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Chapter

Developing Inclusive Games: Design Frameworks for Accessibility and Diversity

Matheus Cezarotto, Pamela Martinez and Barbara Chamberlin

Abstract

All players should have the opportunity to play, engage with and enjoy a game, especially games that are designed to educate or transform the player. In addition to the game interface, mechanics and artwork, high quality games must also ensure that all players can use the controls, understand the context, receive information from the game, and have a sense of belonging to the world of the game, or ability to identify with messages and in-game worlds. Design teams may well have the desire to create games that are both accessible and representative of all players, but find the process of doing so overwhelming. Based on evolving work in an educational media studio, this chapter presents two frameworks to guide teams in reviewing the issues involved in accessibility, equity, diversity, inclusion and representation, with recommendations on steps to take towards integrating these design approaches into consistent development processes.

Keywords: inclusion, learning, process, a11y, DEI, representation, needs

1. Introduction

The ultimate goal of a learning game is to provide an engaging and effective learning experience, fostering a change to the player's knowledge, skill, behavior, emotion or physiology [1]. Extensive publications have offered guidance on making quality games, highlighting key markers of quality, identifying affordances of games, and justifying the potential of games to transform. Yet, fewer publications emphasize the importance of extending this access to all players, or ensuring that all players can see their culture, identity, and representation in the games they play. Inclusion is a state of being included in a group or activity. In game design, inclusion is the state of giving all players a sense of belonging to the game, messages or gameplay, as well as giving all players access to play, navigate and enjoy the full experience of the game. "The people who design the touchpoints of our society determine who can participate and who is left out… Design shapes our ability to access, participate in, and shape our world" ([2], p. 6–7). Inclusive design is often considered a bridging terminology to enable multiple types of backgrounds and abilities: including age, culture, economics, education, race and accessibility. "The focus is on fulfilling as many user needs as possible, not just as many users as possible" [3]. Because designers hold the power in

making games inclusive, it may be helpful to view inclusivity in terms of two aspects: accessibility and diversity.

All players, regardless of their abilities, need a degree of accessibility to properly play and interact with a game [4]. Accessibility represents the features that developers design into the game to allow access and use of the game by players with a wide range of needs [4–7]. Accessibility is a large part of making games inclusive from a mechanical standpoint, in that accessibility usually gives a player access to ways of interacting with a game. Inclusivity also includes the way players see themselves in a game, identify with the content or intent of the game, and are given access to the game content in a meaningful way. This can include the presentation of characters, storylines and game environments that represent multiple worldviews, but issues of diversity, equity and inclusion also include fostering diverse teams, research, games, mechanics, and communities [8]. As more game developers prioritize accessibility, diversity, equity and inclusion in design, games will have wider appeal to more players, empowering and enriching players who are often underrepresented [9].

Researchers and developers have been making improvements in designing for accessibility, prompted in part by legislation such as, in the US, the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990 [10]. The publication of the Twenty-First Century Communications and Video Accessibility Act [11] guided web development, which in turn prompted calls for greater accessibility in web-based games. Designing for accessibility has included several different terms, such as "Design for All" [12], "Barrier-free Design" [10], "Inclusive Design" [13], and "Universal Design" [10, 12]. Accessible design emphasizes the creation of products, systems and interfaces which includes all users.

Many individuals still face barriers in their daily life because their needs are not considered when products or systems are designed—which includes games and digital media. Prejudice and disablism against those individuals are still present in our society, disabling them from having equal opportunities to engage and participate in society [13]. In light of the "emancipatory research paradigm" [14] the authors acknowledge that users with disability are the true knowers of their challenges, desires, and needs; disabilities should not be falsely simplified as a tragedy to be pitied; researchers and developers need to foster an environment where users with disability can benefit by empowering them through participation; the research role should be in identifying and striving towards removing disabling social and physical barriers.

Research and development recommendations specific to diversity and equity are somewhat newer in game design, yet other media offers an insight regarding the need for representation. In a review of more than 160 studies on representation in media, Armstrong [15] documents a significant lack of representation of people of color, emphasizing the predominance of White characters in software, books and learning tools. Where progress has been made among representation of different racial, ethnic, and gender groups, characters who represent marginalized groups are still underrepresented. "Even when characters of diverse racial, ethnic, and gender groups are represented, these may not be accurate depictions. Some cases may reinforce stereotypes, limit portrayals and roles, and present inaccuracies" ([15], p. 30). To improve the situation, she calls for an improved sense of belonging in media for all individuals, cultural authenticity by engaging diversity among content creators, and recognizing nuanced identity by providing details of characters which reflect complex stories, relationships and situations [15].

The International Game Developers Association provides an overview of designing and developing inclusive games, with great emphasis on diversity. The framework

in "Inclusive Game Design and Development" offers suggestions for strengthening overall development, starting with a diverse team, thorough research, world building, characters, design and mechanics, and even marketing [9].

