

Special Issue: Issues in Teaching Theatre Design

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‘Learning to be’ a Lighting Designer: 21st-century Lighting Design Education in the Constructionistic Learning Era; Incorporating Adult Learning Techniques in Lighting Design Curriculum

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Abstract

Professional lighting design education and practice have evolved immensely in the last 25 years. This article seeks to spotlight the constructionistic character of lighting education, presenting two case studies of ‘learning to be’ a lighting designer in the 21st century to prompt educators to reflect on ways to fine-tune their teaching to the ever-changing nowness. Drawing inspiration from relevant articles and critically reflecting upon personal teaching and learning experiences, I will highlight the importance of the constructionistic educational approach, where learning is a social activity, offering chances for common experiences, collaboration, and active participation in one’s learning. I will then suggest that adult education theories and teaching techniques can be easily remodeled for lighting education in order to reinforce its constructionistic character.

Issues in Teaching Theatre Design

Students often wonder what it takes to become a lighting designer. When discussing with emerging lighting designers how they perceive themselves, young adults often reply that they don't yet feel like lighting designers and don't feel like experts. So, what does it take to feel like a lighting expert, and how is this perception of oneself affected by the learning process a designer has gone through? Experiencing light in person is vital to understanding and engaging with it. After all, learning through experience, learning-by-doing, is at the heart of lighting design evolution; as Scott D. Palmer notes, early twentieth-century lighting pioneers Adolph Appia and Edward Gordon Craig's "individual fascination with light as a new expressive material for the stage can be traced back to formative embodied experiences of bright light and darkness that each experienced while backstage in the theatre" (Palmer, 2018). So, if this worked for them, why not apply it in the contemporary lighting learning process?

Most certainly, learning just the theory of light doesn't qualify you as a lighting designer; "mastering a field of knowledge involves not only 'learning about' the subject matter but also 'learning to be' a full participant in the field" (Brown, J. S. & Adler, R. 2008). So, how do you "learn to be" a lighting designer?

Lighting is a dynamic design element of the theatrical visual synthesis, "a material that has the ability to make a profound impact on audiences – it is not simply an illuminant but has meaning in and of itself" (Palmer, 2018). Even though professional lighting design practice has greatly evolved through the 21st century, Essig (2007) observes that "the foundational methodology of much, though not all, lighting education has remained rooted in [Stanley] McCandless's mid-twentieth-century paradigm" (p. 62). This is mainly because "the role of stage lighting has historically often been dominated by concerns with the practical – the need to be able to see the performers and the scenery, and the technological means by which light might be created and delivered to the stage" (Palmer, 2018, p. 48). As a result, lighting education has prioritized fueling students with knowledge and skills that serve the needs of "providing illumination, atmosphere and decoration" (Knowles, 2001, p. 5), preparing aspiring lighting designers to 'be' in the service of other disciplines, instead of 'being' themselves active and creative collaborators.

The traditional teaching approach, the transmission model of instructionism, has been around in lighting education since the first quarter of the 20th century. Instructionism refers to educational practices that are teacher-focused, skill-based, product-oriented, non-interactive, and highly prescribed. Instructionism describes top-down teaching methods. "Teachers are conceptualized as transmitters of objective reality; students are viewed as passive receptors of knowledge [...] Instruction is directed towards efficient movement of skills and knowledge

from the teacher to the student often in the form of drill, practice and rote memorization” (Johnson, 2005, p. 5). Even though instructionism has been systematically questioned by the educational lighting community, if we take a closer look, what has changed is not the content but the channeling of knowledge through hands-on, constructionistic routes, while light is still being viewed and valued through the prism of its usefulness to other theatrical design and performance areas.

This article is based on a combination of personal experience, observation, and critical reading, starting with the need for lighting education to completely free itself from instructionism and step into the contemporary constructionistic learning era, where learning is a social activity routed in collaboration and active participation in one’s learning, through tailored learning experiences. Even though much of constructionistic learning reform has been around for a while in educational settings, still there is an urgency for constructionism to become the salient method for the art of lighting to evolve. I will build on such adult education theory as Malcolm Knowles’ *Andragogy* (1984) as a formula for good teaching practice that can be easily processed and remodeled for lighting education.

