SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Excellence in Undergraduate Education (EUE) Proposal

Project ID# (*leave blank*)

25-06

Project Title

A Classroom Response System for Student Engagement, Active Learning, and Real-time Intervention in CHEM 121A/B

Project Director	ID Number	Telephone	Email
Thomas C. Holovics	800390710	650-2589	tholovi@siue.edu

Department	Campus Box	School College
Chemistry	1652	College of Arts and Sciences

Course or Program

CHEM 121A General Chemistry I and CHEM 121B General Chemistry II

Project Co-Director	ID	Department	Email

Student Impact:	~650 students/year

Priority Rating (If Submitting Multiple Proposals):	

Project Budget

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total
5528	1400								6928

Cost-Sharing

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total
		1000							1000

Prior EUE Support

Project Director	Project Number	Award Amount	Project Dates
None in the past 5 years.			

Applicable 2024-2025 Priorities (*check all your proposal fits, if any*):

- ☑ Course redesign project that uses inclusive, student-centered pedagogies to address equity gaps, improve student learning outcomes, & enhance retention
- ☑ Project involves courses that have high number of sections, a high ratio of D/F/W grades, or key required courses with high enrollments and opportunities to improve equitable student success

Project Summary

General Chemistry (CHEM 121A and CHEM 121B) is a two-semester general chemistry sequence for science majors. These lecture-based courses have large enrollments (~250 students in 121A and ~100 students in 121B each Fall and ~150 students in 121A and ~150 students in 121B each Spring) and typically have high DFW rates, sometimes greater than 30%. This situation is not unique to SIUE, and chemical educators everywhere have tried a variety of strategies to help students succeed in chemistry.[1] To address this concern, the SIUE Department of Chemistry already employs several inclusive, student-centered pedagogies in CHEM 121A/B: Supplemental instruction (SI),[2] peer led team learning (PLTL),[3–10] online homework problem sets,[11–13] and low-stakes quizzing.[14]

An additional tool that has shown great promise is the classroom response system (CRS).[15–25] A CRS uses software running on electronic mobile devices (laptop computers, tablets, and smart phones) to provide continuous feedback from students to the lecturer. The CRS replaces traditional feedback methods such as show of hands, coded cards (flash cards), and dedicated electronic devices (clickers), and has the advantages that it allows numerical answers, provides detailed tracking of student participation, and gives the instructor the ability to completely change the direction of instruction based on student performance on a problem worked in real-time. The CRS that is provided (free) with the current CHEM 121A/B Pearson textbook is *Learning Catalytics*.[26]

Tom Holovics has taught the CHEM 121A/B sequence for many years, and has developed extensive student resources (PLTL workshop materials and a detailed course pack) that are specifically tailored to these SIUE general chemistry courses. This Excellence in Undergraduate Education (EUE) proposal requests funds for the development and implementation of in-class CRS resources for CHEM 121A/B. EUE funds will be used to

support Tom Holovics for one month in Summer 2024 to write CRS problems aligned to the CHEM 121A/B curriculum, and to pay an undergraduate worker to attend CHEM 121A lectures in Fall 2024 and CHEM 121B lectures in Spring 2025 at least two days per week (and other times as needed) and to assist Holovics in implementing and assessing the impact of the CRS. The overall goals of this project are to address equity gaps, improve student learning outcomes, and enhance retention of students in CHEM 121A/B.

Proposal Narrative

a. Current Situation:

First and second year chemistry courses are very challenging to students everywhere, and the discontinuation of the use of standardized test scores for placement into these courses at SIUE has led to an increased number of underprepared students enrolled in them. Also, after COVID there seem to be more students who fail to engage in courses, sometimes to the point of never attending class or completing any online assignments. One consequence is high DFW rates in CHEM 113, CHEM 121A, CHEM 121B, and CHEM 241A. This situation is not unique to SIUE, and chemical educators have tried a variety of strategies to help students succeed in chemistry.[1] To address this concern, the SIUE Department of Chemistry already employs several inclusive, student-centered pedagogies: Supplemental instruction (SI),[2] peer led team learning (PLTL),[3–10] online homework problem sets,[11-13] and low-stakes quizzing.[14]

General Chemistry I (CHEM 121A) is a first-semester general chemistry course for science majors. This lecture-based course has large enrollments (~250 students each Fall and ~150 students each Spring) and has DFW rates that sometimes exceed 30%. The second-semester general chemistry course, General Chemistry II (CHEM 121B) also has large enrollments (~100 students each Fall and ~150 students each Spring). Tom Holovics has taught the CHEM 121A/B sequence for many years, and has developed extensive student resources

(PLTL workshop materials and a detailed course pack) that are specifically tailored to these SIUE general chemistry courses. It is estimated that 650 undergraduate students per year will be affected by this project upon implementation.

