Title:

Q110 – an exceptionally unfair game: Promoting teacher ability to identify & address inequality of opportunity through playing a serious game

Abstract

Promoting inclusive school cultures and, more specifically, addressing inequality of opportunity is high on the European education agenda. This is reflected in the policies and ambitions of many teacher training institutes. As inequality is part of a 'wicked problem', simply adding the theme to the curriculum is hardly a solution. Equipping teachers to be able to identify and address inequality of opportunity requires them to develop sensitivity, multi-perspectivity and agency, for instance, and these are complex attributes that require personal experiences and deep reflection.

Recognizing this complexity, five master's students chose this challenge for their collective graduate research project. Following the principles of design research, they developed a game that helps both beginning and experienced teachers reflect on the hidden mechanisms of inequality, particularly on the effects of socio-economic status (SES), and it stimulates them to address these mechanisms. In the card game, that is played by 3-5 teachers, each teacher first draws a persona card: each player 'becomes' a pupil with a given SES-background, and then gathers positive and negative experiences.

This paper reports on the impact of the game – both in terms of outcomes and in its driving mechanisms. To this end, the canvasses on which the individual participants recorded their learning outcomes were analyzed, as well as a retrospective questionnaire that was administered. The respondents (n=90) were students in either initial teacher training programmes or post initial (master's) programmes.

The results are promising: especially identifying with low SES pupils and feeling the accumulation of negative experiences raises teachers' awareness. The participants report that through the individual and collective reflections afterwards they are better equipped to understand and address the issue.

Keywords: inclusive school cultures; inequality of opportunity; design research; gamification

Introduction: inequality of opportunity is back from never really gone

Inequality of opportunity is a growing problem in the Netherlands (OECD, 2022; Dutch Inspectorate, 2021; Onderwijsraad, 2021), and schools struggle to address the issue. For decades, Michael Young's (1958) ideas on a merit driven society have indeed been a driving force towards a society in which not one's background determined one's destination, but rather IQ and effort. It led to an education system that was long seen as 'the great equalizer' (e.g. Downey, von Hippel & Broh, 2004). It meant a great increase in the number of people that pursued higher education and as a result in the Netherlands more people than ever before have school certificates, diplomas and degrees.

Paradoxically, this situation has now led to new forms of inequality. Jansen, Elffers and Jak (2021) argue that in a market driven world where *everybody* gets an education – the strive for equality has generated new forms of competition. Parents with high socio-economic status have the means to support their children to be a little more equal than others (Elffers, 2019). Because of this, education is no longer necessarily the place where differences are eliminated. Moreover, the diversity in (and outside) today's classrooms has increased (Eurostat, 2021), and consequently, so have reported differences in opportunity. The SER (2021) - the Dutch Socio-Economic Council - reports that the

COVID crisis has magnified these differences, and as a result inequality is back from never really gone and it poses great challenges for schools.

Can schools compensate for society?

A much quoted (and often misrepresented – see e.g. Pavet, 2014) article on the role of education with regard to inequality of opportunity is Bernstein's (1970) *Schools cannot compensate for society*. Bernstein explains that the notion of compensation is problematic if it "serves to direct attention away from the internal organization and the educational context of the school, and focus on the families and the children" (p. 344). If pupils are seen as deprived, he argues "teachers will have lower expectations of the children, which the children will undoubtedly fulfil." The paradox here is that if teachers do not take their pupils' backgrounds into consideration, that too can lead to inequality of opportunity (Cobb, 2017).

Bernstein's ideas are often compared to Bourdieu's concept of habitus (e.g. Harker & May, 1993). Bourdieu (1986; 1990) explains differences in opportunity in terms of how economic, social, and cultural capitals are allocated as different types of resources. If little of these capitals are accumulated in the home situation, not only is a child's starting position in school compromised, but the child also misses the very instruments with which to accumulate such capitals (Reay, 2011). It would mean the inequality of opportunity increases, not just over the course of a child's school career, but also after that.