I will argue that we must re-imagine the lighting curriculum, even though it may not be possible yet to apprehend how lighting design practice or tools will look in 50 years. Still, we have to prioritize envisioning the future of lighting art, mainly because “we’ll never produce real change unless we put considerable effort into what isn’t being done” (Papert, 2001). Lighting design training needs to create practitioners who will “embrace digital transformation and build a workforce with the necessary skills” (Arts and Humanities Research Council, 2021, p. 7) while first and foremost “developing their own aesthetics” (Goebbels, 2015, p. 77) in order to pioneer 21st-century lighting design practice, especially since, as some suggest, “the theatre is in a fundamental and rapidly developing state of departure” (Goebbels, 2015, p. 100). Lighting education urgently needs to be fine-tuned to the emerging, cross-disciplinary theatre era while reinventing the curriculum (Bass, 2012) to align with the learning needs of Generation Alpha.¹

Theatre Education

For decades, the traditional didactic educational system has advocated that learning occurs first through the transmission of knowledge (instructionism), and only after being packed with sufficient knowledge would someone be expected to engage in practice and work in the field. This method of learning, though, was established in the 19th and 20th centuries when

¹ Generation Alpha are the kids born after 2010, who will become the next theatre makers in a few years from now. The keywords that characterize this generation are digital, global, social, mobile, and visual. Retrieved from: <https://abcnews.go.com/GMA/Family/gen-meet-gen-alpha-generation-born-2010-today/story?id=68971965>

“scientists didn’t know much about how people learn” (Sawyer, 2006, p 1). Early in the 20th century, Swiss psychologist Jean Piaget contributed a great deal to the development of learning sciences by articulating the Constructivist² learning theory, while in the 1990s, the mathematician Seymour Papert coined a new definition: Constructionism. Constructionism and Constructivism both advocate for the construction of meaning and knowledge,³ their main difference being that Piaget’s constructivism emphasizes how an individual actively constructs their own notions of reality through their cognition, while Papert’s constructionism focuses on the social, collaborative process of meaning-making, being “more situated and pragmatic” (Ackermann, 2001, p. 5). Papert (2001) was an advocate of project-based learning and argued for “giving up the idea of curriculum” to accommodate project-based learning in schools, “replacing it [curriculum] by a system where you learn this where you need it... meaning we are going to put kids in a position where they are going to use the knowledge that they are getting.”⁴ His views on education have been revolutionary.

In the theatre education field, a lot has been written during the past decades, focusing either on the dichotomy between theory and practice or the isolated training for different theatre disciplines. Still, “the relationship of theory and practice doesn’t need to be a contradiction” (Goebbels, 2015, p. 96). nor do different disciplines need to learn in isolation from each other; in fact, theatre disciplines benefit from collaborative learning, as “knowing is a process that involves the person, the tools and other people in the environment and the activities in which that knowledge is being applied” according to Sawyer (2006, p. 5). In his essay “Research or Craftsmanship?” Heiner Goebbels (2015) sums up key issues that can be applied in lighting education: “We don’t have to spend every possible minute of the curriculum on craftsmanship and technical training... Perhaps the rigid separation of different disciplines should generally be called into question... We should train their [the students] social competency in teamwork, their ability to collaborate and their mature self-dependence... Theatre is a cooperative art form” (p. 77-81).

Goebbels is referring to a new model of learning, in which craftsmanship and technical training are not the central educational pillars, while also suggesting that what should be prioritized is introducing them to a social “system where you learn this where you need it” (Papert, 2001), presenting opportunities to discover knowledge through problem-solving through working on projects. As a result, training for this job requires “viewing learning as the process of joining a community of practice” (Brown & Adler, 2008, p. 20) rather than a

² Constructivist theory was initially based on the work of Jean Piaget (cognitive constructivism) and Lev Vygotsky (social constructivism), maintaining that what an individual learns and understands is constructed by the individual.

³ Ackermann, E. (2001). *Piaget’s Constructivism, Papert’s Constructionism: What’s the difference?* Retrieved from: http://www.sylviaatipich.com/wp-content/uploads/2015/04/Coursera-Piaget-_-Papert.pdf

⁴ Retrieved from: [https://www.edutopia.org/seymour-papert-project-based-learning ..](https://www.edutopia.org/seymour-papert-project-based-learning..)

traditional classroom.

Speaking from a practitioner's point of view, I find it useful to think of theatre as a construction site: building new worlds on stage is a time-consuming task that requires cross-disciplinary action, communication, and close collaboration. Linda Essig (2007) herself calls the lighting process a scaffold, while Sawyer (2006), elaborating on the learning process, mentions that "to describe the support that promotes deep learning, learning scientists use the term scaffolding" (p. 11).

The purpose of twenty-first-century theatre education should be to "give the theatre-makers of the future a broader, up-to-date, palette of theatrical means" (Abulafia, 2016, p. 246) for them to 'be the theatre of the future' instead of previous century 'recyclers,' who use Neolithic tools to build spaceships.

