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Teaching decision-making with social networks

Real people, real data and an acquired life skill.

By Ali E. Abbas

Decision analysis is an essential life skill that is seldom taught before college and is rarely used in our daily decisions. Many people do not even recognize that decision skills can be taught and used. In a 2012 *New York Times* article [1], Larry Summers noted: "In an earlier era where many people were involved in surveying land, it made sense to require that almost every student entering a top college know something of trigonometry. Today, a basic grounding in probability, statistics and decision analysis makes far more sense."

It is useful to think of decision-making as a calculator. The inputs to the calculator are the elements of decision quality: the alternatives, preferences, uncertainties, information, pros/cons and the bigger picture from the perspective of the decision-maker. The calculator itself is the logic that determines the best decision given the inputs you provide.

Decision education has traditionally focused on the logic – the computational aspects of making the decision –using tools

such as decision trees and weight and rate analysis. Coursework is often augmented with case studies and spreadsheets projects. Most students of decision-making, however, do not think of their decision education as an essential life skill.

As we navigate this era of social networks and the widespread availability of the Internet, we have an opportunity to make decision education an essential life skill and to spread decision education to the masses. This article describes our recent efforts enhancing decision education, making it more relevant to our daily lives and spreading decision skills to the population at large by leveraging peoples' affinity for social networks. The focus is on the inputs to the calculator (the elements of decision quality) using real world decisions posted on a free online decision-making social network.

The decision-making social network, Ahoona, originated from a National Science Foundation (NSF) project and has been used successfully in the classrooms at the University of Illinois and Virginia Tech. It has also been featured on CBS [2] and the National Science Foundation Discoveries section [3]. Several university campuses will be using Ahoona in decision education in the upcoming semesters.

Using this social network, students learn decision skills by helping others with their decisions through categorized inputs representing the elements of decision quality. When the inputs to the decision have been provided, students are presented with an array of decision tools to help users make the best decision. The approach teaches decision skills in a way that is simple and fun. It can be used in parallel with existing decision analysis courses to augment lectures by providing hands-on training on the inputs to the decision analysis for a variety of real world decisions. It is also scalable so it can be used with online MOOCs on decision education.

Sharpening the Elements of Decision Quality

An important aspect of teaching decision skills is the observation that we are dealing with a decision-maker, a person. People, not data, make decisions. Internet search engines, such as Google, Yahoo and Bing, provide significant amounts of data that help with the informational aspect of decision quality, but information alone is not sufficient to make a good decision. When dealing with people, there are other aspects of a decision that need to be considered such as the preferences, the uncertainties, the frame (or bigger picture), the alternatives, and the pros and cons of each alternative (see Figure 1). These aspects comprise the elements of decision quality. Since the best decision alternative that results from an analysis is usually one of the alternatives that is already being considered, it is important to think clearly about all elements of decision quality before making a decision.

Figure 1: Elements of decision quality represented on a hexagon.

It is also important to provide training on these elements of decision quality in the classroom. The shaded area in the hexagon of Figure 1 represents how much each aspect of decision quality has been thought of for a given decision. Each element of decision quality represents a vertex of the hexagon. The more inputs received for a given element of decision quality, the closer is the shaded region to the vertex of that element. When more aspects of decision quality have been considered, the shaded area gets larger.

To encourage students to think about the elements of decision quality in a classroom setting, we use an assignment called the *decision journal*. The decision journal is an eight-week group assignment in which students divide into groups and consider decisions in their daily lives (past, present and future). To provide some guidance, we define several categories for them to consider: automobiles, dating/relationships, education, fitness, purchases, travel/vacation, housing, jobs/work/business, investments and lifestyle. Each week every student in the group is asked to:

1. Record one decision they are currently facing or will face in the near future. The decision needs to be a meaningful decision that is worthy of analysis and is nontrivial. A good test of whether a decision is meaningful is whether or not they will still care about the decision in a month when they will be asked to analyze their decisions.
2. Reflect on a decision they have made in the past and post a story about it.
3. Post a question in the form of a poll. Students are also asked to turn in their predictions of the poll results before the survey time expires.

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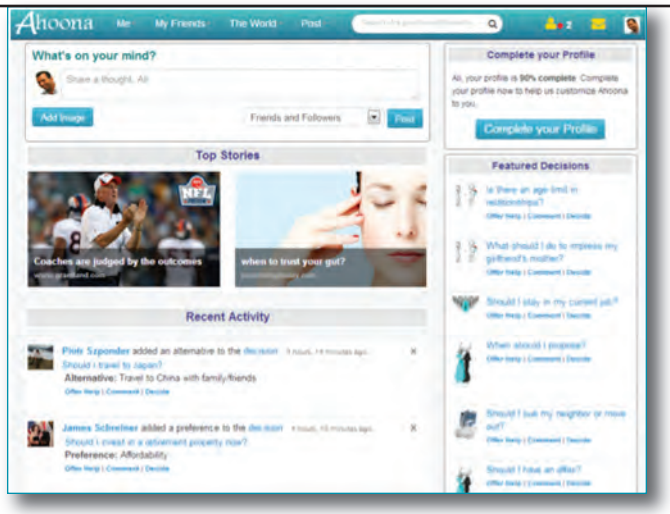

Figure 2: Examples of decisions posted on Ahoona.