A similar outcome is explained through the accumulation model (e.g. Benzeval et al., 2014): the accumulation of adverse childhood experiences – sometimes referred to as ACEs – can negatively affect opportunity and even health (Edwards, Gillies, & White, 2019). Whereas schools may not be able to change or fully compensate for ACEs that children accumulate outside of school, they should at least make sure school itself is a safe environment where differences are not magnified; where the accumulation of ACEs stalls. Or in the words of Raey (2011, p.1): we "need to create educational systems that reduce the social distance between people rather than, as the current systems do, exacerbate them."

Promoting such inclusive school cultures is high on the European education agenda (e.g. European Commission, 2020). This is reflected in the policies and ambitions of many teacher training institutes. As inequality is part of a 'wicked problem' (see e.g. Keep & Mayhew, 2014), simply adding the theme to the curriculum is hardly a solution. Equipping teachers to be able to identify and address inequality of opportunity requires them to develop sensitivity, multi-perspectivity and agency, for instance, and these are complex attributes that require personal experiences and deep reflection (VELON/ VELOV, 2021).

IQ110 – an exceptionally unfair game

Recognizing this complexity, five Master's students chose this challenge for their collective graduate project. These students were all experienced teachers in either primary, secondary, vocational or higher education. Part of their challenge was to find a way to engage their beginning and experienced colleague teachers to become more sensitive to their pupils' backgrounds. Oplatka and Gamerman (2021), who conducted research on the element of compassion in urban education, argue that to this end, a teacher ideally "takes into account the student's personal and social position, respects his or her personality and identity, empowers the student, and increases the

student's self-esteem and encourages constructive behaviors in the class" (p. 324). The first step to such compassion is identification, they claim.

In educational settings, a promising way to facilitate the process of identification is through the concept of gamification (Faiella & Ricciardi, 2015). Zainuddin, Chu, Shujahat and Perera (2020) discuss how, in game-based learning, connections between social comparison and competitiveness can be afforded, which seems suitable when attempting to make people sensible for the earlier discussed paradox. Gamification is defined by Koivisto and Hamari (2019, p.191) as "designing information systems to afford similar experiences and motivations as games do, and consequently, attempting to affect user behavior". Having people play roles and engage with each other from these roles, almost forces them to live the experiences of the personas, and this facilitates the development of empathy, of compassion.

Inspired by this prospect, and following the principles of design research, the Master's students constructed a game that has identification as its driving force: the players in the game each 'become' a pupil with a given background and then – through situation cards – accumulate different experiences. While doing this, they compare and contrast these experiences and subsequent accumulation with those of their fellow players. While doing so, they become aware of the impact of their earlier acquired 'capitals': the game personas' backgrounds were informed by Bourdieu's (1986; 1990) ideas on economic, cultural and social capital, as well as the designers' own experiences. In fig. 1 an example of a persona card can be found. Please note that this example is one of a persona with negative prospects – other personas scored higher on the various forms of capital, to create a simulated sense of inequality. The only characteristic all personas share is their IQ; they all have an IQ of 110, suggesting that – according to the principles of a meritocratic society in theory – they should have equal chances of becoming successful.

Fig. 1 – a sample of a Persona Card

After each of the three to five payers have studied their personas and shared their key characteristics with their fellow players, in turn they draw a situation card. These situations have

three possible outcomes, each resulting in getting green (positive) or red (negative) chips. For each situation the other players discuss the most likely scenario and thus determine the pupil's score. This aspect of the game – witnessing how other people decide for you – is an important aspect of the simulation.

Fig. 2 shows a situation card. These cards and scores were informed by SES research as well as by the designers' personal experiences as teachers (and sometimes as pupils).

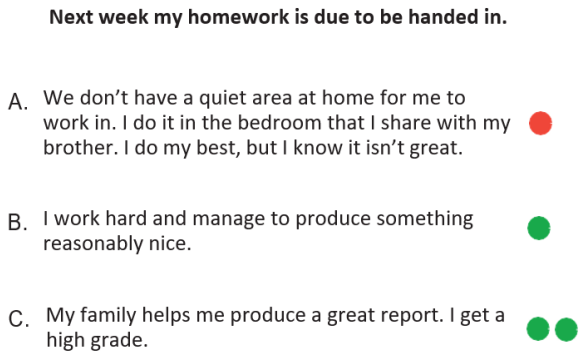

Fig. 2 – a sample of a Situation Card

The game is played in three rounds: one round represents primary school experiences; one secondary school and finally a round that represents either higher education or work. The game ends with a discussion on the insights that playing brought about, guided by the Follow-up cards that are provided. In addition, as a processing assignment, each of the players fill in a *canvas*, a form that records specific intentions and applications for their own workplace, as a form of self-imposed homework (see fig. 3).

