

Scales of Inclusion in a Vertically Integrated Program for a Community-Focused Interactive Experience



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Introduction

Increasingly, university departments are working with public organizations and groups to provide learning opportunities for students that result in public-facing artifacts like web pages, apps, and other digital experiences. Scaffolding curricula and pedagogical tactics to support this kind of student work and learning that benefits both the community and students is challenging. One solution is developing Vertically Integrated Programs (VIP) that enable students to work on a singular research or development project over many semesters (Bayer, 2014; Ferri et al., 2017). With each new semester, the students learn new skills that increase the quality of the final artifact and produce more value for the community. Further, these students become part of a community of learners wherein more experienced students elevate new students (Corrie, 1995).

VIP programs encourage different educational tactics that parallel different pedagogical philosophies (Barrella & Watson, 2016). These philosophies are Jean Piaget's Constructivism, Lev Vygotsky's Social Constructivism, Seymour Papert's Constructionism, and Jean Lave and Etienne Wenger's Communities of Practice. These pedagogical theories are implemented at different times in the VIP structure

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in parallel with departmental curriculum. At the same time, the curriculum and VIP projects include students in different ways and within different social arenas depending on their degree progress. Students' participation then occurs within different scales of inclusion depending on whether they are being included in the VIP in the social arenas of the classroom, the academy, or in conversations with the community partner. To explore the VIP model and these scales of inclusion, this chapter presents a case study on a public-facing serious game developed for the Economic Awareness Council (EAC) in Chicago (Economic Awareness Council, 2020). The case study discusses the obstacles that occurred with a first effort and how students overcame them in the second effort. It tracks the development of the game through 18 months of production.

Pedagogical Philosophies in a Vertically Integrated Program

Broadly, the idea of a VIP is rooted in Jean Piaget's concept of Constructivism: as humans, we construct knowledge based upon our learned experiences with the world around us (Ackermann, 2001; Von Glasersfeld, 2005). Engaging in this way can strengthen genuine learning through shared experiences in an educational setting. Concepts of human-centered design parallel this approach. Constructivism and human-centered design understand that information and meaning are contextual—our experiences are subjective. We are creating an environment that encourages an iterative creative practice wherein each iteration builds upon previous information as a foundational process of human learning.

Expanding Constructivism, Lev Vygotsky's theory of Social Constructivism recognizes that learning in a social setting precedes human development and that we construct knowledge through our interactions with others (Liu & Chen, 2010; Liu & Matthews, 2005). As teachers, we guide our students to help them navigate their learning experience. Teachers act as facilitators in the knowledge creation process. It is not passive. The process is an active dialogue with our students that is new and distinct each time.

In Seymour Papert's theory of Constructionism, we create mental models of understanding based upon the information we already know to create new understandings (Papert, 1993; Papert & Harel, 1991). This model mirrors effective learning and industry-standard creative practices. It is a model that validates the basic pedagogical assumption that we create meaning and understanding from our interactions with the world around us, particularly with other humans. We study and design this process for others as practitioners of human-centered design.

A VIP mirrors Jean Lave and Etienne Wenger's Communities of Practice (Lave, 1991; Wenger, 1999). As humans, we learn from each other in our shared experiences. Experience level may vary—student to professor, mentor to mentee, manager to employee—but a community of practice creates a living and breathing environment of situated knowledge and growth through shared and varied experiences. As we learn through iteration, we acquire new knowledge to share with our peers and

vice versa. Students learn from their professors, professors learn from their students, clients learn from students, and the community benefits from this learning.

Scales of Inclusion

When speaking about inclusion, there appears to be a disconnect between the abstract idea and its practical implementation. The term requires an operational understanding (Qvortrup & Qvortrup, 2018). Ane and Lars Qvortrup, education researchers, recognized that inclusion can happen at different levels for a student's participation. They recognized that "the experience of being included" was required as part of inclusive design—it is not enough to be asked or able to participate—a feeling of being "included" is necessary (Qvortrup & Qvortrup, 2018). Further, that such levels also occur in different types of communities, whether those be inside the classroom, inside the department, or outside of the school.

A VIP model attempts to create the curricular structure of a community of practice, with "inclusion" being a required and expected outcome. Outside of the required foundational courses, students choose to electively engage in this process. The hope is that learning becomes self-motivated, and students choose their level of inclusion as well as depth. A VIP scaffolds this process.