Each possible answer in the poll must be clear. This requirement trains students on clearly defining the terms they use in directed inquiry.

Students then post their decisions, polls and stories on Ahoona. Students can post anonymously if they wish, but most of them use their real names and post publicly to the world. Figures 2 shows examples of decisions that were posted and some of the inputs received including: "Should I switch majors?" "Should I get a tattoo?" "Which school should I go to?" "How should I approach my teammates if they are not pulling their weight?" "What should I do to impress my girlfriend's mother?" "What type of housing should I get next year?"

Students are then asked to help their group members with their posted decisions, stories and polls by providing categorized inputs to these decisions. In response to a decision post, the group members provide elements of decision quality for that decision. The feedback is given online as is the case with many social networks, and the learning is achieved through a learning-while-doing approach. The longer students spend on the social network, the more decisions they get exposed to and the more training they get. In response to a story, students are asked to comment on the quality of the decision that was made and ask probing questions to the poster. In response to a poll, students are asked to vote on the poll, and the person who posted the poll is asked to predict the results of the histogram to get training on calibrating their forecasts.

At the end of the journal assignment, students are asked to analyze their decisions using the tools on the site (pros/cons analysis, weight and rate analysis and decision trees) that are by that time covered in class lectures. They also have to choose the appropriate tools for the decision (e.g., decision trees when there is uncertainty and value functions when there is no uncertainty).

It was real **people,** with real **decisions,** and clearly **relevant** to peoples' **daily lives.**

Learning from the Decision Journal Assignment

Decision analysis has been taught in various settings (executives, graduate students, at-risk teens, high school students, high school math teachers). Each setting brings its own learning experiences about the educational process. Teaching decision-making with social networks brings a different flavor.

Using social networks for teaching decision-making is definitely a mechanism for keeping students engaged and talking about class concepts within their daily lives. It was delightful to see students online even during weekends or when no assignments were due. They were out there helping people around the world with the inputs to their decisions. Students invited their parents to join the social network to get help on their decisions. Decision education was no longer a classroom setting. It was real people, with real decisions, and clearly relevant to peoples' daily lives. Students were also carrying out the decision analysis using the tools on the site, and they were sharing the results of the analysis online with other users. They were also receiving inputs from all over the world in response to their own queries.

Students also quickly realized the difference between a decision and a mere thought. At the start of the course, a student posted a decision, "Should I pay for my kids' education when they go to college?" His teammates reminded him that this is a mere thought since he does not have kids yet. A decision requires alternatives that you own and an irrevocable allocation of resources.

Students also realized that not all decisions need to be analyzed. Sometimes thinking about the elements of decision quality – and receiving pros/cons, preferences, uncertainties or a different perspective about the decision they had not thought of – was sufficient to achieve clarity. Students also understood that they need not rush into the analysis and click the "decide button" without spending more time on refining the inputs. Students wondered why they were not taught about the elements of decision quality earlier in their lives.

As with any users in a social network, there is a natural relationship that develops among users of the site. Students could see the comments that other students (and the instructor) had provided in response to the posts. It was a mutual relationship; they were getting help on their decisions and providing help to others. By the midterm, it was clear that the class dynamics and interactions were significantly higher than previous years. The learning they acquired was an essential life skill that would remain following the

classroom discussion. It was also interesting to see how students who are less vocal in a classroom setting were much more active in the social network setting.

People Helping People

Wikipedia has shown us that people love to help others with their expertise. The result was the finest encyclopedia that exists today. Facebook has shown us that people love to connect with friends in a social network. The result was one of the largest companies that exist today. We now have an opportunity to make decision education highly relevant to peoples' daily lives and to create a resource that can be used to help the masses. For example, people with knowledge and expertise about any area can now offer help to the population at large by posting stories about the decisions they have made in the past and the thought process they had when they made these decisions. They can also use their expertise to help other people with their current decisions.

The site can help people of all ages and disciplines, and the hope is to create a large database of decisions and elements of decision quality to create awareness about decision skills worldwide. The hope is also to enhance decision education within the classroom. Anyone interested in teaching decision-making with social networks or in offering expertise to the population at large, please visit www.ahoona.com. For access to any of the teaching modules developed, contact Ali Abbas, aliabbas@illinois.edu. ORMS

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REFERENCES & CITATIONS

1. Lawrence Summers, 2012, "What you (really) need to know," *New York Times*, Jan. 20, 2012.
2. CBS Channel 3 recognizes Ahoona: "Using Ahoona is easy decision," www.illinoishomepage.net/story/using-ahoona-is-easy-decision/d/story/as6F0v8oYUW08Fw8sInaqw
3. The National Science Foundation Recognizes Ahoona: "Helping people through the decision-making process using a Web-based application, www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=127901&WT.mc_id=USNSF_51&WT.mc_ev=click