Lighting Design Education – A Brief Overview

Theatre lighting education is under-researched worldwide and rarely discussed.⁵ Only a limited number of articles and papers focus on lighting education. Still, they are worth addressing as they provide context and background for the discussion. The following twenty-first-century theatre researchers and educators from Canada, the UK, and the USA, countries where lighting education has a long history, all seem to agree that lighting education is still in need of reform.

In "Looking for Enlightened Lighting: The Discourses of Lighting Design, Training and Practice," Ric Knowles (2001) offers an overview of lighting education readings in English, noting that texts teaching lighting design "tend to naturalize particular procedures as the taken-for-granted 'way things are.'" while promoting certain hierarchies in the creative and rehearsal process, which, in the case of lighting, lead to the marginalization of the lighting designer.

In her article "Stanley McCandless, Lighting History and Me," Linda Essig (2007) acknowledges that "lighting design is a young discipline" (p. 64), narrating her early struggles in developing methods for teaching lighting. She states that she still teaches students the historical importance of the McCandless method as "the first modern codified methodology for stage lighting, while simultaneously requesting that they not employ it in their own work

⁵ Detailed lighting education research worldwide goes beyond the scope of this article. In that direction, Zezulka (2012) has provided a brief overview of the history of technical theatre and design courses in the UK in her article "A History of Lighting Education." *Focus*, October-November 2012. p. 23-26. Anna Farthing (2012) published the report "Mapping Technical Theatre Arts Training," and Marc Evans (2015) presented the joint paper "Theatre Training Beyond Theatre: ideas, challenges and Provocations for a 21st-century Paradigm" at the International Platform for Performer Training Conference in Zurich in 2015, all discussing interesting topics.

in order to ensure that their work is, in fact, their own” (p. 62). Essig approaches lighting history as an educational tool, providing “lighting designers with a vocabulary” while also valuing the individualized understanding of the theatrical lighting design process, describing it as “an open structure, a kind of scaffold” (p. 64), clearly advocating for project work that results in “developing their [the students’] own aesthetic response to the material” (p. 65).

In his article “Modelling Light: The Transformative Role of the Model and the Miniature Studio in the Development of Lighting Design Practices in the UK,” Nick Hunt (2018) presents in detail both the historical evolution and the importance of the lighting studio as an educational means of experimentation. Hunt argues that “the model scale lighting studio has a continuing role for lighting designers’ development” (p. 2), opening up space for true collaboration, testing of ideas and experimentation, away from the rehearsal pressure, “helping to overcome the challenge of working with light’s inherent immateriality” (p. 19), while he cites students’ testimonies of the lab’s use in Rose Bruford College, where he has been leading the program between 1996-2007.

Claire Carolan (2019), in her PhD thesis, *Undergraduate Lighting Design Curriculum and Pedagogies in Canada*, stated that “the present curriculum and pedagogy are significantly unchanged since the 1980s” (p. iv), observing that “there is no history of lighting education in Canada” (p. 28), which is probably true for many other countries, and advocated “for a student-centered approach to learning for the twenty-first-century student” (p. 44). She identifies key elements that need to be included in future lighting curricula and pedagogies: collaboration as a learning method, the need for self-directed learning, and developing digital literacy skills. Carolan proposed a revised syllabus for lighting design that “facilitates a blended learning model” (p. 220).

In “Examining the Pedagogy of Theatre Lighting,” Kelli Zezulka (2020) presents findings from the field and end-user feedback, drawing data from qualitative sources, questionnaires, and interviews of professional lighting designers and educators, introducing the importance of “what types of education are valued by students and professionals” (p. 93) as a means to assess lighting education process and outcomes. Zezulka highlights the still prevalent dichotomy between academic and vocational, education and training, theory and practice, underlining the gap between training and what is happening in the UK theatre industry. Equally important to that end is Neil Fraser’s student survey, included in Farthing, A. (2012) *Mapping Technical Theatre Arts Training*, and Linda Essig’s and Mollie Flanagan’s survey (2016) *Artist Professional Development Needs: Findings and Recommendations from a Survey of Artists and Organizations*.

The latest paper on the subject was delivered earlier this year (2024) by Nick Hunt: *Drama Studio 2.0. A template for the performance learning space of the future*. In this paper, Hunt draws attention to another very important issue: “The theatre, event, film, television and related industries are undergoing a period of profound and rapid change. Industry sectors that used to operate largely independently are now seeing the cross-over of technologies, skills and personnel” (p. 1). Hunt reflects upon “what these changes mean for the training and education of performers, designers, technicians and others, and – specifically – what they mean for the spaces in which that training takes place” (p. 1). He concludes that “the greater challenge still lies ahead – the challenge of developing a new curriculum across performance, design and technology courses” (p. 5) while placing a lot of importance on creating “a learning model that brings students from all the disciplines together to experiment, create and discover very different ways of working that may lead to very different outcomes” (p. 6).