2. Designing for inclusion: challenges and benefits

Facilitating dialog that leads to change can be challenging within design and development studios. Creating effective learning games is a complex task; incorporating inclusive design approaches can add extra challenges for design teams. An inclusive game design provides access to the game but also can foster acceptance and belonging among players [16, 17]. However, engaging in discussions about inclusion identifies gaps where others are still excluded. In a broad picture, both **accessibility** and **diversity** involve acknowledging the existence of people and/or groups who lack social power, prestige, or entrenched advantage, as well as establishing an awareness of their marginalization or exclusion based on social or physical barriers [16].

Developers of learning games experience additional challenges to making their games accessible. In addition to issues related to user interface and communication of game status to the player, games which seek to change the player in a meaningful way must also balance the learning goals and content-specific educational approaches with the needs of users. For example, mathematics is traditionally taught with visual guides such as maps and graphs: translating facility with these mechanics into gameplay can be challenging. Adding full accessibility to these games presents an additional level of design considerations.

By making games accessible and addressing diversity, equity and inclusion, development teams not only benefit players but also make their games better. Blackwell [18] coined the term "the Curb Cut Effect", to denote instances when accessibility changes benefited unintended audiences: curb cuts in sidewalks help people in wheelchairs move from the paved sidewalk to cross a street, as well as parents with strollers and delivery drivers with carts. A game that provides subtitles for the narrative offers benefits to users who are deaf as well as to those who are playing in a second language, those who cannot use sound at the moment, and those who need more time to cognitively process the information. Designing games towards accessibility also increases the game value as a meaningful experience for players and the community, fostering equality and a relevant social connection between players with and without disabilities [19].

Because curb cuts are now commonplace, their origins in accessibility are sometimes forgotten, without recognizing them as having been intentionally designed. Similarly, designing for diversity must also be intentional in providing access to multiple stories, identities and cultures. It gives learners—who may not traditionally have the opportunity to see themselves in materials—a mirror through which they see people like them, and gives all learners proficiency in a "broader range of expressive, analytic, and cognitive styles that are crucial to success in the twenty-first century" ([20], p. 17).

Progress is being made in both fields. One industry leader, Unity, offers an online free practical course [21] on game accessibility, supporting teams to design games for diverse audiences, with modules considering the design and development process. Microsoft has been very active in supporting the development of accessible media, with special attention to the gaming community. From their initiative it is worth highlighting the online course "Gaming accessibility fundamentals" [22] and the

inclusive design toolkit [23]. Schell games provides an online accessibility matrix [24] that allows developers to identify, discuss, prioritize and find solutions to accessibility needs. A group of studios, specialists, and academics organized and keep updating the "Game Accessibility Guidelines," [25] a reference list for designing inclusive games. Able Gamers Charity [26] has been active in making an impact in players with disabilities' lives by providing peer counseling, engineering research on assistive technology, community development, user research to find solutions to barriers, and professional development promoting inclusion.

In our evolving world of social justice, more developers, design teams, and educational institutions are acknowledging the importance of **diversity, equity and inclusion (DEI)**, a trending topic. There are many published works regarding the wider scope of the topic. Rittner [27] provides a critical review of systems such as the *institutional*, *economic*, *social*, *political* and *interpersonal* as a way to recognize the need for change and how designers can create impact through their work. Alozie et al. [16] provide an overview of the importance of designing for equity and inclusion and the impact on student outcomes when consideration for the diverse needs of diverse students is taken into account.

In dividing *inclusion* into two categories of *accessibility* and *diversity*, this chapter attempts to guide design teams by offering two simple frameworks for understanding key components, facilitate discussion among developers, and refine processes used in development to address each aspect in accessibility and representation. While each concept is complex, teams can begin by identifying the specific areas that must be addressed, then translating them into steps relevant to their own design processes.

3. Frameworks for inclusion: accessibility and diversity

Several barriers may keep teams from engaging in the design of inclusive games, which are consistent with fears articulated by Holmes about inclusion in general [2]. Individuals may be fearful about engaging in the discussion, out of fear of using the wrong vocabulary or unintentionally hurting others; designers may fear that they cannot solve the entire problems, so it is not worth trying; fear of scarcity means worrying there aren't enough resources, such as people, money and time.

Simplified frameworks can help teams familiarize themselves with the key issues, build their vocabulary around inclusion, and begin to identify reasonable steps they can take to address parts of each problem. Inclusion as a broad goal suggests games are available to all players, but design teams may find it easier to break inclusion into two types of actions: accessibility and diversity. Simply: frameworks are a gateway for each design team to establish best practices for inclusive design of the games they create.

3.1 Framework for designing games for accessibility

Accessibility in games represents a set of characteristics that developers design into a game to provide players access, considering players needs related to vision, hearing, motor skills and cognition [28]. By understanding game accessibility from the *social* model of disability, in contrast to the *medical* model, accessibility lives in the product and not in the user [29]. It means that the disability is a mismatch between the design and the person's needs, instead of a personal health condition. Thus, a good game design that matches users' needs enables players, and a bad game design that does not match users' needs disables players.
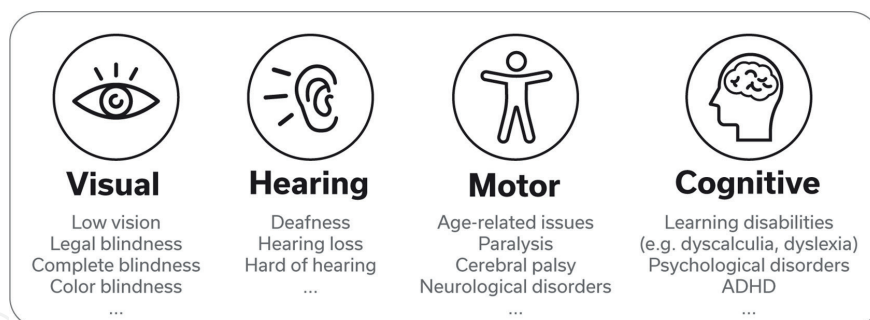
Figure 1.
Framework for designing games for accessibility.

