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"Nothing Is Set in Stone": Incorporating Futurology into College Courses

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Abstract. "Futurology" is the process of forecasting or designing the future, whether that be the near future or far future. College courses rarely explicitly include futurology, even though the content of many courses has implications for the future. To build knowledge on how future-oriented content can be incorporated into educational curriculum, I studied a college course in which students used futurology activities as part of an active learning setup. My study suggests that future-oriented content is appealing to students and helps students develop a sense of control over the future. In order to better introduce students to futurology, instructors must attend carefully to students' unfamiliarity with structured future-oriented thinking, as well as to fatalistic attitudes about the future.

Keywords: futurology, active learning, pedagogy

Despite the fact that all academic disciplines have a stake in the future, college teaching rarely explicitly incorporates future-oriented content. This is surprising given that future-oriented content can help students develop constructive hope about modern social and technological problems (e.g., climate change) rather than denying that such problems exist (Ojala, 2015). Education about the future is rare despite its importance and despite many attempts to make it more mainstream (Slaughter, 2008). Since education about the future is unfamiliar to many students, this study seeks to provide some general guidance to instructors who incorporate future-oriented content into their courses. This study evaluates the benefits and challenges college students experience when they engage in future-oriented activities and discusses how an instructor can effectively respond to students' experiences with future-oriented content.

Literature Review and Hypotheses

This study bridges two literatures: the literature on active learning and the literature on teaching futurology. Futurology is the process of forecasting or designing the future (Serra Del Pino, 1998), and futurology encompasses the short-range, mid-range, and long-range future. A future-oriented focus is essential for life in the modern world of rapid social and technological change (Inayatullah, 2008; Masini, 2011). Future-oriented education is based on students using creative thinking to manipulate uncertain situations to people's benefit rather than on students simply absorbing and reciting existing knowledge (Bishop and Strong, 2010). Futures education is an aspect of active learning, which is an educational technique based on multidimensional flows of information rather than a transfer of information from teacher to student (Huggins & Stamatel, 2015). Active learning approaches encourage students to develop a sense of responsibility for their learning and allow students to not only practice technical skills but also practice

communication and decision-making skills (Huggins & Stamatel, 2015). Future-oriented learning is thus inherently active learning, since it requires students to be participants in using evidence to construct the future.

Creative thinking and problem solving are essential parts of our modern world, which is experiencing exponential social and technological change (Bishop & Strong, 2010). Active-learning educational methods fulfill this need because they utilize class time for concept engagement rather than content delivery (Huggins & Stamatel, 2015). Active learning techniques increase students' creative and critical thinking by allowing them to practice problem-solving (Huggins & Stamatel, 2015; McCarthy, 2016). In courses based on active learning, there is still a transfer of core content; however, this transfer is accomplished not through lecture but instead either through delivery outside the classroom or through activities. This way, class sessions can be devoted to actively engaging with material instead of passively absorbing it. The literature on active learning points to improvements in student outcomes compared to lecture (e.g., Eglitis, Buntman, & Alexander, 2016; Huggins & Stamatel, 2015; Luna & Winters, 2017). Historically, education has been based on transmission of information, with instructors expecting students to be able to regurgitate existing knowledge rather than to develop new answers (Bishop and Strong, 2010). However, the solutions to modern social problems such as pollution and terrorism must be created rather than found among existing knowledge (Bishop & Strong, 2010; Inayatullah, 2008); thus, instructors must provide more opportunities for students to build upon existing knowledge and use their creativity. Futurology can help people build preferred futures despite the weight of the industrial era on society (Inayatullah, 2008).