Adult Education Theory

When I first started teaching lighting design in educational institutions in Greece in 2009, I soon realized that I was in the dark regarding teaching practices and content: I had to improvise educational material and teaching methods without having any clue, apart from my professional background and personal learning experience in the Royal Central School of Speech and Drama (RCSSD). I knew that enumerating types of lanterns and lighting objectives wouldn't do the job; still, there was not much more I could think of. Apparently, as has been demonstrated in the recent Linda Essig's and Mollie Flanagan's survey (2016) *Artist Professional Development Needs: Findings and Recommendations from a Survey of Artists and Organizations*, I was not the only one: art practitioners themselves have identified their lack of teaching experience and expressed their wish to have been taught more about teaching their craft.

While reading articles and observing the students, I attended an online seminar on adult education, which proved to be eye-opening. What I wish to suggest in this article is that adult learning techniques provide a solid ground for lighting design educators who are rarely trained as such, laying down a tested framework to sharpen the edges of lighting education schemes to the nowness.

Adult education is a relatively new theory field —based on other disciplines such as psychology and sociology⁶— that emerged in the 1970s-1980s, when adult educator Malcolm Knowles developed the concept of andragogy, the art and science of teaching adults. Knowles identified certain characteristics within adult learners (Knowles et al., 2015, p. 45-50).

⁶ Adult learning theories are rooted in *situated cognition theory* (Brown, J.S., Collins, A., & Duguid, P., 1989) and Piaget's *Constructivism* (Sawyer, 2006, p. 3) and are still being updated.

- The need to know
- The learner's self-concept
- The role of the learner's experiences
- Readiness to learn
- Orientation to learning
- Motivation

The student and his/her/their pivotal role in the learning process is the central pillar of adult education. Taking a closer look at students' characteristics, most lighting students are in their early-mid 20s, a period of life that psychology professor Jeffrey Jensen Arnett has identified as emerging adulthood. The term was coined 20 years ago, but it is still worth noting that "the scientific study of adolescence began just 120 years ago" (Arnett, 2000, p. 476). Emerging adulthood is defined by certain characteristics, such as independence and an urge to explore life's possibilities, as stated by Arnett. So why not structure the educational process around these dominant psychology pillars of emerging adulthood, given that both scholars and artists seem to agree that theatre education should be more self-directed and collaborative, giving more opportunities for discovery?

The other focal pillar of adult education is the instructor. It has been decades since the educator was the expert and only source of information when learning was considered an activity of sitting in a classroom being lectured by someone who knows more than yourself. Adult education researchers envision the teacher as a facilitator who acts as a flexible resource for students, clarifies purposes, and responds to students' needs while recognizing their own limits. Becoming that person is no easy task. Claire Carolan (2019) reflected upon the "teaching preparedness of instructors who have disciplinary expertise but no formal teacher training" (p. 245-246), calling attention to the need for teacher training. Most lighting educators are professionals mastering their art and craft. Still, having deep knowledge and experience with the subject doesn't suffice to teach lighting effectively; being a rigorous researcher with many publications doesn't do the job either. Once more, dichotomy is not the solution. As Peter Zazzali and Jeanne Klein (2015) observed, "theatre professors seem to merely recycle what they were taught, albeit with new infusions of technology" (p. 261).

Adult Education Teaching Techniques

There is no single correct way to teach lighting design or any other subject. Different teaching techniques may feel comfortable to some educators and completely strange to others. After all, individual personalities involved in the learning process impact both group dynamics and teaching techniques, calling for customized handling. For the purposes of this article, I will focus on a limited number of adult learning techniques that have proven compatible and valuable to lighting education: case studies, brainstorming, working in groups, visit tours,

field trips, and demonstrations.

Case Study:

Presenting and discussing specific case studies is a common teaching method in both adult and design education. Case studies present unique professional stories and offer insights into real problems that had to be resolved under specific circumstances. Case studies feel like 'breaking the fourth wall' of the stage, inviting students on stage to be part of the process and observe it inside-out. Watching performance videos or photos helps students spot and recognize key issues, articulate questions, and come up with their own suggestions. Discussions about specific shows and the use of light within them deepen students' understanding and sharpen critical thinking. Case studies are also discussion starters, delivering content in an experiential way, boosting creative-critical thinking and innovation while teaching attitude, and accelerating students' 'learning to be' a lighting designer process. I find it productive for students to analyze case studies of performances that I have been personally involved in as a lighting designer since this allows me to offer students insights into the process, the decision-making, and the impact all creative factors had on the end product.