All players fall somewhere on a spectrum of need in three possible scenarios: permanent need (e.g., a person with one hand), temporary need (e.g., person with a hand injury), and situational need (e.g., a new parent holding a baby) [23]. Identifying and addressing those needs can be a challenging task, since there is a wide range of needs. One approach to support this task is to discuss the needs in categories, being able to see an overview picture. In the literature four main categories of needs are used—**visual**, **hearing**, **motor**, and **cognitive** [30]. These categories allow the identification of possible barriers players may face in games (**Figure 1**).

- **Visual needs:** players with some degree of vision loss, such as low vision, legal blindness, complete blindness, color blindness.

- **Hearing:** players with some degree of loss in the ability to hear, either from one or both ears, such as hearing loss, hard hearing, deafness.

- **Motor:** players with some mobility limitation or muscle control, such as cerebral palsy, lack of steadiness, lack of mobility, age-related issues, neurological disorders, repetitive stress injury, paralysis, arthritis.

- **Cognitive:** players with mental or psychological disorders, which causes a deficit in the ability to learn, process or remember information, communicate, make social interaction, and make social decisions. Examples include neurodivergent learners, learning disabilities, or intellectual disability.

Each area of need exists within a spectrum, from low to high, and there are specific types and profiles within each category—for example, two players with ADHD (attention-deficit/hyperactivity disorder) can have different cognitive needs to support attention. Instead of having discrete boxes for needs and disabilities, they are frequently co-diagnosed, with any given user having needs across several different types of issues—for example, a deaf player will likely have needs associated with hearing, and may also have needs associated with some cognitive functions.

3.2 Framework for designing games for diversity

Diversity in games represents components of inclusion that developers incorporate into their teams and games for broader accessibility. Diversity, equity, inclusion (DEI), and accessibility have come to the forefront of education and societal issues, forcing developers to focus on addressing them in more meaningful ways to support

social imbalance. As specializing in DEI continues to evolve, so do references to it. Often seen as DEI in the past, it is evolving to represent the order of concentration, Equity, Inclusion, and Diversity (EID). Diversity in relation to games is observable in how diverse a development team is (who is part of the team, who is making decisions, who has the power) and transparency in knowledge and sentiment towards inclusion. Moreover, it includes how this design team portrays game worlds, environments, storylines, and characters in their games to promote identification, acceptance, and counteract stereotypes.

In creating a framework, the authors drew from the expertise of the International Game Developers Association Diversity white paper that provides a unique structure. This paper offers a more succinct framework for diversity with a more in-depth perspective on accessibility to strengthen inclusion practices in game development (**Figure 2**).

- **Team Building:** Design and development teams include professional instructional designers, educators, learning specialists, animators, web developers, programmers, and marketing and distribution experts with various educational backgrounds and expertise. In addition to the professional roles, each team likely includes individuals of different ethnicities, gender identities, varied backgrounds, and personal experiences. This richness contributes to the creativity needed to produce inclusive educational media, and should be encouraged in hiring practices: diverse teams are one of the easiest ways to make sure diverse voices are heard. Regardless of the makeup of any given team, professional development opportunities for diversity, equity, and inclusion coaching can increase the ability of a team to meet inclusion needs. Meet annually to discuss issues, engage in guided case study reviews, exchange ideas, and examine fresh viewpoints and perspectives. In addition, it takes intentional actions to curate a culture of inclusion where everyone has a voice, and to reflect on power dynamics. Even when it is assumed that all voices are welcomed, unseen power dynamics may make some individuals feel as though their voices are not encouraged. Ultimately the quality of the products represents the dedication of focus on accessibility and diversity for a broader range of inclusivity for players. This work should be ongoing, consistent, and reflective throughout the life of a studio.
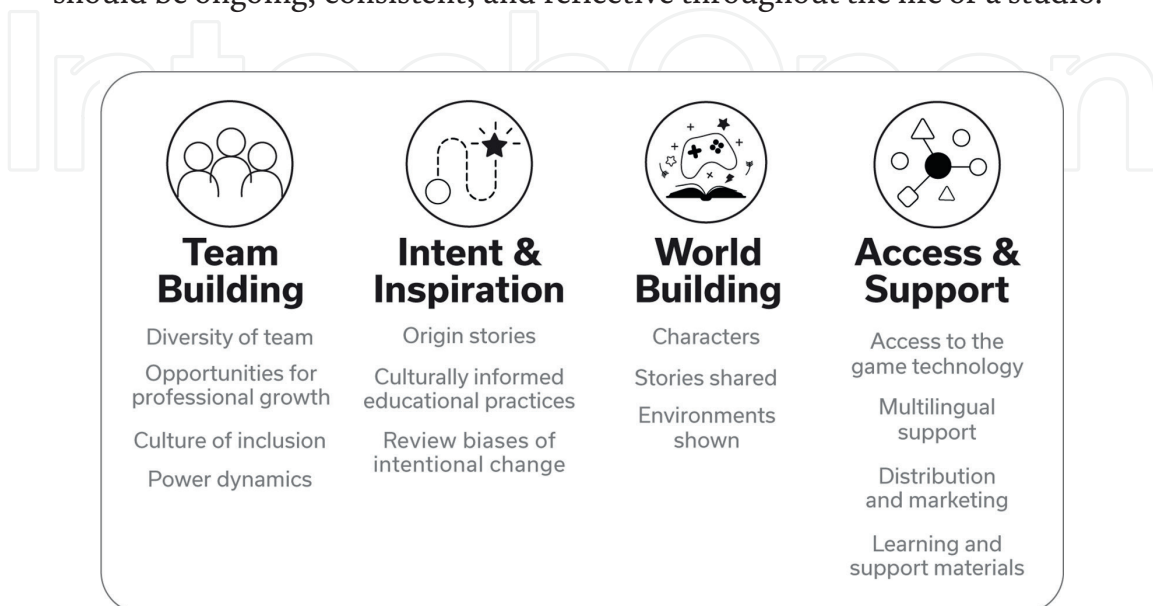