Education generally does not explicitly incorporate future-oriented content (Slaughter, 2008). When future-oriented content is incorporated into education, it is frequently unspecific or hasty, or it ignores diverse possibilities in favor of attempting to predict only one potential outcome (Hicks, 2004). It is important that educators incorporate more comprehensive and structured futures content into courses because future-oriented education helps students think logically about social problems so that they can develop plans of action for themselves or society instead of feeling fearful and overwhelmed (Masini, 2011; Slaughter, 2008). In addition, future-oriented active learning can help students understand the concerns and experiences of people from diverse backgrounds (Masini, 2011). Future-oriented education is thus a method for achieving critical thinking outcomes in students. "Critical thinking" refers to skills that enable students to be informed consumers and users of information; both within and outside the student's field of study (Huber & Kuncel, 2015). Students grow their critical thinking skills during their college careers; however, careful attention must be paid to ensuring that students have the opportunity to grow these skills throughout college, rather than emphasizing their development just at the beginning of students' college experience or toward the end of their degree (Huber & Kuncel, 2015; Hall 2017). Because future-oriented education emphasizes creative and original thought, it not only helps students grow as professionals in their own disciplines but also helps them grow their critical thinking skills in general (Masini, 2011). As a result, future-oriented education can be implemented across fields and in both lower-division and upper-division courses.

Many techniques for future-oriented analysis have been developed (e.g., Inayatullah, 2008; Saleh et al., 2008). For reader convenience, a description of some of these techniques as they can be adapted for classroom activities is available in the appendix. All of these futurology activities, like many other types of active learning techniques, can be adapted to fit instructors' unique needs and learning goals. For example, an instructor can modify the scope of an activity to fit into a particular time limit; can decide whether students should practice an activity alone or in groups; can decide whether an activity will be completed in class or out of class; or other factors. Due to the diversity of ways in which instructors can use futurology activities, as well as the fact that the activities are suitable for use in diverse fields of study, the purpose of this study is not to suggest specific ways of using these activities. Instead, this study identifies some general benefits and challenges students experience upon encountering future-oriented content for the first time, so as to inform emerging future-oriented pedagogy across fields.

Based on the literature, I hypothesize the following:

(1) Futurology will give students a sense of control over the future.
(2) Students will need structure and repetition in order to feel comfortable with futurology due to their unfamiliarity with it.

Research Method

This study was conducted at a large, rural, public university in the United States with approximately 23,000 undergraduates. In compliance with the university's guidelines regarding classroom research, all the study procedures were reviewed and approved by the Institutional Review Board (IRB) prior to the implementation of the study. Data were collected in a sociology class, Age and Society, which had 21 enrolled students. The students ranged from first years to seniors, and there was a mixture of majors, though most students were either sociology or psychology majors. This class met for 50 minutes per session, three days a week, for 13 weeks.

Two types of data were collected for this study: class session notes and self-report survey data from students. This survey data is qualitative, from open-ended questions. Following each class session, I wrote detailed notes about what occurred in class that day. These notes incorporated a description of the discussion, activity, lecture, or other content for the day and also an account of students' reactions to the content. The other source of data used for this study comes from a survey; 14 of the 21 enrolled students were present in class the day the survey was administered, and all gave consent for me to use their responses. The surveys were completely anonymous (no names or other identifying information were collected on the forms). The IRB required that I leave the room while the surveys were administered to ensure the anonymity of the data collection process. This data collection strategy allowed me to not only test my hypotheses, but also identify and explain themes as they emerged organically in the course.

The survey questions follow:

(1) What have been the most useful aspects of learning and practicing futurology so far this semester?
(2) What challenges have you experienced while learning or practicing futurology in this course?
(3) One of the goals of this course is for you to practice thinking about the future in a structured way. Do you think this way of thinking will benefit you, either in your other courses or in your non-academic life? (This question was followed by three options a student could circle, "yes," "no," and "maybe/unsure," as well as space to elaborate on one's opinion.)
(4) Is there anything else you would like to share about your experience with futurology, or with this course (Age and Society) in general?
(5) Instead of a consent form, there was a question at the end of the survey that allowed students to mark yes or no to the question of whether I could use their anonymous responses in a published paper or presentation.