Brainstorming:

Brainstorming is a student-centered technique that allows students to collectively construct knowledge. It can be highly engaging and amusing, gathering a quantity of information in a fast and relaxed way. Every student's response is considered equally important; there is no right or wrong answer, and no judgments are allowed. Brainstorming is a good technique for introducing a subject; it is a place to freely express ideas while respecting other people's personal views, promoting collaboration in a 'silent' way. I often use brainstorming when talking about colored light, given that my goal is to help students understand the subjectivity of color perception and onstage use instead of providing coloring formulae. For more inspiration and associations, a great lighting pioneer, Max Keller (1999), offered an extensively elaborate color perception and associations chart, invaluable to all lighting practitioners, in his "Light and Colour" (p. 42-43) chapter in *Light Fantastique*. Still, it feels more productive to let the students talk about color instead of informing them about what connotations Keller attributes to it. Students are surprised by the range of different responses to colors. Brainstorming leads to hands-on experimentation with colored gels and student mobiles' torches: throwing in a couple of swatch books and asking them to match their wordy color responses to specific gels, drags them into another round of surprise and amusement while providing the opportunity to build personal color palettes! Brainstorming gets them interested in color in a very personal way while learning hands-on how colored light interacts with different materials, fabrics, or human skin tones.

Working in Groups:

Working in groups is a collaborative learning method based on social learning, acknowledging that “our understanding of content is socially constructed through conversations about that content and through grounded interactions, especially with others, around problems or actions” (Brown & Adler, 2008, p. 18), while “diving into situations rather than looking at them from a distance” (Ackermann, 2001, p. 8). Working in groups offers the chance to observe other group members engage with the given project parameters differently. “Knowledge is situated, being in part a product of the activity, context and culture in which is being developed and used” (Brown et al., 1989, p. 32). Working in groups is a highly effective and productive learning method; students learn from each other, exercise collective problem-solving, and develop critical thinking while sharing knowledge. By ‘Learning to learn together’ (Mavrikis et al., 2012), students come face to face with prioritizing choices and negotiating aesthetic and practical issues in order to reach consensus in their project decisions, offering important eureka moments for all participants. Schott (2013) calls these incidents learning moments, explaining further that not everybody learns the same thing at the same time. There are different sorts of learning occurring simultaneously in a team.

Visit Tours, Field Trips, and Demonstration

Field trips offer a chance to closely observe and experience a situation while evaluating and reshaping previous knowledge. Field trips provide an opportunity to demonstrate and compare lighting equipment in real-life conditions and observe and critically reflect upon processes and good practices while creating for students a sense of ‘belonging’ to a lighting community, offering a ‘sneak peek’ of the professional world they are about to enter. Field trips are a great way to construct knowledge on the spot and demonstrate attitudes, tools, and techniques; they offer a chance to reshape preconceptions and test and evaluate methods and ideas. Field trips can vividly demonstrate the multifaceted-multilayered nature of lighting design: visiting different types of venues, lighting rental and sales companies, visualizing studios, etc., gives a great insight into the different fields of practice and collaboration channels that lighting designers are expected to engage.

21st-century Lighting Design Learning Objectives

So, what and how are we supposed to teach 21st-century lighting design students? “What should we continue doing? What should we abandon? What needs to be creatively invented at first?” (UNESCO, 2021) Given the lack of extended research on lighting education, I sought inspiration and good practices from well-researched cognate fields like graphic design and mathematics. Graphic designer Richard A. Swanson (2020) observed: “The design skill I believe is most important is one I’ve never really figured out how to teach: the ability to be

interested in everything and anything” (p. 103), arguing that teaching design is about teaching how to keep your mindset alert, teaching attitude rather than knowledge, procedures, or tools. Swanson also advocated for hands-on, learning by doing as a valid design teaching method:

“[M]aking is a center for discovery, for communication with others, and as a way to gain a clearer understanding of the topic and the nature of whatever they are designing... to start a sort of visual vocabulary list to bring the designer face-to-face with a range of issues the drawings encourage expansion of the designer’s vocabulary and they inspire connections and analogies” (Swanson, 2020, p. 103).

