Designing for Wonder and Curiosity in Higher Education: An Exercise in Perspective-Taking

Abstract

Curiosity and wonder are two distinct, yet related states, each of which has been considered essential to human life and development. While curiosity is fostered and praised in the education of younger children, this focus changes as students get older. However, in a society where workers are expected to be agile and versatile continued learners [8], fostering an innate sense of curiosity is arguably increasingly important. To accommodate this, curiosity should remain a core focus throughout a student's academic path.

In this article, I propose that curiosity may be designed for taking the intellectual perspective of students. This means to create a mental model of what a student currently knows, and making inferences about how this informs his or her understanding. Such a model needs to be continuously evaluated to ensure that it is not biased by what a student is expected to understand, rather than what is actually understood. Taking the emotional perspective means to expand the model towards how information is appraised [7].

On the basis of such a model, educators are able to determine how far to set the gap for new information [15]. Designing for curiosity requires educators to strategically point students towards the unknown. Without perspective taking, any such effort is likely to either introduce too much uncertainty or result in trivial reproduction of information. Wonder, on the other hand, can be invoked by presenting information or achievements that do not call for immediate action, but rather appreciation. Here, too, perspective taking is required to find a context that is likely to resonate with students.

Introduction

Children are frequently described as being naturally curious about the world and its inner workings [1, 3, 12]. Educators of young learners are encouraged to appeal to their students' curiosity and use it to guide them through predefined learning material [2]. As students reach higher education however, educators tend to shift their focus towards conveying information efficiently and in a manner that is readily testable. As a result, a student's motivation and tenacity to deeply immerse him or herself in a subject matter becomes an expected prerequisite to pursue higher education.

In this article I take the position that the role of curiosity and wonder is unduly neglected in higher education. While this neglect may stem from administrative necessities and practical challenges, it inevitably communicates that the application of knowledge is valued higher than the drive to pursue it. I argue that educators should take charge of actively invoking curiosity and inspiring a sense of wonder in their students. Implicit in this argument is the assertion that curiosity and wonder can be

designed for [13]. Doing so is as much an exercise in intellectual and emotional perspective taking as it is dependent on the domain knowledge that is being communicated.

This article focuses on the state of epistemic curiosity, characterized by a desire to seek out information in response to a knowledge gap that is perceived to be surmountable [9, 11]. Wonder is a closely related state that differs in how it arises, as well as lacking the need to satisfy a desire [14]. Although curiosity and wonder take on distinctive roles in the context of education, they both require perspective taking.

About Wonder and Curiosity

Before deliberating about how curiosity could be designed in an educational context, I will clarify my perspective on wonder and curiosity in regards to how they differ and how they are alike. My thoughts on these concepts are largely based on the work of Schmitt and Lahroodi [14] who note that *"Curiosity is often accompanied by wonder, and wonder is usually accompanied by curiosity. Nevertheless, the two states differ."* They go on to state five aspects that differentiate wonder from curiosity:

1. Wonder, unlike curiosity, is associated with a characteristic feeling of awe and always involves this feeling.
2. In wonder, attention is drawn to the object, while curiosity does not necessary entail this focus.
3. Wonder arises from a cognitive conflict and wanes when the object of wonder becomes better understood or familiar. Curiosity can occur without such a conflict and may continue even for something familiar.
4. Wonder does not involve the desire to know, and is usually not accompanied by the desire to terminate the state of wonder. Curiosity motivates actions to satisfy it and thus terminate it as a state.
5. Wonder decays more rapidly than curiosity. It requires exposition to the object or an active effort to remind ourselves of how striking it is. Curiosity persists until it is satisfied.

The authors continue to argue that curiosity is an epistemically more valuable state than wonder, as curiosity motivates the necessary persistence and tenacity to deeply engage with subject matter. This view is shared by Ilhan Inan [6] who critically notes that scholars throughout history have had more to say about the merits of wonder than about curiosity, adding that "Descartes should have at least acknowledged that it was only when wonder was coupled with curiosity that we started doing philosophy and developed the sciences."

Curiosity has a range of related, yet still varying definitions. As Guthrie [5] notes: "… the research literature on curiosity is a bit messy." This 'messyness' is an indicator that curiosity is a complex state that is difficult to pin down to a specific set of circumstances, behaviors or physiological responses. In broad strokes, curiosity can be described as an intrinsic motivation to pursue new knowledge and experiences that is accompanied by emotional excitement [4]. The valence of that excitement can be pleasurable, but can also be disconcerting depending on the individual person and situational circumstances [10]. What makes curiosity important for educational endeavors is the promise of effective learning and emotional satisfaction. Rather than gaining knowledge for an

external reward, curiosity drives us to learn for the mere sake of knowing. It ensures that our attention is captured for as long as the state persists.