Ane and Lars Qvortrup outline these separate inclusive arenas as, "other arenas related to the classroom and the school." In this chapter, we recognize that such arenas have a particular scale. For example, the arena of inclusion within a classroom has a smaller scale than feeling included within a school. They identify five of these different arenas. These are presented in Table 1 in relation to scales.

Considering these arenas in terms of scale addresses where the impact of this inclusion or exclusion may be felt by the student. In agreement with Qvortrup, we recognize that these scales of inclusion can and do influence learning achievement. The VIP supports the inclusion of students from the initial classroom setting and transitions them into ever larger social arenas of inclusion. In the instance of the case study, students moved from the small social arena of the classroom to the larger

Table 1 Ane and Lars Qvortrup's arenas of inclusion and their definitions

Arena of inclusion	Scale
Social arenas within the classroom as a complex of interaction systems	Within the classroom
Social arenas related to the interpersonal relationships between children	Within the classroom
Social arenas within the professionally organized learning community	Within the academy
Social arenas related to, but not a formal part of the school community	Within the community
Social arenas related to interpersonal relationships between the individual child and one or more adults, e.g., the teacher	Within the community

social arena of the college's Design Lab, and then to the even larger social arena of the community. At each level, their learning was impacted by a different scale of inclusion.

The Case Study: Economic Awareness Council's Investing Game

In the Spring of 2020, the EAC approached the Department of Interactive Arts and Media (IAM) at Columbia College Chicago to design and develop a serious game on investing literacy. The Economic Awareness Council has a 19-year history of working with youth in distressed communities to improve their financial literacy. They run summer camps and youth leadership programs through community groups. After two successful projects with a now-defunct unit of Columbia College Chicago, The Convergence Lab, they wanted to collaborate again.

This collaboration required new scaffolding. The college lost its capacity to administer public-facing projects when the Convergence Lab closed. As a result, the authors and a colleague were asked to direct their efforts to produce a new lab called The Design Lab within the IAM Department. Further, the administration asked the authors to connect classroom work to community-situated and public-facing projects. There was general goodwill and a desire to do this work. Unfortunately, as is often the case, there was no additional funding, release time, or administrative support to establish this effort. Undeterred, the authors and their colleagues met with the EAC to begin scaffolding the program and to develop the project.

The EAC had a short timeline for their project. They wanted to launch the game in the summer of 2021. This timeline allowed for a mere 4 months to design, develop, and launch the experience. The faculty lead warned EAC that the timeline was ambitious and might not result in a viable product. However, with appropriate investment from students and faculty, the experience might be capably produced. To this end, the first author recruited the best performing students in their Serious Games and Simulations class to develop a Game Design Document (GDD) for the game.

Seven students worked independently to draft the GDD using a design brief and educational materials from the EAC. After their first iteration, they met with the faculty lead to revise their work. The faculty lead then scheduled a meeting with the EAC stakeholders so the students could present their work. During this meeting, the students presented the GDD and their rationale for interaction design mechanics, pedagogical goals, and other formal game design qualities. The faculty lead moderated the conversation. Three other meetings occurred during which the students learned to solicit feedback, communicate with clients, and iterate on designs. After the fourth meeting, the faculty lead handling development of the game took over.

During this period, the administration had provided dispensation for two student workers to commit 20 hours each to the project weekly. With only 3 months left

until the game was meant to launch, the students were to work tirelessly. However, this effort was not forthcoming for various reasons. First, the hired students were graduating seniors. Accordingly, they were more focused on employment and graduation than the project. This became increasingly evident as graduation approached and their future employers made job offers. Communication breakdowns occurred with increasing regularity. When EAC sought to launch the game, the students had disappeared entirely, leaving an unfinished project, stressed faculty, and an upset client. In short, the first effort at establishing a successful model for The Design Lab failed. At this time, the development faculty member quit to take a job in industry and the lead design faculty was left to salvage the effort.

The Second Effort

After a stressful call with EAC, the faculty lead recommitted The Design Lab to producing a complete experience for the summer of 2022. The lead worked with his colleagues and chair to hire student workers that were second and third-year students. With the longer timeline and younger students, it was possible to institute a VIP where the third-year students could help train the second-year students. Further, the students came from different programs within the IAM Department. Programming students worked with Interaction Design (ID) and User Experience (UX) students. A team was formed and met weekly.