Lighting educators seem to agree. Lighting education should first and foremost initiate and boost students’ creativity in a safe environment for experimentation and collaboration to allow them to come up with their unique lighting language (Tipton, 2006). Essig (2009) wondered: “Is it possible to ‘teach’ innovation? Or should it be our intent to create an environment in which innovation can happen and be supported?” (p. 123). Hunt (2018) addressed this by proposing lighting lab practice as a solution, leaving no doubt that creativity can be cultivated hands-on at the model box, as it is “a place of experimentation, testing, sharing, and collaborative decision making” (p. 15) without the pressure of the production week, personal agendas or the expectations of the sold-out opening night. The lighting lab is a strong example of “a combined model of act and learn together: learn by acting” (Visser, as mentioned in Rogers, 2003, p. 36), freed from expectations to deliver a product, offering chances for critical judgment to flourish as “critical judgment is not necessarily antecedent, nor totally subsequent, to a creative act, but often occurs during the act” (Ecker, 1963, as mentioned in Schott, 2013, p. 298). Critical judgment is what makes you feel like an expert; demonstrating proficiency fuels confidence. It is when you realize that your choices and problem-solving skills have been proven right and have worked that you are sure of possessing a high degree of competence. Building critical judgment is a very personal and time-consuming process that can only happen on the go; it is not some sort of knowledge that can be transmitted top-down; it is built inside out.

Collaboration “lies in the heart of theatre” (Evans & Pitches, 2015, p. 14); it is both a building block and ground for creativity to flourish and is essential to lighting design. Collaboration is a skill; therefore, practitioners should practice it to unlock its secrets. Time and space should be allowed to create this type of knowledge, “train and develop the ‘muscles’ of collaboration” because “any effective piece of theatre is always greater than the sum of its parts” (Evans & Pitches, 2015, p. 14). 21st-century lighting classes would be much more beneficial to students as open-source communities, where content and process are equally important and where novices and experts coexist and collaborate (Goebbels, 2015). Hunt and Melrose (2005) refer to theatre as a “network of human relationships” (p. 70), a dynamic and

complex “production organism” (p. 77). Collaboration is the veins of this organism where the blood of creativity runs.

A 21st-century distinctive attribute we should embrace is the emergence of newly available and rapidly evolving digital learning technologies and communities (Sawyer, 2006) that are very familiar to generation Alpha digital natives. The recent pandemic crisis has significantly changed our attitude towards online training, proving that virtual tools and platforms can be of high educational value and should not be treated as an inferior learning medium. Since the Internet dominated our lives, “a great deal of informal learning is taking place both on and off campus via the online social networks” (Brown & Adler, 2008, p. 22). Lighting students don’t really need educators anymore to tell them about technical specifications of luminaires; they can Google it, watch tutorials, visit user forums, and ask each other all sorts of questions. “The participatory culture of the web and the informal learning that it cultivates” (Bass, 2012, p. 27) need to be treated and molded into allies, not enemies, especially now that Generation Alpha is about to step into the theatre. Brown and Adler (2008) present numerous examples of online learning resources, communities, and platforms explaining how students benefit from peer and expert interaction. The internet is “ideal for supporting multiple modes of learning” (Brown & Adler, 2008, p. 18); it is a technology that horizontalizes the channeling of information since students can access information themselves (Evans & Pitches, 2015, p. 20). Educators need to teach students how to process, evaluate, and make the best use of available resources, help them learn how to learn,⁷ and “find their uniqueness” (Essig, 2009, p. 120) while learning in a communal and collaborative way.

So, what is the best way to teach all these skills if not through Papert’s (2001) collaborative, project-based learning? Papert, who had insightful discussions with well-known theorists of adult learning like Paul Freire, shared a clear vision for collaborative learning of the future: “kids will work in communities of common interest on rich projects that will connect with powerful ideas” (Papert, 2001). Isn’t that an apt definition of theatre? A community sharing common interest? So, if a mathematician envisioned the learning process as collaborative, why not apply this in educating future generations of theatre practitioners, including lighting designers? As Papert (2001) stated, “improving education is the key to the survival of the human race.” Projecting that into the theatre world makes us realize that improving theatre education is the key to the survival of theatre. It is safe to assume that the conditions are set for “the emergence of new kinds of open participatory learning ecosystems that will support active, passion-based learning” (Brown & Adler, 2008, p. 32). Lighting education will most benefit from learning to learn together or L2L2 pedagogies (Mavrikis et al., 2012), where

⁷ Smith (1982) defines learning how to learn: “Learning how to learn involves possessing, or acquiring, the knowledge and skill to learn effectively in whatever learning situation one encounters” (p. 19, as mentioned in Knowles, Holton III, Swanson, 2015, p. 170)

digital learning technologies and project-based learning are dynamically embedded and blended.

