, reliability assessment, factorial validation, and comparison with independently rated student performance. Community-partner versions of the instrument should also be developed because student perceptions of reciprocity may differ from partner experiences.

4.3 Synthetic Variables, Statistical Procedure, and Partnership Ethics

The principal outcome, Civic Problem-Solving Competence, was represented on a 0–100 scale and was designed to reflect problem framing, stakeholder analysis, evidence interpretation, alternative generation, feasibility assessment, collaborative decision-making, and evaluation.

Two secondary synthetic measures were created. Reflective Learning represents the capacity to examine assumptions, integrate experience with academic theory, and modify future practice. Community Responsiveness represents the extent to which student decision-making considers partner knowledge, local feasibility, stakeholder needs, and consequences for affected groups.

Random variation was added to all scores to represent heterogeneity among students. Pearson correlation was used to estimate the synthetic relationship between curriculum embeddedness and civic problem-solving competence.



The resulting simulated association was:

$$r = 0.760$$

This is a property of the synthetic model and must not be generalized as an empirical effect size.

Future real-world research should also address partnership ethics. Community organizations should not be required to contribute extensive unpaid supervision solely for student benefit. Projects should have realistic scopes, community partners should understand academic timelines, ownership and use of project outputs should be clarified, sensitive community information should be protected, and institutions should develop continuity plans when community needs extend beyond a semester.

5. Analysis

5.1 Civic Problem-Solving Outcomes Across Embeddedness Levels

The simulation shows progressively stronger civic problem-solving outcomes as community embeddedness increases. Students in the Limited Embeddedness category recorded a mean Community-Embedded Curriculum Score of approximately 40.4 and a mean Civic Problem-Solving Competence score of approximately 54.8.

Students in the Collaborative category recorded mean values of approximately 60.0 for embeddedness and 68.5 for civic problem solving. The Co-Designed category recorded the strongest synthetic outcomes, with mean curriculum embeddedness of approximately 82.0 and mean Civic Problem-Solving Competence of approximately 84.2.

Table 2: Simulated Learning Outcomes by Community-Embedded Curriculum Level

Curriculum Embeddedness Level	Simulated n	Mean Embeddedness Score	Mean Civic Problem-Solving Competence	Mean Reflective Learning	Mean Community Responsiveness
Limited	75	40.4	54.8	55.3	52.4
Collaborative	131	60.0	68.5	67.1	63.6
Co-Designed	94	82.0	84.2	80.1	79.7

The differences are important because the strongest synthetic outcomes occur not merely where students spend more time in communities but where curricular design gives community knowledge and feedback a stronger role in the learning process.

5.2 Relationship Between Curriculum Embeddedness and Civic Problem Solving

The synthetic Pearson correlation between Community-Embedded Curriculum Score and Civic Problem-Solving Competence was:

$$r = 0.760$$

The associated coefficient of determination is approximately:

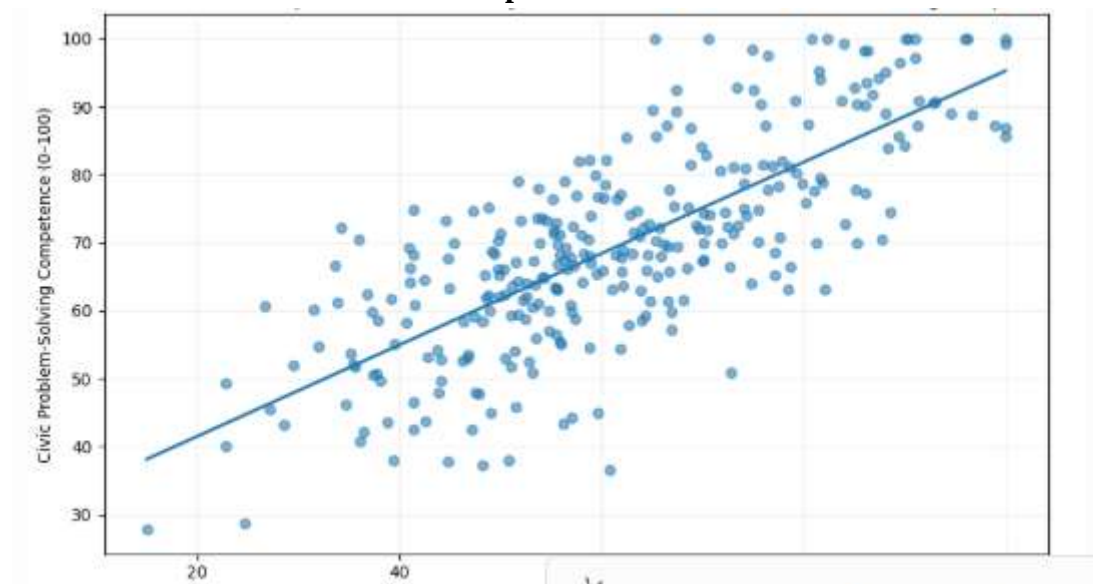
$$R^2 = 0.578$$

Within the constructed dataset, approximately 57.8% of variation in civic problem-solving competence is statistically associated with variation in curriculum embeddedness. This result is illustrative rather than empirical.

The positive relationship is conceptually consistent with the 2025 meta-analysis showing beneficial community-engaged-learning effects on academic, social, and citizenship outcomes. However, the present simulation extends the idea by emphasizing *depth of embeddedness* rather than simply whether a course contains a community component.

5.3 Actual Graph: Community Embeddedness and Civic Problem-Solving Competence

Graph 1: Simulated Relationship Between Community Embeddedness and Civic Problem-Solving Competence



Interpretation: The graph shows a clear positive relationship. Students represented by higher Community-Embedded Curriculum Scores tend to display higher simulated Civic Problem-Solving Competence.