Learning Catalytics[26] is an interactive student response tool (also called a classroom response system or CRS)[15–25] that encourages team-based learning by using students' smart phones, tablets, or laptops to engage them in interactive tasks and thinking. *Learning Catalytics* features open-ended, multiple-choice, and image upload questions that encourage collaboration among students for team-based and group learning. It also enables instructors to monitor student responses and keep tabs on how well students understand what is being taught and discussed. If a topic has low understanding by students, faculty (having the immediate in-class feedback) will be able to offer immediate intervention to help aid students with their knowledge retention. This will also hold students accountable for not only attending lecture, but also keeping up with understanding the concepts that are being discussed. In a large classroom it may be easier for students to feel detached or distracted and hopefully this will help students feel more "connected". As an instructor, you can also pose a variety of open-ended questions that help your students develop critical thinking skills, while monitoring responses with real-time analytics to find out where they're struggling. With this information, you can adjust your instructional strategy in real time and try additional ways of engaging your students during class. *Learning Catalytics* also lets you manage student interactions by automatically grouping students for discussion, team-based learning, and peer-to-peer learning. *Learning Catalytics* is included with the course textbook materials at no additional cost, and the developed questions can be used from year-to-year so this project is sustainable after termination of the EUE grant.

b. Proposed Project:

This Excellence in Undergraduate Education (EUE) proposal requests funds for the development and implementation of in-class *Learning Catalytics* resources for CHEM 121A and CHEM 121B. EUE funds will be used to support Tom Holovics for one month in Summer 2024 to write *Learning Catalytics* problems aligned to the CHEM 121A/B curriculum, and to pay an undergraduate worker to attend CHEM 121A lectures in Fall 2024 and CHEM 121B lectures in Spring 2025 at least two days per week (and at other needed times outside of the classroom) to assist Holovics in implementing and assessing the impact of *Learning Catalytics*. The overall goals of this project are to address equity gaps, improve student learning outcomes, and enhance retention of students in CHEM 121A and CHEM 121B.

There are three main areas that this development will make an impact on our general chemistry courses. The first area of improvement is student engagement and involvement. Students will be able to "click in" with a smart device and they will feel connected with the main lecture. This will also promote good attendance with proper commitment to the lesson at hand. The second area that we will focus on is students building knowledge during the lecture so that they will be able to navigate complex chemistry problems on their own. Students will be tasked with up to five questions during the lecture, which will assess how students are keeping up with the new concepts and problems that are being introduced. This should also maintain some impact on how students are gaining their new knowledge. The third aspect will be faculty intervention. The big advantage of real-time data on how students are understanding the material is a very valuable piece of information. Students also have the ability to mark "this topic is not clear to me". Being armed with this data, instructors can try to go over a difficult topic again and try to intervene when student understanding is low. This will also give instructors another aspect to trigger advanced warning systems for students that are consistently struggling with the

material. This way these students can be presented with new avenues for help (examples are supplemental instruction, tutoring, and faculty office hours).

During a small pilot study in CHEM 121B in Spring 2024, we have been learning how to utilize *Learning Catalytics* through Pearson. Within this tool students can answer questions and hit a button when they are confused about a particular topic. This can give the instructor immediate feedback about when students are confused, and they do not have to overcome the barrier of asking a question in a 250+ person lecture. During this limited trial we have observed an increase in attendance. We tracked a very preliminary increase from around 85% attendance in the first few weeks to up to 95% attendance at the halfway point in the semester. The ability to reinforce unclear topics has also shown to increase results on exams and assessments (albeit a small sample size).

In Fall 2024 we plan to build and implement the infrastructure to roll out a full trial of *Learning Catalytics* for General Chemistry I (CHEM 121A). In Spring 2025 we plan to continue use of *Learning Catalytics* for General Chemistry II (CHEM 121B). This will involve creating a large pool of specifically designed questions aimed to help students be successful in this scholarship. This pool needs to correlate well with the previously implemented structure of general chemistry. We also will require the support of an undergraduate student worker to facilitate the seamless integration of this methodology in the large 250+ student classroom.

c. Evaluation and Dissemination

We plan to assess the success of *Learning Catalytics* by comparing CHEM 121A student retention in Fall 2024 to Fall 2023 (the control population before implementation). We feel that the addition of faculty intervention with the reinforcement of difficult student concepts will be a major factor in increasing retention. We also plan to use interventions when we identify students

that are lacking course engagement. We hope to use much earlier flag systems to try and correct behavior that is detrimental to success. We also plan to use student surveys to gauge the effectiveness of the *Learning Catalytics* program.