Wonder focuses the attention less on the fact that there is something unknown that could be known and more on the object that causes a cognitive conflict. While it would seem that this state is less likely to motivate action, it does provide a sense of appreciation. Within an educational context, this can create a shared sense of appreciation that anchors us in a field. Over time, that which was once awe inspiring and incomprehensible might become understood, but the memory of what caused us to wonder persists. The emotional experience of wonder can be just as motivating as that of curiosity, as wonder is generally felt more positively. Here, we might be motivated to experience the feeling itself and thus find aspects in life that are able to invoke wonder.

Where wonder might have once received more attention than the state of curiosity, within education and by extension in the pursuit of science, curiosity seems to be held in higher regards than the state of wonder. As someone who experiences the impatient feeling of curiosity more frequently and more intently than wonder, it is enticing to see curiosity as a ‘more productive’ state; a state that motivates action and thus, presumably, progress. However, wonder gives room for reflection and grappling with the limits of what can currently be comprehended. Rather than position one of these two closely related states as superior to the other, I would argue that they both are valuable in their own right to support education.

The Role of Curiosity in Higher Education

Especially in the context of education, children are often portrayed as young discoverers. School forms such as the Montessori system emphasize that every child has the innate desire to learn and as such just needs to be supported in this process. This support is however not uniquely about answering questions that children might have, but rather to inspire an inquisitive mindset. As children grow to become students in higher education, the importance of fostering curiosity gradually becomes less important. Instead, the attention shifts towards ensuring that instructions are understood and can be reproduced. It is not so much that curiosity is no longer valued. Rather, it becomes an expected requirement to continue one’s education – especially if students continue on an academic path.

As mentioned before, I consider both wonder and curiosity valuable states to support education. Nevertheless, I will primarily talk about curiosity as it is more readily ‘applicable’ to the goals of the formal education system; that is, the acquisition of knowledge and the pursuit of progress. Much of the literature on curiosity is concerned with curiosity that is expressed by children. And so it is perhaps not surprising that both the state and trait of curiosity is primarily a concern for the education of children rather than that of (young) adults. Modern school curricula often involve moments of playful experimentation. No doubt, the communication of knowledge is important, but much care is taken in how that knowledge is presented. Even before school, efforts such as adventure playgrounds embrace a philosophy of facilitating exploration that is not always guaranteed to be safe. Here, being able to explore and follow one’s curiosity is valued higher than a childproofed playground that might provide fewer venues for exploration [16].

As children become older and move towards higher education, the active facilitation of curiosity gradually subsides. Whether or not this makes sense, depends largely on what one believes to be role of academic institutions. If the primary role of higher education is to verify that certain skills can be executed and that certain knowledge has been retained, then this shift seems appropriate. If, however, higher education seeks to motivate the development of new knowledge, it stands to reason that curiosity is just as valuable as validating existing knowledge, if not more so. Considering that knowledge if increasingly created in a digital form, access to it tends to get easier too. It is difficult to make the same point about curiosity; it is not clear if any recent efforts have made the development of curiosity any easier than in the past. Therefore, curiosity especially could benefit from becoming a more integral component of course design.

Turning the attention to fostering curiosity in higher education and beyond should not be construed as an attack on the value of applying skills and learning, but rather an effort of introducing balance in institutions that currently lack it. Here, the challenge is in finding ways in which this can be achieved.

Design Through Perspective Taking

Up to this point, I have written about why wonder and curiosity are valuable states in education and that their current roles take a backseat to the acquisition of measurable knowledge and practical skills. That still leaves a big topic unaddressed: how can wonder and curiosity take on a stronger role in formal education? It is good and well to argue for the importance of these states, but is it nothing more than an academic exercise in appreciating the disposition of some students to engage in a subject matter in a proactive way?

Ideally not. Just as we consider how knowledge can be communicated in an effective way, so too should we look upon fostering wonder and curiosity. This means to explore approaches to teaching that can create a stimulating atmosphere in which these states can occur. This, I argue, is largely a design problem, and thus benefits from domain knowledge coming from fields that involve design thinking. My thoughts on design are primarily inspired by my work as video game designer. In game design, much of the work lays in anticipating the thoughts and actions of players. Such an anticipation is necessarily only an approximation and requires frequent adjustments through iterative testing sessions. Nevertheless, a starting point must be made so that something can be tested in the first place. That starting point is a mental model of what a player might want to do at any given point in time within a designed game. And not just an individual player, but different kinds of players reacting to a wide variety of situations that a game can present. Constructing this mental model is, at its core, an exercise in perspective taking. By assuming the emotional state of a would-be player, the designer is more likely to make decisions that support the intended gameplay experience.