Case Studies

The following part, is a piece of field-based observation, containing remarks from my own experience as a lighting student and educator.

Master of Arts in Advanced Theatre Practice, Strand of Lighting Design (RCSSD)

Looking to critically reflect upon the teaching methods and learning goals for 21st-century lighting design education, I found myself looking back at how I was taught stage lighting 23 years ago on a master's degree level at RCSSD. When I started my master's degree in 2001, I had no previous knowledge of lighting. I had a bachelor's degree in Theatre Studies, a four-year theory-based course at a Greek University, which meant that even though I had studied all sorts of theatre practices, ranging from ancient Greek drama to Stanislavski, I still had no experience constructing theatre. Looking for hands-on experience during my theoretical studies, I volunteered in a repertory theatre to do secondary tasks that would not need a certified artisan to fulfill them. This was a deep dive into theatre making, a time of exploration and experimentation that made me realize that I was interested in lighting, even though I had no idea what lighting was. A few months later, I enrolled in the Advanced Theatre Practice Master's degree program of the RCSSD. The student body consisted of approximately 50 people: performers, directors, writers, dramaturgs, stage and sound designers, a puppeteer, and me. Coming from an instructionistic learning environment, it felt strange not having lighting classes and instead being thrown immediately into the making of lighting. Looking back, it took me a while to break the 'instructionistic chains' and allow myself to be taken by the creative tide of collaboratively constructing knowledge on the go. So, what was Central's method? In their brochure for the MA/MFA in Advanced Theatre practice programme specifications for 2022/23, Central states that they created a "community of practitioners – with a shared vision of learning – able to research your own particular field and push forward the boundaries within your own chosen area of practice" (MATP programme specification 2022/23, p. 3), learning both as individuals and as a group, "aiming to imagine the theatre of the future." (RCSSD, MATP programme specification 2022/23, p. 3) Central advocated that experimentation and collaboration are key learning outcomes, not just teaching tools, encouraging students to participate "in an innovative laboratory for practical experiment - with a focus on working flexibly and constructively with others to create and invent new models of collaboration and practice" (RCSSD, MA/MFA Advanced Theatre practice, programme specification 2022/23, p. 3), where students are active members of the learning process. Central's learning process echoed Papert's constructionistic views; there were projects to complete instead of strict curriculum to follow; we would learn by doing, while

doing. We would be allowed time and space to experiment, explore, observe, fail, repeat, undo, reflect, start all over again, discuss, while “each success and failure provided new information” (Swanson, 2020, p. 104).

The other backbones of Central’s learning process were feedback and peer learning: students were encouraged to exchange feedback with their peers and educators, while working with peers and observing different approaches, offered enhanced learning opportunities. On an individual level, keeping production journals, documenting and reflecting upon your own process, helps “sharpen your [the students’] potential for action both in terms of your own practice and in the work, you will jointly create” (MATP, programme specification 2022/23, p. 3). Looking back into my journals from 23 years ago, I managed to trace learning curves, shifting attitudes, and goals set for personal development. I realized that we had been taught specific rules, procedures and methods but without them becoming inhibiting factors for the student body’s aesthetic polyphony. (Goebbels, 2015).

Central had incorporated the majority of adult learning techniques and constructionistic learning methods at the beginning of the 21st century; they would use discussion, dialogue, case studies, and working in groups on projects. It was more about the process and the attitude of lighting design, “trying and testing practice at an exploratory level” (MATP, programme specification 2022/23, p.4), rather than learning lighting standards and restrictive lighting formulae. I am not sure what lighting design education was at a bachelor’s level back then. However, on a master’s level, it felt like an open-ended source of inspiration, helping students ‘outgrow their current views’ of the theatre world and construct deeper understandings of themselves and their lighting craft (Ackermann, 2001).

National Theatre of Greece – School of Directing

5-day lighting design workshop: putting ideas into testing

In June 2023, while writing this article, I was invited by the National Theatre of Greece’s Directing School to deliver a 25-hour/five-day lighting workshop for their alums. The Director of Studies briefed me about the workshop: “The graduates have asked for a hands-on, practical workshop.” This workshop tested my hypotheses on using adult education techniques in lighting education. This group of five people was an excellent test group: having graduated from the Greek National Theatre’s Drama School (Directing Department), ensured they had all the theoretical knowledge and dramaturgical background needed so that we could immediately dive into lighting; they were familiar with the theatre process, possessing a set of theatre making skills and vocabulary. The main idea was to use a project-based approach to help them construct lighting design knowledge.