Results and Discussion

Various themes emerged from this study, both from the notes and from the survey. The results section begins by focusing on the survey. The three tables provide tallies of the number of students who made a specific type of response to a certain survey question. In these tables, the "Comment" heading shows themes that emerged from the qualitative comments, and the "Frequency" heading shows the number of students who made a response fitting into that theme. The interpretation of the tables incorporates some specific direct quotes from students and observations from my notes. Following the interpretation of the survey responses is an interpretation of other key themes that emerged from the notes.

The Benefits of Learning and Practicing Futurology

Table 1

Responses to Survey Question About Benefits of Using Futurology

Comment	Frequency
Thinking of the future in tangible ways	4
Understanding the steps needed to achieve a desired outcome	4
Reference to the usefulness of specific futurology activities	4
Acknowledging that there are multiple potential future outcomes	3
Organizational skills	2
Thinking about the future more often	2

According to the first question, students had diverse viewpoints on the benefits of learning and practicing futurology. As shown in Table 1, the greatest number of students identified how the future-oriented content changed their worldview, such

as allowing them to think of the future in more tangible ways and understanding the steps needed to achieve a desired outcome. One representative comment is thus: "Thinking about the steps needed to be taken in order to achieve whatever goal (future outcome) we expect to happen [has] been a useful tool for myself in organizing my thoughts and taking into consideration what steps I need to take in order to achieve my desired outcome for myself when I graduate college." In addition, many students also made references to specific futurology activities. Students have often made the link between specific futurology activities and a concern for the future of society more broadly, which is what Serra Del Pino (1998) advocated for; as one student commented, "Studying futurology has allowed me to develop a more complete understanding of what the future may have in store for us. By learning new techniques of futurology I have been able to think of the future in more tangible and concrete ways." In addition to the major themes outlined in Table 1, some responses were idiosyncratic to only one student, such as finding videos from the course useful; finding visual depictions of futures useful; and practicing futurology both during class sessions and in out-of-class written work.

The Benefits of Learning and Practicing Futurology

Table 2

Responses to Survey Question About Challenges of Using Futurology

Comment	Frequency
Discomfort with the inability to predict or plan for the future perfectly	6
Student indicated no significant challenges	3
Irrelevant comment (explanation of idiosyncratic academic challenge unrelated to futurology)	3
Difficulty with abstractness	2

There was more homogeneity of viewpoints with regard to the challenges of learning and practicing futurology. As shown in Table 2, the main source of concern for students was difficulty in making precise predictions. As one representative comment stated: "One of the challenges about learning futurology is that our thoughts are just thoughts. What I mean by this is that we can only predict or anticipate what will happen in the future. This makes futurology so difficult to analyze and to brainstorm because there are so many possible outcomes and we don't know for sure what is the outcome that will happen." My own notes corroborated this fact: students expressed discomfort with uncertainty and ambiguity. Students commented positively on more concrete activities that leave students with a tangible product in place when the class period is over, such as a futures wheel (a visual depiction of the direct and indirect consequences of a proposed action). Students more often verbally critiqued more open-ended activities such as scenario planning (visioning different potential future outcomes) because of their lack of immediate impact.

Two students indicated difficulty with abstract content. For example, one student wrote: "After we analyze where do we go from there? Not dealing with concretes is a challenge. If all this is hypothetical with no true equation or applied methods how

is this helpful?" Since nothing of substantive social importance can be predicted with exact precision, futurology instead focuses itself on helping people identify diverse potential futures and identify how to reach preferred futures out of these (Dator, 1995). Educators covering futurology are faced with combating stereotypical ideas about the future as something that can be predicted with precise accuracy.

Transparency can help instructors encourage engagement and comfort with new instructional techniques. Instructors using active learning methods in class often fear student resistance to novel educational content (Seidel and Tanner, 2013). In order to help students see the value in new teaching methods, it can be useful for instructors to explicitly share the reasoning for the pedagogical tools they use (Seidel & Tanner, 2013). This transparency not only helps students understand how the instructor is working to maximize their learning but also improves instructor rapport with students through treating students more like colleagues than underlings—the transparency respects students' intelligence and right to know why their participation is requested (Seidel & Tanner, 2013). Furthermore, active learning allows students to understand and practice the process of becoming an expert in one's field (Wallace et al., 2014). Instructors thus may give students opportunities to critique and improve upon future-oriented analysis, with the goal of not only helping students feel more comfortable with it but also encouraging students to take an active role in constructing knowledge.