The project director and/or the student researcher will disseminate project results externally to other chemical educators at an American Chemical Society regional or national meeting after completion of the project.

Budget and Budget Justification

Salary:	1 month faculty salary, Summer 24	$5,528
Student Wages:	$14/hour x 50 hours/semester, Fall 24, Spring 25	$1,400
	Total	**$6,928**

Cost Sharing

Travel:	Dissemination at regional or national meeting	$1,000

The requested funds are to support one faculty member and one undergraduate student worker to complete the activities described in the Proposal Narrative. The faculty salary line is for one month of Summer 2024 support for project director Tom Holovics. The student wages are based on 50 hours of support per semester in Fall 2024 and Spring 2025 for a chemistry undergraduate student at the prevailing wage for undergraduate teaching assistants.

The Department of Chemistry is providing cost sharing of $1,000 for the project director and/or the student researcher to travel to a regional or national meeting to disseminate project results.

References

1. Vyas, V. S.; Reid, S. A. What Moves the Needle on DFW Rates and Student Success in General Chemistry? A Quarter-Century Perspective. *J. Chem. Educ.* **2023**, *100*, 1547−1556.
2. Anfuso, C.; Awong-Taylor, J.; Savage, J. C.; Johnson, C.; Leader, T.; Pinzon, K.; Shepler, B.; Achat-Mendes, C. Investigating the Impact of Peer Supplemental Instruction on Underprepared and Historically Underserved Students in Introductory STEM Courses. Internat. *J. STEM Educ.* **2022**, *9* (55), 1–17.
3. Gosser, D. K.; Roth, V. The Workshop Chemistry Project: Peer-led Team Learning *J. Chem. Educ.* **1998**, *75*, 185.
4. Woodward, A.; Gosser, D. K.; Weiner, M. Problem Solving Workshops in General Chemistry *J. Chem. Educ.* **1993**, *70*, 651.
5. Gosser, D. K.; Cracolice, M.; Kampmeier, J. A.; Roth, V.; Strozak, V. S.; Varma-Nelson, P. Peer-led Team Learning: A Guidebook; Prentice Hall: Upper Saddle River, NJ, 2001.
6. Gafney, L.; Varma-Nelson, P. Peer-Led Team Learning: Evaluation, Dissemination, and Institutionalization of a College Level Initiative; Springer Science: Dordrecht, 2008.
7. Lewis, S.; Lewis, J. E. Departing from Lectures: A Peer-led Guided Inquiry Alternative *J. Chem. Educ.* **2005**, *82*, 135-139.
8. Wamser, C. C. Peer-led Team Learning in Organic Chemistry: Effects on Student Performance, Success, and Persistence in the Course *J. Chem. Educ.* **2006**, *83*, 1562-1566.
9. Hockings, S. C.; DeAngelis, K. J.; Frey, R. F. Peer-led Team Learning in General Chemistry: Implementation and Evaluation *J. Chem. Educ.* **2008**, *85*, 990-996.
10. Lyon, D. C.; Lagowski, J. J. Effectiveness of Small-Group Learning in a Large Lecture Class *J. Chem. Educ.* **2008**, *85*, 1571-1576.
11. Arasasingham, R. D.; Martorell, I.; McIntire, T. M. Online Homework and Student Achievement in a Large Enrollment Introductory Science Course. *Journal of College Science Teaching* **2011**, *40* (5), 70−79.
12. Cole, R. S.; Todd, J. B. Effects of Web-based Multimedia Homework with Immediate Rich Feedback on Student Learning in General Chemistry. *J. Chem. Educ.* **2003**, *80* (11), 1338−1343.
13. Eichler, J. F.; Peeples, J. Online Homework Put to the Test: A Report on the Impact of Two Online Learning Systems on Student Performance in General Chemistry. *J. Chem. Educ.* **2013**, *90* (9), 1137−1143.
14. Theobald, E. J.; Hill, M. J.; Tran, E.; Agrawal, S.; Arroyo, E. N.; Behling, S.; Chambwe, N.; Cintrón, D. L.; Cooper, J. D.; Dunster, G.; Grummer, J. A.; Hennessey, K.; Hsiao, J.; Iranon, N.; Jones, L., II; Jordt, H.; Keller, M.; Lacey, M. E.; Littlefield, C. E.; Lowe, A.; Newman, S.; Okolo, V.; Olroyd, S.; Peecook, B. R.; Pickett, S. B.; Slager, D. L.; Caviedes-Solis, I. W.; Stanchak, K. E.; Sundaravardan, V.; Valdebenito, C.; Williams, C. R.; Zinsli, K.; Freeman, S. Active Learning Narrows Achievement Gaps for Underrepresented Students in Undergraduate Science, Technology, Engineering, and Math. *PNAS* **2020**, *117* (12), 6476–6483.