In many ways, best practices for teaching reflect what designers do when they create game experiences. Video games frequently introduce new game mechanics, which are actions that can be taken within the game under certain circumstances and to which the game system responds to. Such game mechanics need to be introduced to players in a way that does not overwhelm them. Players receive new information in a similar fashion as is done in education. Information is scaffolded, and is then tested in a variety of applicable, but not identical scenarios. At first, such a test might be constructed to be so obvious that its only function is to ensure that information was

conveyed successfully. A game might introduce the ability to jump through the press of a button, and then simply ask the player to jump, thus confirming that the player has understood the information. This is often followed by situations in which a player is not told outright what to do in order to progress. Jumping simply happens to be part of a the skillset that a player can use, and the current obstacle requires the player to do so. But it is up to the player to figure out what to do.

This example is of course rather simple, but it is a situation that requires designers to predict how a player will deal with uncertainty in a situation. Adding a visual prompt for when to jump removes all uncertainty, but also means that taking the action has less of a chance of invoking a feeling of accomplishment. The player was not able to apply learned knowledge. He or she was simply told what to do and was able to carry out an instruction correctly. On the other hand, too much uncertainty increases the chance that a lot of actions will be taken, with none of them leading to the desired outcome. In game terms, and in the case of this example, it means to visually emphasize what can be overcome by jumping. Obstacles that cannot be jumped over are thus made taller or otherwise indicate that jumping is likely not going to work.

Structuring lectures and education material could follow a similar pattern. Each lecture can be seen through the lens of creating an experience; a path to the content that we want to teach. Designing for such an experience starts with gaining an understanding of the possible motivations that exist for students to take a course. Some students might already be interested in the content that will be taught. They might come with preexisting knowledge and look for more in-depth content. Their motivations might be pragmatic in nature, opting to delve into a subject because of what it might enable them to do in their career. They might also simply have to follow a course as part of a larger study programme. Intuitively, we can presume that varying motivations have an impact on the curiosity that students feel for a course. Such variations need to be taken into consideration when designing the paths that students can take. Indeed this means that educators should not think in terms of creating a single, ideal path, but instead develop several likely paths that students can follow. This approach is, again, mirrored in design in general and video game design in particular. Design can be opinionated, but it has to account for different users and guide them appropriately.

Next to understanding the motivations for partaking in a course, educators need to take the level of familiarity and experience with a topic into account. Even the highest level of enthusiasm can be dulled by confronting students with seemingly insurmountably high obstacles. Likewise, presenting students with negligible challenges can also hamper curiosity, as students might find few opportunities for new information. Finding the right level of difficulty is already a common concern for educators, and is one that teaching methods such as scaffolding seek to address. However, it is important to frame this approach in regards to individual students, or at least the mental model that is formed about students. What information is a student with a certain background likely going to have? What preconceptions might such a student have that will need to be addressed? Such questions do not solely point to a single, increasingly more challenging path, but rather different paths that benefit from distinctive scaffolds.

Another aspect that needs to be taken into consideration is the likely state of mind of a student. This impacts both the *tone* of a designed learning path as well as the *amount of uncertainty* it presents at a given time. Just as video games are designed to alternate between moments of intensity and moments of calmness, a path for education purposes must be mindful of how much uncertainty a

student is able to deal with. Rather than striving for a constant, optimum level, lectures can be designed to feature more challenging moments that are followed by more light or playful times. Tone, on the other hand, should be more consistent, representing the framing of an educational path. This gives students a sense of stability that persists even when confronted with new topics and challenges. As an example, a course that asks students to independently create professional output might emphasize the need for rules and procedures that are found in the respective field. This might present students with a rather serious tone. Regardless of what tone is ultimately chosen, it is important that it remains consistent, as it allows students to know what kind of course they are following.

This ties into the next aspect: presenting students with a safe environment for potential failure. Curiosity and wonder are states that cannot arise in moments in which we feel unsafe. Even if curiosity involves uncertain elements, it ceases if uncertainty becomes overbearing. While it might not be impossible, it is a tall order to expect curious engagement from students when they are more concerned with how a potential lack of success might impact their future. That does not mean that a course designed for curiosity cannot challenge students, or indeed measure their performance. Rather, it means to provide sufficient space and time for experimentation in which failure is an option, or rather, an investment. A consistent tone is part of what creates a safe space, simply because it represents a point of stability. Other efforts include clarifications regarding expectations, availability of materials, and similar assurances. In doing so, students are more likely to gain the necessary 'space' for expressing curiosity, and ideally, take self-initiated epistemic excursions into a given subject matter.