Among students who indicated no significant challenges in the survey question, the responses suggested that students had interpreted the question as if it were asking whether the course expectations were difficult to follow; for example: "[No challenges.] I have learned a lot in this class and I enjoy the material and setup." This is likely a function of the fact that the setup of this survey was very similar to an ordinary midsemester evaluation in which students comment on the instructor's clarity and the course expectations more generally. It is also possible that these comments reflect the fact that some students are more comfortable with uncertainty and ambiguity than others.

The Benefits of Learning Futurology in Other Courses or in Personal Life

Table 3

Responses to Survey Question About Benefits of Learning Futurology in Other Courses or Personal Life

Comment	Frequency
Better able to prepare for the future	6
Organizational and critical thinking skills	5
Acknowledging diverse possibilities for the future	5
Comment as to the usefulness of a particular futurology activity	3
More able to take on a long-term perspective	2

When asked whether they believe future-oriented thinking will benefit them in other courses or in their personal life, 11 responded yes and 3 responded maybe/unsure.

None responded no. This result shows that students overwhelmingly believe that future-oriented education is useful. The lack of "no" responses also suggests that instructors who choose to take on a future-oriented perspective are unlikely to receive resistance from students with regard to that ideological perspective. In this survey question, five students mentioned academic benefits in the comments section, 4 mentioned personal benefits, and 6 mentioned benefits without specifying the context. Only one student did not elaborate in the comments section.

As shown in Table 3, there were diverse reasons students thought future-oriented thinking is or may be useful. Futures thinking allows some students to feel more optimistic due to a greater sense of control over the future. As one student wrote: "This class is extremely important in and out of the university setting. It helps people our age realize that there still can be a happy, successful life waiting for them when they are over 65. Looking to the future in a more positive, less stereotyped way, makes it more exciting." Some students feel as if futurology helps them understand the many options available to them; as one student wrote: "I can see [this course] benefiting me in life. It reminds me that nothing is set in stone. There are millions of possible futures."

Among students who commented as to the usefulness of particular futurology activities, two referenced the futures wheel specifically, and both commented on its ability to help them organize and brainstorm ideas for other situations. The third focused on visual representations of futures more generally: "The importance of visual representations is often understated. Futurology uses them heavily." Similarly, five students commented on how futures content helps them develop organizational and critical thinking skills, indicating the value of futures content in contributing to academic and personal development more generally. Visual depictions and organizational skills can reinforce each other. My notes indicate that visual depictions of futures such as the futures wheel on the boards allowed for better comparison of differing opinions compared to presentations of work that did not have a substantial visual element. This is because it was easier to refer to points made earlier in the period when those points were visible for the whole period, as opposed to when multiple groups expressed points solely in the more fleeting verbal format.

Attending to Unfamiliarity with Futurology

Various themes emerged from the class session notes as well. One major theme was that futures thinking is new to students. This observation comes primarily from the observations of class sessions and is corroborated by comments in surveys. As one student wrote, "[This class] has been an experience unlike any class I have taken. Before this, I would never have thought to take a futurology approach to anything." My notes indicate that I have frequently needed to repeat directions and provide suggestions to students who are using futurology activities during in-class work, especially the first time an activity is introduced. Students had the most difficulty getting started at the beginning of a class period with new activities, though most students displayed more confidence by the end of the class period.

Classroom dynamics more generally are relevant. Many students feel intimidated about publicly admitting a lack of knowledge or understanding in class (Roehling et

al., 2011). When describing a new futurology activity, I always asked whether students had questions before allowing them to start working, but usually no one spoke up. Once they got to work and I began circulating around the room, there were questions, indicating that either students did not realize difficulties until actually practicing the activity or that many students did not want to ask questions in front of the whole class. When students did ask questions in front of the class, it was the same few people who felt comfortable speaking up publicly. Since futurology activities are new to many students, instructors who use them should anticipate difficulty and provide opportunities for students to get help in a nonthreatening way.