Key Finding: Community engagement appears most educationally powerful in the simulation when it is integrated deeply enough for community perspectives, evidence, feedback, and real constraints to shape student reasoning rather than simply provide a location for completing an assignment.

6. Discussion

6.1 Civic Problem Solving Requires Authentic Problems and Shared Authority

The central implication of this study is that civic problem-solving competence is difficult to develop through decontextualized exercises alone. Real community problems force students to confront uncertainty, stakeholder disagreement, limited resources, historical context, and unintended consequences. AAC&U's high-impact-practice framework similarly emphasizes direct engagement with problems students are studying and opportunities to analyze and respond to real issues.



Yet authenticity requires more than selecting a local topic. A faculty member can choose a community issue without giving affected residents any role in defining it. Mitchell's critical service-learning framework remains instructive because it emphasizes genuine relationships, social change, and attention to power. The strongest version of community-embedded curriculum therefore treats community partners as knowledge contributors and co-educators rather than as recipients of university expertise.

This approach can strengthen student reasoning because community partners frequently introduce forms of knowledge that are absent from academic literature: institutional memory, practical constraints, informal networks, historical attempts that failed, political sensitivities, resource limitations, and lived experience. Students then need to reconcile these perspectives with disciplinary evidence rather than treating theory as automatically superior to local knowledge.

6.2 Reflection Converts Community Experience Into Academic and Civic Learning

The second implication concerns reflection. Community experience can remain superficial when students complete activities without systematically examining what they learned. Eyler and Giles' foundational research demonstrates the importance of structured reflection in connecting experience with academic understanding and civic development.

Reflection should therefore be more analytically demanding than describing what happened. Students can be asked to identify assumptions that proved inaccurate, compare academic evidence with community testimony, examine who possessed decision-making power, explain why an apparently strong solution was rejected, identify ethical tensions, and evaluate how their own position influenced interpretation.

The simulated Reflective Learning scores increase considerably from the Limited to Co-Designed categories. Although these are generated results, the pattern illustrates why reflection and community embeddedness can be mutually reinforcing. More meaningful community interaction creates richer material for reflection, while structured reflection prevents authentic experience from remaining disconnected from academic learning.

Reflection also protects against simplistic "solutionism." Students may enter civic projects believing that every social problem can be solved through one intervention, application, campaign, or technical design. Community engagement can teach that legitimate civic problem solving often involves incremental improvement, negotiation, institutional coordination, and recognition that some problems cannot be resolved within a semester.

6.3 Reciprocal Partnerships Should Produce Value for Communities as Well as Students

A third implication concerns the ethics of educational benefit. Community-engaged learning research frequently evaluates student learning more extensively than community outcomes. A course can receive excellent student evaluations while imposing substantial coordination costs on a small community organization.

Contemporary community-engaged leadership research argues for approaches that recognize community expertise, authentic relationships, collective decision-making, and community self-determination. This perspective implies that universities should ask not only whether students improved their civic



competence but also whether community partners considered the collaboration respectful, relevant, and worth continuing.

Partnership quality can be strengthened through early co-planning, realistic expectations, compensation or resource support where feasible, named institutional contacts, clear communication, data protection, and continuity mechanisms extending beyond the course calendar. Community partners should also have opportunities to challenge student assumptions and reject solutions that are technically impressive but locally unsuitable.

The long-term institutional implication is that community engagement should not depend entirely on individual enthusiastic instructors. UNESCO continues to frame community engagement as part of higher education's wider social responsibility, suggesting that institutions themselves need structures capable of sustaining community relationships. A genuinely community-embedded curriculum therefore requires institutional commitment as well as innovative classroom design.

7. Conclusion

Community-embedded curriculum offers higher education a mechanism for connecting disciplinary learning with the social and civic environments in which knowledge is ultimately applied. Its educational value does not arise merely because students leave the classroom. Strong community-engaged learning connects academic objectives with authentic problems, reciprocal partnerships, structured reflection, and opportunities to produce outcomes that matter beyond the university. Contemporary meta-analytic evidence indicates that community-engaged learning can positively influence academic, social, and citizenship outcomes among college students, providing empirical support for the broader educational rationale.

The synthetic analysis developed in this study illustrates how deeper community embeddedness could be evaluated quantitatively. Across 300 hypothetical students, curriculum embeddedness showed a positive simulated correlation of $r = 0.760$ with Civic Problem-Solving Competence. Mean problem-solving scores increased from approximately 54.8 in the Limited Embeddedness category to 84.2 in the Co-Designed category, while reflective-learning and community-responsiveness scores followed a similar pattern. These values are intentionally synthetic and should not be interpreted as observations from actual students or community programs.

The principal practical conclusion is that universities should move beyond models in which communities simply provide locations for student projects. A stronger curriculum begins with problems communities consider meaningful, integrates local knowledge with disciplinary evidence, creates opportunities for iterative feedback, and gives community partners influence over how solutions are evaluated. Structured reflection should remain central because students need explicit opportunities to reconsider assumptions, analyze stakeholder relationships, connect theory with experience, and understand the limits of their proposed interventions. This orientation is consistent with both critical service-learning scholarship and contemporary community-engagement research emphasizing authentic relationships and shared decision-making.

Future empirical research should test this framework across disciplines such as engineering, public health, business, environmental studies, social sciences, information technology, education, and public administration. Longitudinal studies should examine whether civic problem-solving capabilities persist



after graduation and whether students subsequently participate more effectively in community or public decision-making. Equally important, future studies should collect independent community-partner evidence concerning reciprocity, usefulness, workload, relationship quality, and sustained impact. The strongest community-embedded curriculum should ultimately be judged by two outcomes simultaneously: whether students become more capable civic problem solvers and whether communities experience the partnership as meaningful rather than extractive.

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