15. Moredich, C.; Moore, E. Engaging Students Through the Use of Classroom Response Systems. *Nurs. Educ.* **2007**, *32* (3), 113−116.
16. MacArthur, J. R.; Jones, L. L. A Review of Literature Reports of Clickers Applicable to College Chemistry Classrooms. *Chem. Educ Res. Pract*. **2008**, *9* (3), 187−195.
17. Freed, J. E. Teaching with Classroom Response Systems: Creating Active Learning Environments. *Rev. High. Educ.* **2009**, *33* (2), 288−289.
18. Towns, M. H. Crossing the Chasm with Classroom Response Systems. *J. Chem. Educ.* **2010**, *87* (12), 1317−1319.
19. Emenike, M. E.; Holme, T. A. Classroom Response Systems Have Not "Crossed the Chasm": Estimating Numbers of Chemistry Faculty Who Use Clickers. *J. Chem. Educ.* **2012**, *89* (4), 465−469.
20. Vital, F. Creating a Positive Learning Environment with the Use of Clickers in a High School Chemistry Classroom. *J. Chem. Educ.* **2012**, *89* (4), 470−473.
21. Murphy, K. Using a Personal Response System to Map Cognitive Efficiency and Gain Insight into a Proposed Learning Progression in Preparatory Chemistry. *J. Chem. Educ.* **2012**, *89* (10), 1229−1235.
22. Sutherlin, A. L.; Sutherlin, G. R.; Akpanudo, U. M. The Effect of Clickers in University Science Courses. *Journal of Science Education and Technology* **2013**, 22 (5), 651−666.
23. Morrison, R. W.; Caughran, J. A.; Sauers, A. L. Classroom Response Systems for Implementing Interactive Inquiry in Large Organic Chemistry Classes. *J. Chem. Educ.* **2014**, *91* (11), 1838−1844.
24. Gibbons, R. E.; Laga, E. E.; Leon, J.; Villafane, S. M.; Stains, M.; Murphy, K.; Raker, J. R. Chasm Crossed? Clicker Use in Postsecondary Chemistry Education. *J. Chem. Educ.* **2017**, *94* (5), 549−557.
25. Schwartz, G. Interface Model and Implementation Framework for Classroom Response Systems. *J. Chem. Educ.* **2021**, *98*, 2122−2127.
26. https://www.pearson.com/en-us/higher-education/products-services/learning-catalytics.html.

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Curriculum Vitae

Thomas C. Holovics

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St. Peters, Mo, 63304
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Education:

- PhD in Chemistry, the University of Kansas (09/2006)
  Concentration areas: Synthetic Inorganic / Organometallic Chemistry
  Dissertation Title: Low-Valent Coordination Chemistry of Nonbenzeniod Isocyanides, a New Class of Aromatic Isocyanide Ligands
- B.S. in Chemistry with minor Mathematics, Niagara University (2001)

Research Experience:

- Postdoctoral Research Associate, the University of Kansas
  Research advisor: Prof. Mikhail V. Barybin (09/2006 - 05/2007)
- Graduate Research Assistant, the University of Kansas
  Research advisor: Prof. Mikhail V. Barybin (06/2002 - 08/2006)
- Undergraduate Research Assistant, Niagara University
  Research advisor: Prof. Joseph Krause NU (Spring 2001)
- Undergraduate Research Assistant, the University of Kansas
  Research advisor: Prof. Brian Laird KU (Summer 2000)

Teaching/Mentoring Experience:

- Instructor Tier II, undergraduate general chemistry I & II, general chemistry laboratory I & II, general organic and biochemistry and engineering chemistry, SIUE (Fall 2007-present)
- Instructor, undergraduate advanced inorganic chemistry lab, KU (Spring 2007)
- Head Graduate Teaching Assistant, undergraduate organic lab, KU (Summer 2005)
- Graduate Teaching Assistant, general, organic and advanced inorganic chemistry lab, KU (2001-2007)
- Graduate Student Mentor for:
  Tiffany Maher (2004)
  David McGinnis (2006)
- Undergraduate Student Mentor for:
  Ryan L. Shook (2003)
  Alexandre S. Vorouchilov (2004)
  Edward C. Wientrob (2005)

Awards/Scholarships/Recognitions:

- The Ernest and Marvel Griswold Award for outstanding graduate research in Inorganic Chemistry, KU (2005)
- The Reynold T. Iwamoto Scholarship for outstanding academic performance KU (2004)
- Cornelius Armstrong and Martha Kidwell McCollum for excellence in research, KU (2003)
- Chemistry Graduate Student Organization President, KU (2002)
- Bailey Scholarship, KU (2001-2002)
- NSF REU Summer Fellowship Award, KU (2000)
- Niagara University Presidential Scholarship, NU (1997-2001)
- Graduated Cum Laude, NU (2001)

Publications:

(1) Toriyama, M.; Maher, T. R.; Holovics, T. C.; Vanka, K.; Day, V. W.; Berrie, C. L.; Thompson, W. H.; Barybin, M. V." Multipoint Anchoring of the [2.2.2.2] Metacyclophane Motif to a Gold Surface via Self-Assembly: Coordination Chemistry of a Cyclic Tetraisocyanide Revisited,". *Inorganic Chemistry*,**2008,** 47, 3284-3291.

(2) Holovics, T. C.; Robinson, R. E.; Weintrob, E. C.; Toriyama, M.; Lushington, G. H.; Barybin, M. V. "The2,6-Diisocyanoazulene Motif: Synthesis and Efficient Mono- and Heterobimetallic Complexation with Controlled Orientation of the Azulenic Dipole". *J. Am. Chem. Soc.* **2006**, *128(7),* 2300-2309.

(3) DuBose, D. L.; Robinson, R. E.; Holovics, T. C.; Moody, D. R.; Weintrob, E. C.; Berrie, C. L.; Barybin, M. V. "Interaction of Mono- and Diisocyanoazulenes with Gold Surfaces: First Examples of Self-Assembled Monolayer Films Involving Azulenic Scaffolds". *Langmuir*; **2006**, *22(10),* 4599-4606.

(4) Robinson, R. E.; Holovics, T. C.; Deplazes, S. F.; Powell, D. R.; Lushington, G. H.; Thompson, W. H.; Barybin, M. V. "Five Possible Isocyanoazulenes and Electron-Rich Complexes Thereof: A Quantitative Organometallic Approach for Probing Electronic Inhomogeneity of the Azulenic Framework". *Organometallics,* **2005**, *24(10),* 2386-2397.

(5) Barybin, M. V.; Chisholm, M. H.; Dalal, N. S.; Holovics, T. H.; Patmore, N. J.; Robinson, R. E.; Zipse, D. J. "Long-Range Electronic Coupling of MM Quadruple Bonds (M = Mo or W) via a 2,6-Azulenedicarboxylate Bridge". *J. Am. Chem. Soc,* **2005**, *127(43),* 15182-15190.

(6) Holovics, T. C.; Deplazes, S. F.; Toriyama, M.; Powell, D. R.; Lushington, G. H.; Barybin, M. V."Organometallic Isocyanocyclopentadienides: A Combined Synthetic, Spectroscopic, Structural, Electrochemical, and Theoretical Investigation". *Organometallics,* **2004**, *23(12),* 2927-2938.

(7) Robinson, R. E.; Holovics, T. C.; Deplazes, S. F.; Lushington, G. H.; Powell, D. R.; Barybin, M. V. "First Isocyanoazulene and Its Homoleptic Complexes". *J. Am. Chem. Soc.* **2003**, *125(15),* 4432-4433.

(8) Barybin, M. V.; Holovics, T. C.; Deplazes, S. F.; Lushington, G. H.; Powell, D. R.; Toriyama, M. "First Homoleptic Complexes of Isocyanoferrocene". *J. Am. Chem. Soc,* **2002,** *124(46),* 13668-13669.