In the fall semester of 2021, the faculty lead worked with the programming student to refactor and complete the core programming of the experience. The students from the first effort worked haphazardly and without documentation. The faculty lead who left had patched up their code where he could, but this resulted in an illegible codebase with many inconsistencies. This failure inspired a revision where the programming student documented each method in code and technical documentation. Understanding that the Design Lab would hand this game to a client, the programming student worked diligently with the faculty to write clear, well-documented code. In the fall semester, the faculty and programming student met with EAC biweekly to confirm that the game was working as designed by the initial group of students.

In the spring of 2022, the faculty lead brought on the ID and UX students to redesign the interface. In January, the faculty lead gave these students the design brief based on the initial GDD and the faculty lead's conversations with EAC. The students then met with EAC to ask questions, solicit insights, and engage in design research. They also reviewed the educational material from EAC and the codebase provided by the programming student. They then engaged in an agile, iterative design process using Figma. Each week they revised the prototype based on internal feedback and comments from EAC. The Economic Awareness Council and the students were happy with the prototype by mid-February and the Design Lab began usability testing.

The UX student led the usability testing with high school students involved in one of EAC's current programs. The usability sessions lasted 3 hours and involved surveys, interviews, and observation by the UX student. The UX student then compiled a report reviewed internally by the team. Design suggestions were put forward to EAC from that review and were discussed by the VIP cohort. Once affirmed, the UX and ID students revised the prototype. The programming student worked in parallel, ensuring that methods and functions would be ready. This iterative process continued through two usability studies—the last one happening in early March 2022.

The final programming, testing, and deployment took place in April of 2022. The testing took place internally for the first 2 weeks of April, with a final public test occurring in the last week of the month. Finally, the project was handed off to EAC for their use in May of 2022 for their summer camps on financial and investing literacy. EAC used the game with at least 1000 students.

In the final meeting between the faculty lead, students, and EAC a postmortem reflection occurred. EAC noted that the complexity of the process was unknown to them and that they were grateful for the students' work. EAC also mentioned that they would have liked more touch points for communication and meetings. They felt that a dedicated staff member to run the project would have greatly benefited project management. The faculty member and students agreed. The three students engaged in the project felt that they had gained valuable skills in working with a real client on an actual project. Further, they all felt like they learned how to collaborate across their different disciplines in a way that their coursework did not generally allow. Finally, the ID and UX students expressed a desire to be more deeply involved at an earlier point in the project. Since they came in toward the end of the experience, they felt like they did not have adequate time to complete user research and had to work quickly to get up to speed. EAC and the lead faculty member acknowledged this and commended them on the exemplary work they were able to accomplish. The meeting ended with all stakeholders excited about the launch. The Design Lab, VIP students, and EAC felt like all of the project's goals were accomplished.

Analyzing Pedagogy Within the Vertically Integrated Program

The previously mentioned pedagogical theories—Constructivism, Social Constructivism, Constructionism, and Communities of Practice—will be used to analyze the case study. Throughout the project, students took courses that gave them the skills necessary to succeed in the VIP. The first set of pedagogies inspired inclusivity at the classroom and the academy level. The second set expanded the role of community partners and their stakeholders for a different scale of inclusivity.

Constructivism, Social Constructivism, and Constructionism

In the first year of the Interaction Design degree and Game Design degree programs in the IAM Department, instructors teach students psychology and perceptual-cognitive science behind design, interaction design, and effective experience design. They are taught these lessons through hands-on and iterative design activities and lectures. Critically, students are encouraged to incorporate their earned knowledge with their old experiences to produce prototypes. This approach encourages students to take insights from their life experiences and connect them to Human-Centered Design methodologies (Oehlberg et al., 2012). This parallel activates their agency as learners and designers. Critically, agile and iterative development align with Piaget’s understanding that learners must modify their mental models when the world no longer fits (Klemmer et al., 2006). In cognitive development, “mental models” are referred to as schemas (McLeod, 2007). Schemas are the collections of information we already understand from our lived experiences about the world. We modify these schemas in two ways:

- *Assimilation*: new information is modified to fit inside of our existing schemas.
- *Accommodation*: existing schemas are modified to fit new information.