Combatting Fatalism

It was apparent early on in this course that many students easily fell into a fatalistic attitude, in which they perceived the future as something that "happens to people" but failed to address how people shape technological and social development. For example, in a discussion from the first month of class about age and technology, students spontaneously brought up issues such as "the effects of Internet on teenagers" or "the effects of robots on elder care," but rarely did students spontaneously address how people or organizations influence technology. To address this fatalistic attitude, I provided activities that required students to identify their preferred futures and brainstorm ways of achieving them. These activities encouraged students to start thinking of the future as something that can be constructed. Students latched on to the concept of alternative futures (Inayatullah, 2008) as a way of addressing fatalism. "Alternative futures" refers to the fact that there are diverse plausible possibilities for the future instead of a single trajectory. For example, during an activity about the future of retirement, students visioned some alternatives to the economic status quo, such as a 20-hour work week instead of a 40-hour work week or telecommuting being available to a substantial portion of the workforce. During the discussion this day, students acknowledged that such alternatives are plausible, though their implementation would be dependent on many social and technological factors. Serra Del Pino (1998, p. 492) wrote that he tells students that "futurology involves a lot of common sense, plus some techniques and rules, with indispensable megadoses of creativity, imagination, novelty, and, why not admit it, some drops of absurdity." Though students are sometimes uncomfortable with the "hypothetical" nature of alternative futures, as explained earlier in this paper, instructors should help students use the concept of alternative futures so that students can better evaluate their preferred futures.

The students dealt with alternative futures more easily as the semester went on. The primary way I noticed this shift is the fact that during class discussions that occurred toward the end of the semester, students more frequently offered potential solutions to problems spontaneously. In other words, they initiated solution-oriented discussion without my prompting, whereas earlier in the semester, I more frequently needed to prompt them to do so. For example, during the next-to-last week of the semester, the class discussed Sudbury schools, which are schools with no standard curriculum. Most of the students who spoke during this discussion were critical of this model, preferring a school setting that had at least some standard curriculum in addition to unstructured time. When speaking up

to critique the Sudbury model, most students added to their critique a potential way to modify the school setting so that it had both structure and autonomy, such as having a half day of structured coursework and a half day of unstructured time, or incorporating arts education into a standard curriculum. This solution-oriented style was in sharp contrast to some earlier class discussions, such as the above-mentioned discussion on age and technology from the first month.

Conclusion, Implications, and Recommendations

This study has shown support for both of my hypotheses. Futurology is appealing to students and helps students feel a sense of control over the future through encouraging them to identify preferred futures and ways to achieve them. Because most students are unfamiliar with futurology, instructors must closely guide them through futurology activities in order to achieve this outcome. In particular, instructors should combat stereotypical and fatalistic visions of the future and provide an environment in which students feel comfortable trying new activities. As with any active learning setup, instructors who incorporate futurology into a course should monitor students' reaction to new teaching techniques and be able to articulate why the active learning methods are being used (Cavanagh et al., 2016; Seidel & Tanner, 2013).

Finally, the results of this exploratory study should be extended to other academic fields. The President's Council of Advisors on Science and Technology (PCAST) in the United States indicates that a major problem discouraging students from becoming science, technology, engineering, or math (STEM) majors is uninspiring introductory courses (PCAST, 2012). Including more active learning and discovery-based research courses into STEM education may help inspire more students to become STEM majors (PCAST, 2012). Since active learning methods in STEM classes improve student grades and reduce the risk of student failure (Armbruster et al., 2009; Freeman et al., 2014), future-oriented education would further this progress. Further research on futurology can build upon this study to evaluate how particular futurology activities can be used effectively in different settings, such as different academic fields, different class sizes, and different levels of education (introductory versus advanced classes).