Figure 2.
Framework for designing games for diversity.

- **Intent, and Inspiration:** When the idea for a game first appears, it may be rooted in an educational goal, a specific audience to address, or simply a great idea. These origins are often rooted in a given perspective or experience of an individual or group of individuals. When a development team is culturally informed, they research the target audience's social, cultural, and ethnic dimensions; evaluate their own biases in making assumptions about needs; and reflect on the origin of stories, themes and visual presentation. Through these efforts, developers can design appropriate origin stories, themes, characters, and storylines inspired by situations around the topic and content. Continuous discussions help to address biases and support intentional change. Design and development teams should include content experts or advisors to align content and educational support to determine appropriate technologies for target audiences.

- **World Building:** In-game experiences are another way to support inclusion through diversity: what does a player see and hear while playing? How are the characters, locations and storylines presented? Discussion around the environment, geography, and characters happens early in the design of the game and should include discussions centered on diversity. Development teams can spend months planning and defining game worlds and esthetics. The mapping, environment designs, geography, and characters must support cohesive designs towards inclusivity to engage players fully. Consideration of themes, cultures, and people should happen during this development phase through extensive research; representation is at the forefront during this part of the process. A diverse team allows for exceptional discussion of shared experiences and stories that strengthen design decisions. Consult content experts, accessibility and diversity specialists. Not all games may follow realistic cultures and societies, and it is important to review similarities in fictional worlds to real worlds. Designers and developers want to be mindful of crossovers to avoid common tropes or harmful stereotypes. This awareness fosters acceptance and belonging, allowing for a broader range of inclusion.

- **Access and Support:** Games developed in educational development studios may be created to specifically address the needs of marginalized groups, but all games should be created in ways that support the use of all players. Who will access the game, and how does access to technology create barriers for some players? Research helps to determine the type of technology available and the medium to pursue distribution, such as on mobile, tablets, or web, as well as connectivity issues. Addressing technological and educational needs to address equity is a vital conversation to have before development begins, especially when working with marginalized communities. What role does language play in access? Research the target audiences' educational needs; investigate the possibility of multilingual adaptations and support materials. How do cost or subscription requirements limit some audiences? Distribution and marketing efforts should support the target audiences but may also require larger discussions about reaching wider audiences.

4. Process considerations

The Learning Games Lab is a university-based, non-profit development studio that develops educational games, virtual labs, videos, animations and other interactive tools to help learners of all ages learn from research-informed interventions. As part

of NMSU's Innovative Media Research and Extension department, the studio partners with research groups, faculty, and programs nationally and internationally to create educational media in various disciplines. Design-based research guides Learning Games Lab product development, informing the specific goals of each learning game, the audience, as well as the final product.

The Learning Games Lab has used both frameworks in developing their own processes regarding accessibility and representation. Their work occurs throughout the life of the studio, as well as at specific points in the development of a single game. All team members share responsibility in designing for inclusion, and their processes are evaluated continuously through their interactive design process. The team also discusses and integrates accessibility features into products beginning with early designs, so a wide range of users can use the products without interaction barriers.

Action research enables the teams to actively work to create change in their process to prioritize accessibility and diversity, following a continuous, ongoing, and iterative process, a self-reflective spiral cycle of *planning*, *acting*, *observing*, and *reflecting* [31, 32]. Additionally, the team investigates the work of other developers, community organizations, and experts to inform their own development practices, and revisits previously developed games to improve their accessibility and inclusion.