Good designers must iterate on their designs when the context in which they are implemented is not what is expected or changes. Instructors instill this agile and flexible design thinking in students from their first semester.

In the second year of study, students take a prerequisite course for the capstone experience. While students can take this course before their final capstone, instructors encourage them to take it as early as possible, as it extends Constructivism into Social Constructivism and Constructionism (Ackermann, 2001; Papert & Harel, 1991). Students call this prerequisite course “The Failure Class,” not because most students fail—quite the opposite. In line with Papert’s concept of Constructionism and Vygotsky’s concept of Social Constructivism, the course creates problem spaces for genuine and empowered exploration by students. Creating this space sets up the possibility that what they make is not what they expect. Unfortunately, students often code this consequence as failure. However, instructors assess students on their participation in the process—not the final artifact—so they are given space to fail, reflect, learn from what happened, and try again. This system mirrors the iterative practice of the creative industry, but it also helps build resilience. Resilient learners are far more likely to become lifelong learners capable of actively supporting a VIP project that leaves a positive impact on the community.

Constructivism, Social Constructivism, and Constructionism in the Vertically Integrated Program

Students in the second effort of the VIP had completed at least four semesters of the interaction design courses. As a result, they came to the project familiar with iterative and agile design. In many ways, this suited the VIP project, wherein they had to revise work from the first effort based on the project’s shifted aesthetic context.

The faculty lead also worked solely as the facilitator. The students engaged with the client based on their personal and educational experiences in the classroom. Centering the students enabled the faculty to ask questions regarding the project and their relationship with the client. Each question was meant to be a challenge to encourage critical design thinking (McLeod, 2007). Since the faculty lead was also the students' professor, the questions connected directly to previously covered coursework. This engagement benefited from demonstrating to the students the importance of design knowledge in a real-world application.

Appropriately, the faculty lead only guided the students to fulfill obligations to EAC and the project. Students were encouraged to lead the process actively. Naturally, leaders in the game design group and the second effort group stepped up to guide the efforts. These students had an outsized impact on the final serious game and gained the most from the process.

Communities of Practice

A community of practice is a group of people bound by an intrinsic motivation to create. What that creation is or means is defined by the group. Communities of practice form organically when there is one, an opportunity for people to connect; and two, a shared passion or need is discovered. When that happens, the resulting community of practice is situated within the context of this opportunity. Communities of practice are objectively inclusive because of their shared intrinsic motivation. Inclusivity is likely to continue to thrive if the motivation of community members continues to be intrinsic.

The IAM Team class was designed to create a genuine and authentic learning environment that enables and activates this intrinsic motivation. A professor aligns students with an external stakeholder ("The Client") that has a problem they need help solving. The students then define possibilities of how to solve that problem. Since the students are empowered to explore the problem space through the lens of their shared experiences, knowledge, and resources, the resulting process and product are highly likely to be intrinsically motivated or at least offer that opportunity for everyone within the community. The opportunity for intrinsic motivation is supported by individuals in the community learning and teaching one another. This sometimes happens simultaneously and informs inclusion within this social arena. This inclusivity can help flatten the power dynamics—between the worker and the business, between the student and the mentor, between the creative and the project manager—that historically interfere with creative ideation and breed exclusion.

Communities of Practice in the VIP

Within the VIP project for EAC, two of the three students had taken the IAM Team class, and one was currently enrolled in the IAM Team Capstone. The third student benefitted from their peers' experiences. There were two major overlapping

communities of practice: interdepartmental and outside of the academy. These two areas of inclusion included the “Social arenas within the professionally organized learning community” and “Social arenas related to, but not a formal part of the school community”(Qvortrup & Qvortrup, 2018). Accordingly, the scales of inclusion were the academy and the community at large.

The interdepartmental community of practice operated as the Design Lab. Students from Programming, Game Design, and Interaction Design all worked together to create the serious game. Students from the different disciplines approached the common and recurrent problems of interactive media development from each of their situated perspectives. This enabled knowledge sharing and helped frame, constrain, and guide the iterative design process. Over 18 months, students went through the five stages of a community of practice. They saw the potential of working together, coalesced around that potential to ideate the game, and then actively developed the game. As time progressed, the game design students dispersed and returned to their curricula. However, they found the experience memorable and actively checked in on the progress of the game, often offering to beta test the experience. In addition, the Design Lab and VIP project’s community of practice developed meaningful bonds between commuter students who often are excluded from this social arena because of logistics.