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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Appendix

Futurology Techniques Adapted for Class Activities

Technique	Description	Benefits	Cautions & Limitations
Future-oriented discussion	Future-oriented discussion regarding an issue or topic that is not immediately implicated in building solutions or taking action.	Covers general information about a topic. Helps students clarify their own perspective on a topic.	Subject to groupthink. Less effective than more structured methods, such as backcasting, at helping students feel a sense of ownership over the future.
Future-oriented roleplay	Students act out the roles of people or organizations in the future and engage in debate or problem-solving.	The duration is up to the instructor—anything from part of one class session to an entire semester. Permits debate. Builds public speaking skills.	Instructor must help students manage emotions constructively, to prevent students from bringing roleplay conflicts into real-life interactions with classmates. Students may not have an opportunity to express their own viewpoints if roles are assigned.
Backcasting	Determine a desired occurrence at a particular point in the future. Then work backward to determine what would need to happen between now and then in order for the desired occurrence to come about. Follow by providing recommendations for action in the near future that	The scope is up to the instructor—this could be a short exercise lasting less than one class session, intended to get across basic information, or an opportunity for long-term planning and potentially actual action. Helps people feel a sense of ownership over the future.	May not provide opportunities to evaluate radical social or technological change.

Technique	Description	Benefits	Cautions & Limitations
	can help lead up to the desired future occurrence.		
Trend analysis	Look at information from the past and present to forecast expectations for the future.	Helps people familiarize themselves with historical and current events and see underlying patterns.	If using statistical techniques, instructors must ensure availability of computers and software. May not take into account wildcards (low-probability events that would cause substantial effects if they did occur).
Delphi method	Conventionally, questionnaires would be distributed to a set of experts. Then, anonymous responses would be compiled and sent to the same experts, who would have the opportunity to change their initial responses in response to the information in the compilation. This general format could be adapted to allow all students in one class to participate once they are familiar enough with the topic in question.	Anonymity permits quiet or shy people to have their point of view heard. Giving all responses equal weight prevents loud people or people with strong personalities from dominating. Allowing people to express their own thoughts before hearing others' thoughts prevents groupthink.	Since all anonymous responses are treated equally, poorly prepared students can take up time with irrelevant or illogical content. This technique would thus be more suitable for a class in which the instructor knows most students are well prepared. When doing this in person in larger classes, it may require more than one class session or portion thereof to allow time to compile responses.
Scenario planning	Construct several potential future possibilities regarding a specific topic.	Helps people recognize multiple potential futures, thus mitigating narrow-	To avoid idealistic wishful thinking in favor of plausible futures, instructors must create a

Technique	Description	Benefits	Cautions & Limitations
		mindedness.	structure for students' responses (e.g., requiring them to relate their ideas to past successes or failures and requiring them to evaluate necessary steps to completion and a timeline to completion).
Futures wheel (see Figure 1)	Visual depiction of potential futures. Begin with an event or issue in the center, construct branches around it with direct potential consequences, and then construct branches around the direct consequences with consequences of those (that is, indirect consequences of the original event or issue).	Suitable for initial brainstorming about an issue. Permits people to see multiple pros and cons.	Visual depiction is unsuitable for substantial detail. This method does not provide strategies for action.
Stakeholder analysis (see Figure 2)	Identify people or organizations involved in an issue, then evaluate their characteristics and interests in a chart or graph. For example, construct a two-axis grid with one axis for level of power and one axis for level of interest and determine the appropriate place	Helps people understand different roles people and entities play in an issue. Helps people realize where to direct attention or action.	May need to be repeated in order to evaluate change over time.

Technique	Description	Benefits	Cautions & Limitations
	for each stakeholder.		
Futurewatching	Choose a topic and skim a variety of resources (peer-reviewed journals, news, blogs, businesses' websites, etc.) to gain some general information on trends, viewpoints, concerns, and hopes.	Can help students explore a topic they are less familiar with. Provides an opportunity for instructors to teach students how to evaluate the quality of different sources of information.	This technique can incorporate an expansive quantity of information. Instructors must provide guidelines and limits to keep students on track.
Causal Layered Analysis	In four layers (described in detail by Inayatullah [2008]), move beyond the talking points on an issue to explore deeper beliefs and motives.	Encourages students to understand why opposing groups think and behave as they do. This method frequently incorporates an artistic or poetic element, allowing students to practice diverse communication skills.	This method requires students to identify and critique deeply held assumptions about how the world works. Instructors must push students to not only acknowledge their biases but also manage the emotions that come along with them.