Selected Presentations:

(1) Holovics, T. C.; Robinson, R. E.; Barybin, M. V. "Controlling mono- and dinuclear complexation of the 2,6-diisocyanoazulene motif". *231st ACS National Meeting, Atlanta, GA,* **2006**

(2) Holovics, T. C.; Robinson, R. E.; Weintrob, E.; Barybin, M. V. "The 2,6-Diisocyanoazulene Motif: Synthesis and Efficient Mono- and Heterobimetallic Complexation with Controlled Orientation of the Azulenic Dipole". *40th Midwest Regional Meeting of the American Chemical Society, Joplin, MO,* **2005**

(3) Holovics, T. C.; Barybin, M. V.; "Toriyama, M. Organometallic isocyanocyclopentadienides: New opportunities in the chemistry of organic isocyanides". *227th ACS National Meeting, Anaheim, CA,* **2004**

(4) Deplazes, S. F.; Holovics, T. C.; Barybin, M. V. "First Planar-Chiral Isocyanides". *39th Midwest Regional Meeting of the American Chemical Society, Manhattan, KS,* **2004**

(5) Holovics, T. C.; Barybin, M. V. "Isocyanocymantrene and isocyanofferocene: A combined synthetic, spectroscopic structural, and theoretical investigation". *38th Midwest Regional Meeting of the American Chemical Society, Columbia, MO,* **2003**

(6) Holovics, T. C.; Deplazes, S. F.; Barybin, M. V. "Multinuclear NMR and electrochemical studies of $[Cr(CNR)_6]^{0,1+,2+}$ (R = ferrocenyl, 2-azulenyl, 6-azulenyl) and related complexes". *225th ACS National Meeting, New Orleans, LA,* **2003**

(7) Holovics, T.C.; Deplazes, S. F.; Powell, D. R.; Lushington, G. H.; Barybin, M. V "First Homoleptic Complexes of Isocyanoferrocene: Probing Spin Delocalization within a Nonbenzenoid Aromatic π-system by Multinuclear NMR". *37th Midwest Regional Meeting of the American Chemical Society, Lawrence, KS,* **2002**

(8) Chlebowski, M.; Holovics, T.C.; Krause, J. G. "Preparation of Modified Cantharidin Analogues to Test for Anticancer Activity". *55th Annual Eastern Colleges Science Conference, Wilkes Barre, PA,* **2001**

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE

Date: February 26, 2024

To: EUE Review Committee

From: Eric J. Voss, Professor and Chair of the Department of Chemistry

Re: Letter of Support for EUE Project from Thomas Holovics

I strongly support the EUE proposal submitted by Dr. Thomas Holovics, "A Classroom Response System for Student Engagement, Active Learning, and Real-time Intervention in CHEM 121A/B". If funded, the PI and an undergraduate student worker will develop and implement in-class resources for *Learning Catalytics*, the Pearson classroom response system that is available for use in the general chemistry courses CHEM 121A and CHEM 121B. These courses impact about 650 students per year, and this project promises to address equity gaps, improve student learning outcomes, and enhance retention. The project also involves courses that have a high number of sections, a high ratio of D/F/W grades, and high enrollments, with opportunities to improve equitable student success.

The work described is consistent with the funds that are requested, and funding for Dr. Holovics and an undergraduate student worker is reasonable and appropriate. I am confident in the successful development and implementation of the proposed work. The Department of Chemistry is committed to a $1,000 cost share to support travel by the PI and/or student researcher to disseminate results from this project at a regional or national American Chemical Society meeting.

Dr. Eric J. Voss, Department of Chemistry, Southern Illinois University Edwardsville, 618-650-2099, evoss@siue.edu

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE

Date: February 29, 2024

From: Kevin Leonard, Dean, College of Arts and Sciences 

Subject: EUE Dean Memo of Support

The College of Arts and Sciences supports the application of Dr. Thomas Holovics for an EUE grant for expanded implementation of new learning technology into two Chemistry courses that have had historically high DFW rates, General Chemistry I (CHEM 121A) and General Chemistry II (CHEM 121B). The department has already engaged in a small pilot study of the new tool, *Learning Catalytics*, and has seen a significant increase in student attendance and engagement. The EUE grant would enable Dr. Holovics to expand the number of students who are served by this pedagogical tool. As such, this project contributes to student success initiatives on campus and supports EUE priorities.

The budget includes faculty salary over the summer to develop the content and assessment questions needed to enhance student engagement and assess student learning in the classroom. Given the size of these courses (250+ students), the budget also includes wages for a student worker to support the integration of the technology into classes in the Fall 2024 and Spring 2025 semesters. The department has also agreed to provide cost share for travel so that the results of this expanded pilot project can be disseminated at a national conference.

College of Arts and Sciences
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