All of what has been discussed so far focuses on understanding the individual, his or her needs, and on creating an environment that makes curiosity more likely. However, the presented content itself is certainly also of importance. As mentioned before, scaffolding is a useful education method that is also crucial for invoking curiosity. At the same time, there is benefit in taking the time to present 'out-of-reach' content. With this, I mean information that is either difficult to fully understand for students or even difficult to comprehend by scholars in a given field. The goal here is not to present such content as something that must be mastered, but rather to hint at tall peaks along a student's academic path. Especially for information that will eventually be understood, this allows students to first experience a sense of wonder for how something could possibly be known or achieved, only to go on and transform wonder into accomplishment.

In summary, invoking curiosity in students benefits from taking on the mindset of a designer and requires perspective taking to create an effective experience. The creation of a curiosity-promoting experience requires:

1. Gaining an understanding for what motivates students to partake in a course.
2. Gaining an understanding of what knowledge students have already.
3. Taking a student's state of mind into account.
4. Providing an environment that allows for safe failure.
5. Presenting out-of-reach information to inspire a sense of wonder.

Neither this summary, nor the article that it is part of, should be understood as a comprehensive analysis of what invokes curiosity in education. Rather, I present these points as important

ingredients. Perspective taking requires educators to be curious in the situation and mindset of their students. Articles such as this one can only provide support in thinking of effective teaching approaches. They cannot act as reliable guidelines that will yield a predefined outcome. Gaining an understanding of students requires frequent interaction and observation.

In the realm of video game design this is most comparable to testing game players. In any area of design, however, there comes a moment in which the intention of the designer is tested by the reality of how their intentions are received by their users. Ideally, this creates a feedback loop in which designers take the response of users into account for further development. Educators should operate in a similar fashion. Taking the perspective of students into account is not an action that can be done once and then provides the results to develop a course. Rather, it is an iterative process that starts anew again and again. This is a necessary process, as neither curiosity nor wonder is a permanent state. Especially if we want to create the circumstances that make their occurrence more likely, we need to accept that these circumstances change.

Evaluation and Challenges

Before I conclude this article, I want to talk about the need for validation and evaluation. What has been presented so far is best understood as an aspirational position on how curiosity and wonder could and should be made part of higher education. Ultimately, however, the merit of this position will need to be evaluated by other researchers and educators. Arguing for perspective taking is certainly easier than outlining extensive guidelines that ensure the effective design of an educational path.

While the creation of such guidelines is arguably difficult, it is necessary to reflect on the impact that designing for curiosity has on students. Such guidelines will also need to take other factors into consideration, such as the amount of time and effort it requires from educators. What works in a class of 30 students will need considerable modification to work in a class of 130 students.

The central argument remains that perspective taking is a required skill to design for curiosity and wonder. That does not mean that the situation of each and every individual student must be considered, but rather that educators should at least attempt to consider the perspective of some. In this case, the challenge of scale becomes less about having to understand each and every student, but instead take into account how a large student body might change the experience for any (rather than a particular) individual student.

Final Words

Curiosity is an essential factor of human life, as it drives us to ever pursue new accomplishments and achievements. However, as students grow older less room is being made for the curious mind, Instead, education focuses on distilling set knowledge into students' minds that should be reproduced accurately on tests. For various reasons, e.g. the changing requirements of workers with technological developments, it is essential that curiosity does not reduce with age, and is instead interwoven within the fabric of higher education.

In this article, I outlined a possible way of integrating curiosity in the higher education classroom. By iterating and evaluating course material based on the ever evolving mental model of students, we can design opportunity for wonder and curiosity. In this sense, the goal for students is not limited to accurately reproducing or applying existing knowledge, but to achieve an inquisitive mind that is intrinsically motivated to pursue new knowledge. Doing so requires to take into consideration the different backgrounds and motivations of students, provide a safe space for failure, and presenting out of reach information.

It stands to reason that the points outlined in this article require implementation and validation to assess their worth to students. Similarly, one challenge to implementing them is increased effort on behalf of educators. However, I argue that while neither curiosity nor wonder can ever be guaranteed reactions, educators should stay committed to actively invoking them. In doing so, they will give their students the necessary tools to seek out learning material well beyond the classroom.

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