In using the frameworks to understand the key components of inclusion, the team works through specific steps to address the needs in every product created. This includes five specific processes (**Figure 3**).
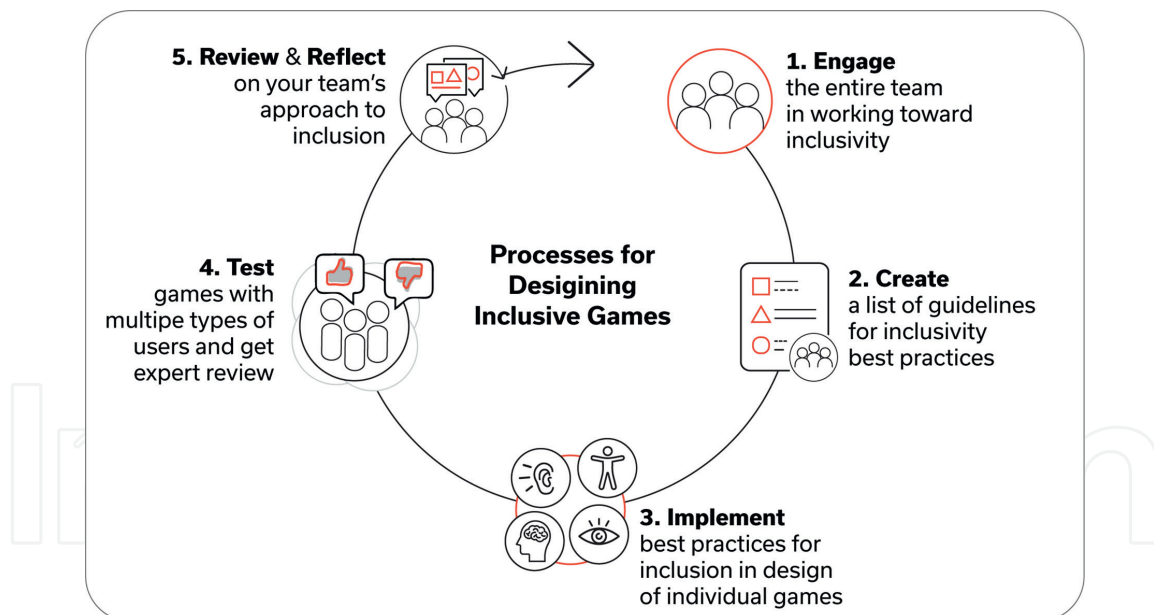

Figure 3.
Processes for designing inclusive games.

4.1 Recommendations for design teams

1. **Engage the entire team in working towards inclusivity:** Create and foster an accessibility and diversity, equity and inclusion mindset among your team. The entire team should understand the value of inclusive games, have vocabulary and be given opportunities to talk about it. Establishing the core principles for your studio can establish lists of what accessibility and inclusion mean, and may provide valuable examples for reference in development.

For example, the Learning Games Lab design team has defined their core principles to include [33]:

- **Representation**: to include a variety of positive visual, cultural and historical and economic presentations so that users can see themselves and others in the products they use. We have articulated our specific approach to equitable representation, and re-visit and edit this approach annually.

- **Accessibility**: enabling use and enjoyment of our products for individuals on a spectrum of physiological needs, such as vision, hearing, motor control and cognition. We also seek to provide diversity for various types of access based on economics, location, and technology. We *use a* specific framework and approach for thinking through accessibility needs, and update this approach annually.

In developing the core principles, it is helpful to engage in other opportunities.

- **Review old games:** Reviewing old projects is a good opportunity for the team to identify accessibility barriers, reflect about things learned and discuss ways to make the product more accessible. Assign at least two members of the team to make an inclusivity review on an old game. Ask reviewers to present the accessibility issues identified. As group, discuss, prioritize and find solutions to remove the accessibility barriers. Similarly, ask reviewers to challenge the assumptions held in the game about the intent and cultural biases of the game, and to identify any instances of cultural appropriation, tropes, or misrepresentation. Conduct a character or world review to track who is and is not represented, as well as the types of environments and stories told. Reviewing old projects gives the team a safe space to normalize and foster a vocabulary on inclusion; additionally, the team gets smarter for future projects.

- **Support professional development:** Encourage and support your team to find knowledge outside of the studio. Interaction with other studios is a good way to learn how other developers address similar issues. Participating in conferences and workshops also give team members an opportunity to learn and connect with other developers and researchers. Present or talk about your team experience with accessibility in conferences; this brings a chance for connection and also allows team members to reflect on the situation, considering different perspectives. Increase participation and expertise through professional learning networks (PLN) that support diversity, equity, inclusion and accessibility initiatives such as educational coaching, webinars and PLNs on social media.

- **Bring specialists to talk with your team:** Bring inclusion specialists to review your games and talk with your team. Your team will learn about possible interaction barriers in the game, and also will better understand the accessibility review process and its value. Invite diversity, equity and inclusion specialists into conversations early and ask them to review throughout the development process.

- **Work and revisit accessibility and representation statements:** As a team, develop core value statements regarding your approach to inclusion. Your team should review and evaluate the statement at least once a year. Give an opportunity to the whole team to participate in creating and refining the statement.

Create a living document that defines a set of guidelines or principles for diversity, equity, inclusion, and accessibility for the team to follow. Review and refine it yearly as the team becomes aware of new information and research that could benefit design and development teams.