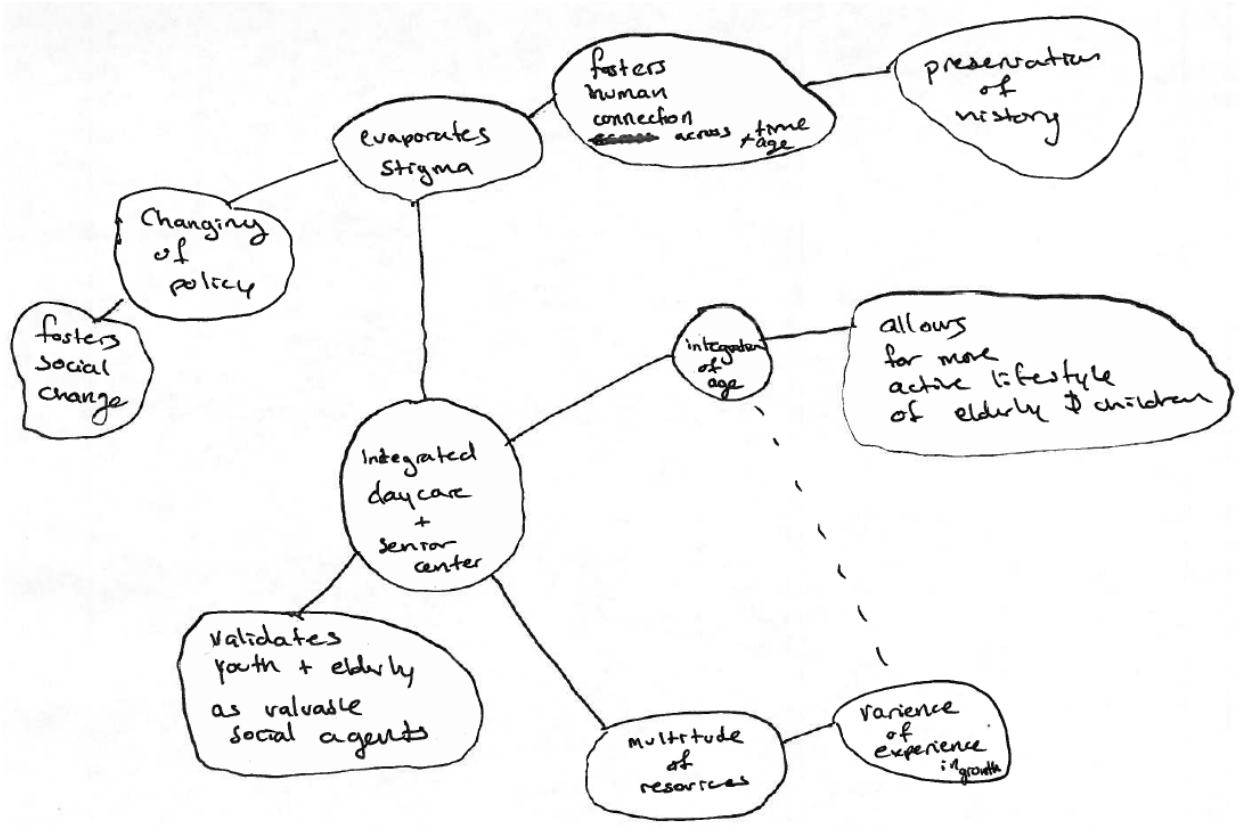

Figure 1. A futures wheel constructed by a group of students that shows potential consequences arising from the construction of an integrated daycare and senior center.