The first day I gave them a brief overview of the sessions to come. Brainstorming was used as a technique to be introduced to lighting and come up with words that describe light. Students were amazed by not being able to find more than 25 words: warm, cold, atmosphere, mystery, dark, and blinding, to name just a few. This made them observe that lighting is a) ambiguous to talk about and b) subjective. Students realized “the difficulties in putting into words our experience of light” (Palmer, 2018, p. 50), concluding that the richer our ‘common’ lighting vocabulary grows, the better we will be able to collaborate. Looking to build a common vocabulary, I shared a couple of visualizing ‘vocabulary builder’ tools with them (mood boards, storyboards) and initiated a group discussion. By the end of Day 1, they were assigned a project to light: a five-line poem about windows, light, and darkness. I asked them to divide it into lighting sections without giving them specific details. I insisted on leaving their imagination free without being obstructed by technical requirements. At the end of Day 1, using an empirical approach, I demonstrated to them the paints and brushes of lighting design and the available lighting equipment. Instead of showing slides or lecturing them about lighting attributes and fixtures, I encouraged them to discover different fixtures and attributes by themselves, exploring intensity, color, and direction hands-on. Students made some interesting technical observations regarding the tools of lighting: for example, they observed that the throwing distance affects the intensity of the light, a piece of knowledge that, in past seminars, I would have struggled for hours to explain in theory using physics slides and whiteboard drawings.

On Days 2 and 3, we entered a studio space fully equipped with lighting gear and a lighting programmer to sit throughout the 5-hour session. In the first hour we discussed lighting objectives and attributes, had a very short brainstorming session regarding what different colors mean to people, and then they set off to light their ‘play’: recreate on stage the lighting sequence of the poem. Before doing anything else, I asked them to get on stage and walk around the space for five minutes in silence. As one participant noted, “this is the first time I am asked to move around and get to know the space, look at it from different points of views in silence, it’s an eye-opening experience” (Athens, P1, June 2023). They were then encouraged to program their lighting cues in collaboration with the lighting programmer without being given any communication rules or techy vocabulary. I could not help observing that the more time they spent, the safer they started feeling about their work and the more elaborate their lighting looks started to be. They even started giving feedback from one to the other, genuinely collaborating and learning from their peers. I overheard them saying they never had the chance before to collaborate with them, as they are all directors: they collaborate with actors to build shows, but they rarely get the opportunity to talk to other directors about creative concerns or observe other directors’ work.

Days 4 and 5 were devoted to feedback, reflection, and experimentation. One of the students

requested to ‘relight’ her show. She explained that experiencing light and observing others work with it changed her mind about her approach, and she re-evaluated her priorities and her lighting narrative; she wished to reconsider and try out a different way. Her observations were elaborate, and she now sounded like she had a very clear idea of how she envisioned light on the dark stage canvas, talking about direction, intensity, color, rhythm and fade times, lighting attributes that she has extensively worked on and observed the previous day. By the end of day 5, each student had sufficiently experimented with light, and all together, collaboratively, they had constructed the lighting knowledge that was expected to be delivered as content to them, having reached all learning outcomes of an introductory session into lighting. I could not help but observe that this constructionistic approach provided fertile soil for different lighting aesthetics to surface while providing the opportunity for peer learning and boosting critical thinking. Working and experimenting with this group of people has been an inspiring process, verifying the hypothesis that constructing lighting knowledge on stage, applying adult learning techniques and Papert’s constructionism, is a legitimate way of learning that promotes “developing their [the students] own aesthetics” (Goebbels, 2015, p. 77) while building a sense of belonging and community.

Conclusion

The purpose of this article was to describe within a narrative framework the application and combination of *constructionism* and adult learning techniques within the lighting education field. 21st century lighting educators have already recognized “the fluid boundaries” (Bass, 2012, p. 27) of lighting and are already developing “post-course consciousness strategies” (Bass, 2012, p. 27) to work on creating more overlapping learning opportunities with other theatre expertise, just as it will happen in real theatre-life. Reconceptualizing lighting education through the lens of adult education and Papert’s *constructionism*, may boost educators’ creativity and offer tools for reformation. To use Goebbels’s (2015) paradigm, “You can’t invent a new car when working on the assembly line. That can only happen under the conditions of the laboratory” (p. 102). For sure, we need more lighting laboratories to invent and construct a new identity of future lighting design to be ready for what Robert Lepage (2012) sees for the future of theatre: “The 21st century will be the scene of some eighth form of art which will be a great meeting point of all disciplines.”

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