- **Learn from accessible and diverse games:** Accessibility for game design and diversity is gaining attention; studios and researchers are increasingly sharing approaches and best practices for accessibility and representation in games. The release of games (from Indie to triple AAA) with accessibility features, and with a diverse cast of characters and stories, is escalating. Play those games and learn from their approaches. As developers we get better by playing and reviewing games. Give opportunities to your team to play inclusive games, and create a space where they can share what they learn with the team.

2. **Create a list of guidelines for inclusivity best practices:** Create a document with accessibility and representation guidelines for all game projects; arrange that the team can easily access and update this document. Every game project will use the guidelines differently. Thus, your guideline list should be seen as a guiding point, which the team will use to discuss, reflect and creatively make inclusive design decisions. Revise your team's guidelines based on technological advancements, learning from projects, and interaction with other studios or experts. Your team can create their own guiding principles for inclusion using different approaches and formats, including:

- **Select from existing guidelines:** There are several excellent and detailed guidelines available—some of them were mentioned earlier in this chapter. From those, select and create your team guideline document. This can help avoid the feeling of being overwhelmed with so much information that some things are not applicable to the game your team is working on, or to the scope and budget available for the project.

- **Use the frameworks:** The four main areas of need for accessibility—*Vision*, *Hearing*, *Motor* and *Cognitive*—is an effective way to organize guidelines and game accessibility features. The areas of need give the team an overview picture, support the identification of barriers or specific issues within the game and game team, and also give the team a vocabulary so they can talk about and articulate accessibility decisions. The four main areas of diversity in games—*Team building*, *Intent & Inspiration*, *World Building*, and *Access and Support*—help teams to discuss and design for diversity. Consider posting these frameworks for the team to access in generating discussion

- **Determine levels of priority for the project:** Inclusion is complex and can be overwhelming, and it can present contracting indications. For example, in designing one character to specifically include one group, it eliminates the possibility of another group being represented in that group. Similarly, creating a captioning process to meet audio needs may present visual challenges. By prioritizing the design and implementation of certain accessibility features based on the project scope, budget and intent, the team is better able to plan and make smart design decisions specific to the needs of a given project.

- **Foster inclusivity conversations among your team:** Allow time for teams to meet and have those difficult conversations that may come with diversity, equity, and inclusion. If necessary, bring in a specialist to guide the conversation; it could save time overall. Meet annually to discuss the guiding principles and approach to Diversity, Equity, Inclusion, and Accessibility. Make sure reviewers—in-house, invited, or hired—are composed of diverse team members. Remember, everyone brings different experiences and voices to the table.

In creating their list of guidelines, the Learning Games Lab defines representation and accessibility actions in the following ways [32]:

4.2 Representation: how the Learning Games Lab portrays individuals in the media it creates

In our products, we seek to produce media that offers diverse representation, promotes acceptance, includes all learners, and counteracts stereotypes. Individual differences and attributes may include:

- **gender** (acknowledging the spectrum);

- **sexual orientation**;

- **body shape** (weight, height, development, anthropometrics);

- **voice,** accent, dialect, way of speaking, vocabulary;

- **skin**, **eye color** and **hair color** and style;

- **clothing and vestments**, including culturally specific or faith-based;

- **age**;

- **social class**;

- national **origin**, **location** (city, suburban, rural);

- **social relationships** (such as living arrangements or family structure);

- **abilities** and **preferences** (such as physical, cognitive, motor or social); and

- **beliefs** (such as religious or atheist).

4.3 Accessibility: how the Learning Games Lab helps people use and enjoy its products

Making our products accessible is a **primary design consideration** for our studio. We strive to make our products as accessible as possible, knowing that we will have to make some compromises, and may fall short in some areas. Our efforts recognize that:

- Accessibility is not just for a set group of users: **all users fall somewhere on a continuum of need** (permanent, temporary, situational). Accessibility is about

user needs, and accessible features must be actively designed during the design process.

- **Disabilities do not exist in discrete boxes:** they are often co-diagnosed, with any given user having needs across several different types of issues. Each area of need exists within a spectrum, from low to high, or specific types within each category.

- **Accessibility lives in the product and not in the user:** a bad design that does not match users' needs disables people, and a good design that matches users' needs enables people.

- User **variability** may include:

  ○ **Visual needs**: the person has a certain degree of vision loss, such as low vision, legal blindness, complete blindness, color blindness. This means our products should be reviewed for contrast, color and on-screen text or visual cues — providing alternatives for users.

    ○ **Hearing needs**: the person has a certain degree of loss in the ability to hear, either from one or both ears, such as deafness, hearing loss, or hard hearing. This is met by offering captioning of both spoken text and other audible cues.

    ○ **Cognitive needs**: the person has a mental or psychological disorder, which causes a deficit in the ability to learn, process or remember information, communicate, make social interaction, and make decisions. This type of disability can be a learning disability, intellectual disability, or a specific cognitive ability (e.g., memory, language processing). Includes developmental disabilities (e.g., dyslexia, dyscalculia), attention deficit hyperactivity disorder (ADHD), Alzheimer or senility because of aging, people with autism, Down syndrome, and other mental retardation. Some people with cognitive issues need information in literal language comprehension. Their thinking is more concrete, rather than abstract. We address this in a wide variety of ways, including design which offers explicit cues and expectations to guide users with cognitive needs.