The community of practice outside of academia included EAC and its students. Design Lab students had to reach out, form relationships, and learn from the client to produce a compelling game. While traditionally, communities of practice have been viewed as internal developments within an organization, the public-facing nature of the Design Lab encouraged a more inclusive approach. EAC and Columbia students had to confederate in their efforts to produce a practical learning tool. This combined effort had to be achieved while maintaining boundaries that protected the students’ learning and labor.

Further, EAC needed to be assured that their efforts would be rewarded with an effective educational game. The faculty lead on the experience had to monitor these boundaries even as they were flexed—by both students and EAC—during the iterative development process. Achieving an inclusive community of practice at this scale meant mediating student concerns and needs with the client’s desired outcomes. The faculty lead often met with students after client meetings to help students prioritize tasks and responses. Far less often, the faculty lead met with EAC to affirm the lab’s commitment.

Students worked with EAC to understand the organization’s learning system to teach financial literacy to its students. This engagement meant that the students had to understand where their serious game fit within a larger organization. This approach presented a unique challenge for students as they often iterate on one-off solutions based on a proposed design problem through coursework. To better understand the EAC’s learning system, the students analyzed their educational materials, met with existing students, and asked poignant questions of the organization’s leaders. They discovered where and when the game would be used, the classrooms in which it would be hosted, the technology available to the students (and educators), and where the game fit in the overall curriculum—accordingly, this impacted design

decisions around UX writing and other information. For example, while EAC wanted definitions for financial tools (mutual funds, certified deposits, etc.), they already extensively covered the material outside the game. This pre-work meant that any definition of a financial tool within the game could be concise and presented as a tooltip by hovering over the term. Learning about the system in which the solution (the game) would be presented enabled the students to design and develop a prototype that respected the organization, both its students and stakeholders.

Through the communities of practice, students were able to gain professional skills in agile and iterative development. They learned how to communicate design problems to one another using a shared language. They coalesced around solutions that included all their unique viewpoints on solving those problems. Finally, by working at an inclusive scale at the social arena that is not part of the school community, one that integrates external partners and stakeholders in the community, students produced a viable game that fit within an existing educational plan. This made implementation easier and guaranteed that students would see their game used.

Achieving Inclusivity at Different Scales in a VIP Program

Throughout this case study, we have discussed how different pedagogical philosophies occur in different social arenas for inclusion, each with their own scale, as part of a VIP project. Implementing Papert, Piaget, and Vygotsky in the early parts of a digital media and production curriculum encourages students to solve design problems through iterative development and agile thinking. They learn to fail, try again, and operate in changing contexts. Further, they begin to accept that their situated perspective is valuable as part of a kaleidoscopic effort that includes the experience of their peers.

Finally, this work prepares them to be part of different communities of practice as discussed by Lave and Wagner. At one level, they learn to include the work of other disciplines and mindsets as they coalesce around problems. At another level, they learn that for a solution to be effective, they must work as a community with clients and their stakeholders to produce an effective digital solution. At each level, students are included and learn to be inclusive of others as they work together in ever-expanding social arenas.

The Design Lab at Columbia College Chicago was the first effort to achieve a VIP at the college. While working with EAC, the faculty running the lab accomplished the administration's goals. Over three semesters, they helped students complete a public-facing project for the public good. The students learned valuable skills and produced a strong portfolio piece. EAC can now implement the financial literacy and investing tool into their more extensive curriculum. Hundreds of their students engaged with the tool in the summer of 2022 for the first time.

Given that the project was an overwhelming success, the authors hope that the college will work to support the Design Lab in the future. That said, there are consistently greater demands put on faculty to produce these kinds of public-facing

programs with limited support. With more significant investment from academia, VIPs and faculty could be active in forming communities of digital practice throughout cities and regions. This work would help distribute the knowledge often guarded in academia. Further, such public engagement could result in a more just and equitable design space and exemplify inclusivity.

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