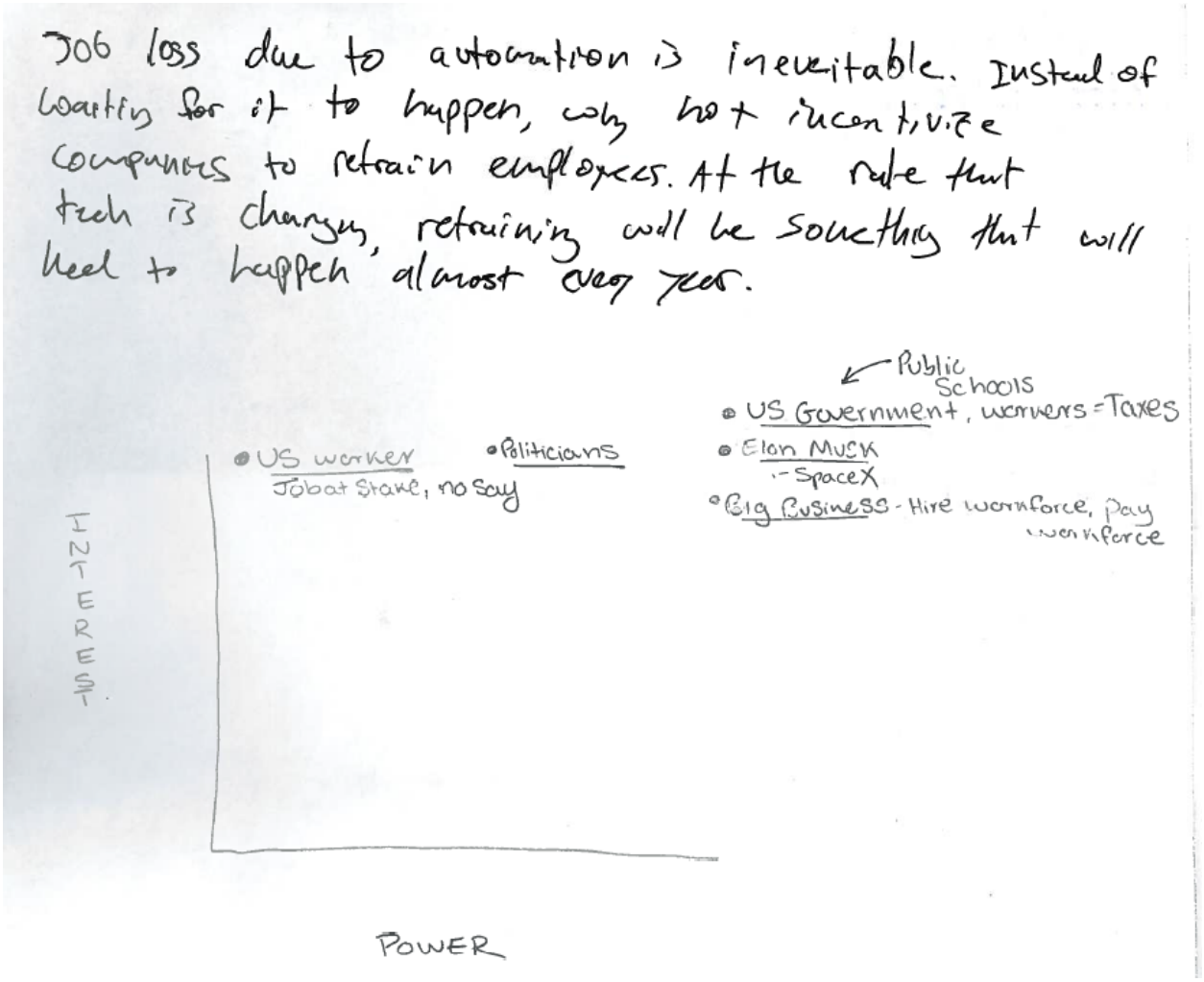

Figure 2. A stakeholder analysis constructed by a group of students that shows the power and interest various people and groups have over guiding automation use in the workplace.