  ○ **Motor needs**: the person has a limitation or a loss in the mobility function and muscle control, such as arthritis, paralysis, repetitive stress injury, neurological disorders, age related issues, lack of mobility, lack of steadiness, or cerebral palsy. We address this by developing resources with interfaces which can easily be mapped to alternative controllers.

3. **Implement best practices for inclusion in design of individual games:** Design your game to be played by as many players as possible, considering accessibility needs (vision, hearing, motor and cognitive) and diversity of identities. Work with your team to anticipate possible gameplay and interaction barriers based on user needs, and use this information to guide design decisions.

- **Design for accessibility and diversity from the beginning:** Make accessibility and diversity discussions and decisions part of the entire design and development process. Instead of something extra, think with your team about ways to improve players' learning experience by improvising accessibility needs.

- **Follow best practices and your team's guidelines** to design inclusive experiences. Ideally, use extensive formative user testing during development to assess how the game supports user's needs.

4. **Test games with multiple types of users and get expert review:** User testing always yields the most direct feedback from players, particularly if you use multiple methods to get feedback, such as observational data, focus groups, play-aloud narration or individual interviews. However, one key aspect of inclusion is recognizing the specific and unique needs of any given player. This can create unintentional biases in user testing: for example, asking one Latina player her perspective on a main character cannot be interpreted as implying the same experience for all Latina players. Similarly, a player with a visual impairment may be able to successfully use one type of web browser to play, when another may not. Where possible, encourage a wide range of players to access your game, and encourage additional strategies to complement your testing.

- **Ask for gatekeeper and expert review:** What other experts could conduct a review of your game? If you have access to others who support a wide range of accessibility needs or educators who work across specific issues in representation, ask them to provide an analysis of your game. This second-level review may not be as personal as going to individual users, but it can provide considerations that warrant another review by others.

- **Consider paid quality assurance reviews**: Investigate organizations who may be able to provide and coordinate reviews for accessibility, testing across different devices or with different groups.

- **Encourage ongoing feedback:** In accepting that you cannot possibly get enough feedback from *all of your audiences*, enable feedback after the game is delivered or launched. Offer an email or other pathway for requests or suggestions for improvement. Consider a link that specifically mentions the game's commitment to inclusion, and invites users to respond with concerns or recommendations specific to your inclusion goals.

5. **Review and reflect on your team's approach to inclusion:** Give your team opportunities to reflect on your accessibility and representation initiatives, being critical about what is working and where some improvements are needed. There are several ways to approach inclusive design rather than a single solution that applies for all. With that in mind it is important that your team finds what works for you, considering your scope of work, budget, technical knowledge and so on. Your team can find the process that works for you in various ways, including:

- **Recognize that inclusive design is an ongoing process:** Keep in mind that inclusive design in learning games is complex, and it is an ongoing process. Work with your team to prioritize accessibility features that are feasible to be

implemented in your games, and plan strategies to allow your team to keep adding more and more features on projects.

• **Create an accessibility and representation plan:** Create a plan for your team in terms of accessibility and representation. Your team can start with small and basic features to make standard in your games, for example, the use of appropriate fonts, text size, checking color for contrast and color blindness, and subtitles. Once you have some standard, start planning ways to get more accessibility features into your games, in terms of what your team needs to learn or what technical support is needed for that.