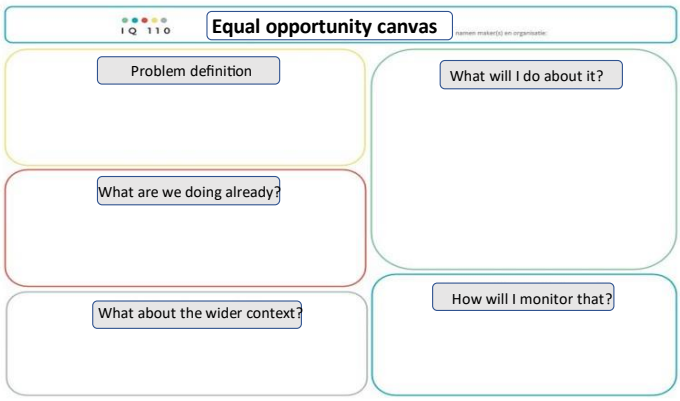

Fig. 3. Equal Opportunity Canvas

In the series of game sessions that were studied in this research project, these canvasses were discussed in small groups in a follow-up meeting, two to four weeks later, and followed by a group discussion.

The game was played in a dozen different settings by a total of 90 people, all students at the Amsterdam University of Applied Sciences, either studying to become teachers in a bachelor programme, or they were experienced teachers studying in a master's programme. The project received ethics approval from the university's committee, and informed consent was obtained from all participating students.

Table 1: Respondents' experience as a teacher

Only placement	13
1-5 years	37
6-10 years	17
11-15 years	8
16-…	10

Table 2: Respondents' workplace/ placement

Primary school	19
Secondary school	42
(intermediate) vocational education	11
Higher education	10
Other	7

The Conceptual Model

The intervention consisted out of three parts: after a short introduction, the game was played (X1). Then, following a discussion on the experience, the players individually filled in a canvas (X2), which was discussed 2-4 weeks in a follow-up session (X3). The expectation was that that would lead to two interconnected outcomes. First, it was expected that playing the game and experiencing the effects of inequality of opportunity personally (Z1) would raise the players' awareness, helping them to identify the problem of inequality of opportunity (Y1). Second, it was expected that the discussions that followed (in effect a collective reflection) – as well as the canvas exercise (an individual reflection) (Z2) would help the players actively think of ways to address the problem in their specific workplace and thus promote their self-efficacy (Y2).

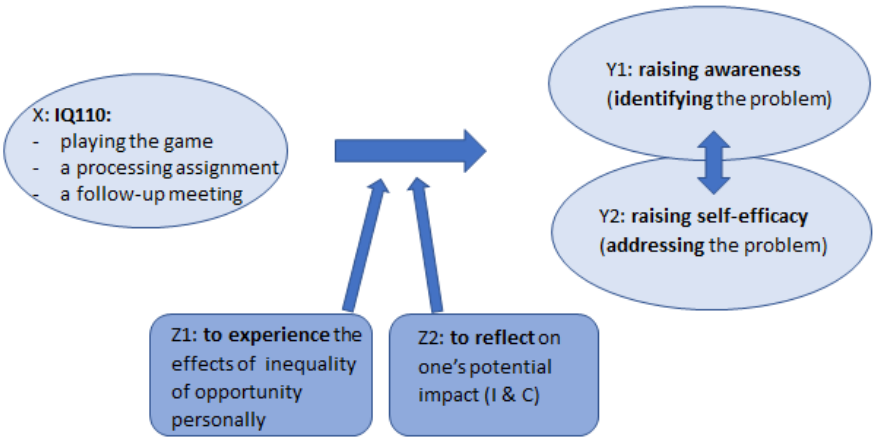

Fig. 4 – Conceptual Model

Methods

The research question with which the conceptual model was investigated is: *To what extent & how does IQ110 affect teachers' ability to identify & address inequality of opportunity?* Three types of data were collected to research this question: a retrospective pretest/posttest was constructed. Added to this questionnaire were two open questions: *What is the most important outcome of this*

activity (so playing the game, the discussions and the follow-up assignment) and *What caused that outcome?* Thirdly, the canvasses were studies to get an overview of the kinds of activities the respondents might follow up on.