• **Reflect:** The Learning Games Lab has used action research to enable this self-reflection and identify implications for the studio design process. This approach
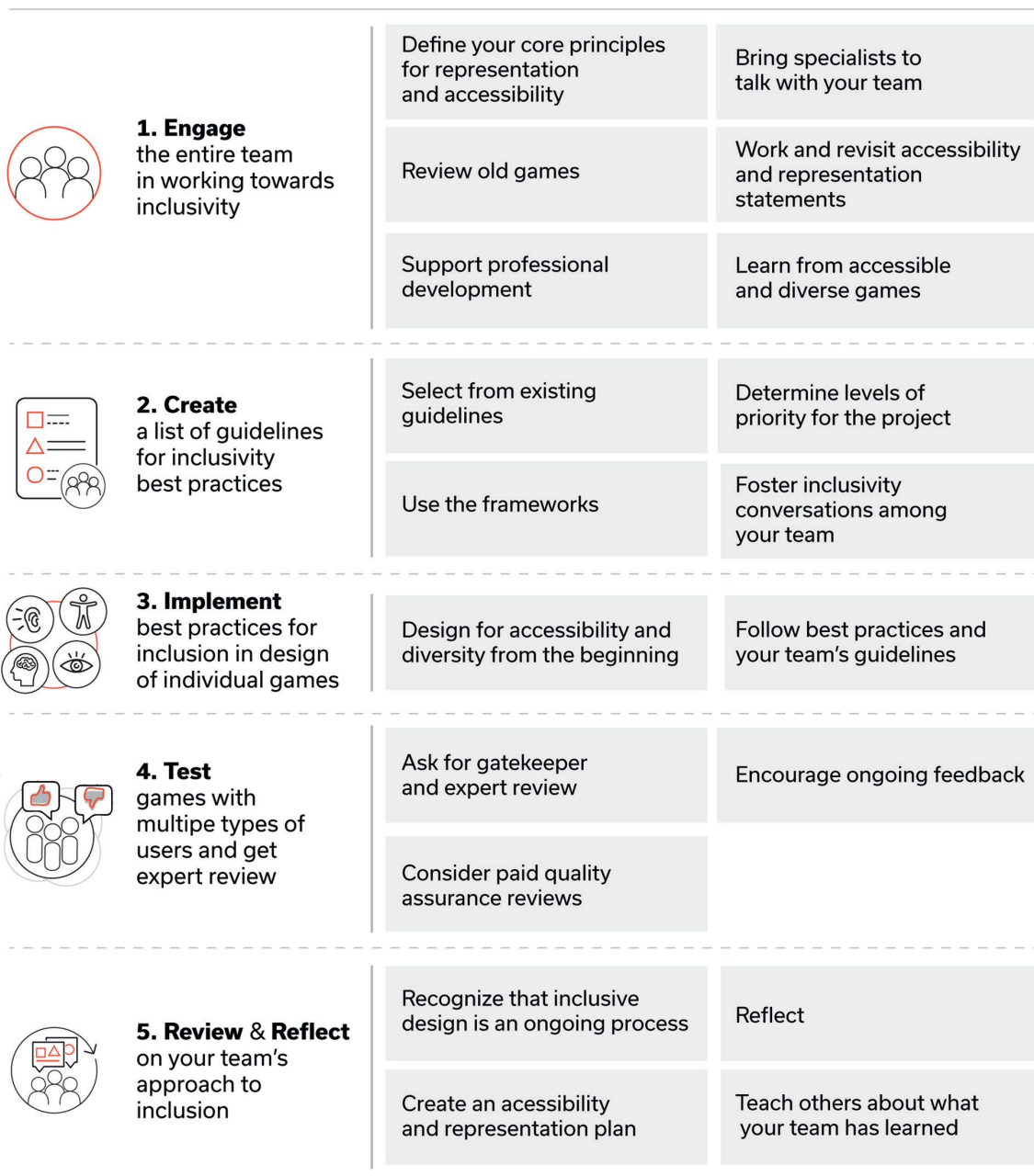
1. Engage the entire team in working towards inclusivity	Define your core principles for representation and accessibility	Bring specialists to talk with your team
	Review old games	Work and revisit accessibility and representation statements
	Support professional development	Learn from accessible and diverse games
2. Create a list of guidelines for inclusivity best practices	Select from existing guidelines	Determine levels of priority for the project
	Use the frameworks	Foster inclusivity conversations among your team
3. Implement best practices for inclusion in design of individual games	Design for accessibility and diversity from the beginning	Follow best practices and your team's guidelines
4. Test games with multipe types of users and get expert review	Ask for gatekeeper and expert review	Encourage ongoing feedback
	Consider paid quality assurance reviews	
5. Review & Reflect on your team's approach to inclusion	Recognize that inclusive design is an ongoing process	Reflect
	Create an acessibility and representation plan	Teach others about what your team has learned

Figure 4.
Recommendations for design teams - flowchart.

was effective to support an accessibility mindset among the team, creating a vocabulary that allows the teams to discuss and make accessibility decisions.

- **Teach others about what your team has learned:** An effective way to reflect and improve your game accessibility initiatives is to teach what you have learned so far to others. Conference workshops or other teaching opportunities allow your team to reflect about your process and also receive feedback on it. In **Figure 4** we provide a visual summary of the recommendations outlined in this study.

5. Conclusions

Inclusivity in games represents a design quality which allows users with a wide range of skills, needs, and backgrounds to resonate with a game and have a great experience. All players need a degree of accessibility to properly play any given game. Players need mirrors to see themselves and windows to see what they could be and how others live [15]. When players' needs are not taken into consideration, interaction barriers occur in the game, preventing players from using the system or delivering them a bad experience. Inclusive games support players' visual, hearing, motor, and cognitive needs. In addition to enabling access, the game should be easy to use, provide a good user experience, allowing players to thrive through game challenges, and allow players to identify themselves with the game. Inclusive games are developed by diverse teams which emphasize the growth of the entire team and review the intent and inspiration of the games in development. Inclusive games offer worlds rich in perspectives, visual and cultural presentation, which consider access and support in distributing the game. Grounded in development and research experience, processes for designing for inclusion should happen throughout the life of a studio by engaging the entire team, developing core values and specific guidelines, then implementing those in an interactive cycle of designing, testing and modifying games. The review of completed projects, as well as ongoing practices, keeps a design team up to date in their initiatives. Finally, teams with successful approaches and recommendations can share their progress with the industry, to ensure that games developed in the field continually improve.

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Conflict of interest

The authors declare no conflict of interest.

Author details

Matheus Cezarotto*, Pamela Martinez and Barbara Chamberlin
Learning Games Lab, New Mexico State University, Las Cruces, USA

*Address all correspondence to: matheus@nmsu.edu

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