As for the pretest/posttest questionnaire: a problem with interventions that seek to raise awareness is that it can happen that respondents rate themselves lower in the posttest, because the intervention made them realise they knew less than they thought they did, a mechanism sometimes referred to as the *Meno paradox* (people do not know what they do not know) or the response-shift effect. In such cases a retrospective pretest/posttest design may be useful (Young & Kallemeyn, 2019). A retrospective pretest is administered at the same time as the posttest: immediately after the posttest, respondents are asked to think back to their understanding before the intervention, and this becomes the reference point to measure potential effects. A disadvantage of this type of questioning is that it might encourage the respondents to simulate a learning effect as that may seem the socially desirable response (Lamb, 2005). It means possible effects need to be put into perspective by associating them with the responses to the open questions. The pretest/posttest questionnaire was presented in statements that were scored on a 5-point Likert scale. The operationalization of the dimensions can be found in Table 3. The questionnaire was filled in digitally and anonymously.

Table 3: Operationalization tables

dimensions	sub-dimensions	Items (example)
Y1: Professional identity: being able to identify the problem	Awareness (4X)	*2. I'm aware of the impact of social capital on pupil opportunity in my classroom*
	Commitment (2X)	*7. As a professional I feel responsible for promoting equal opportunity for pupils.*
	Sensitivity (4X)	11. *I am aware of my own prejudices as a professional*

dimensions	sub-dimensions	Items (example)
Y2: Self-efficacy: being able to address the problem	Knowledge & insight (6X)	*14. I can explain what the impact is of cultural capital on pupil opportunity in my classroom*
	Intentions (2X)	*19. I can formulate intentions to address the inequality of opportunity in my classroom*
	Self-efficacy/ skills (3X)	*22. I feel confident to discuss inequality of opportunity with my (future) colleagues*
	'Learning-to-learn' skills (2x)	*24. I know where to look for interventions that are known to be effective in the battle against inequality of opportunity*
	Behaviour, action (2X)	*27. I adapt my behaviour to battle against inequality of opportunity in my workplace*

Processing the data

First the cluster consistency was tested by calculating the Cronbach's alphas: these varied between 0.7 and 0.9. Then the cluster averages (dimensions and subdimensions) were calculated, and T-tests were executed to see if the differences were significant, which they proved to be ($P<0.01$). Then the effect sizes (or Cohen's d) were calculated by dividing the differences between paired cluster scores by the (average) standard deviation of the pair, a procedure not uncommon in needs analyses (see e.g. Altschuld & Witkin, 1999). The standard deviation thus becomes a measure for differences between paired items. When qualifying these differences, as a rule of thumb, we used Baarda et al.'s (2012) suggestion that a Cohen's d from around 0.5 should be considered an indication of a medium 'effect'; a Cohen's d higher than 0.8 can be considered high. Finally, the results were tested for the different groups of respondents (age groups; years of experience; school sectors). No significant differences were found ($P<0.05$) between these groups.

As for the open question responses: these were first coded openly and then axially, so categories of answers could be constructed. The same applied to the canvas entries: the two relevant sections (Problem definition & What will I do about it?) were copied to a spreadsheet for this analysis. Both

these analyses were carried out by two researchers independently, who then compared their findings. Where there were differences, there was a calibration. There were 90 respondents in total.

Results:

Retrospective pretest/posttest

All sub-dimensions showed medium to large effect sizes. In the first cluster *Raising Awareness* (dimension Y1), Commitment (0.53) showed a medium effect; Sensitivity (0.84) and Awareness (1.03) showed high effects. In the second cluster *Raising self-efficacy* (dimension Y2), Behaviour/ Action (0.52) showed a medium effect; Self-efficacy/ skills (0.65); 'Learning-to-learn' (0.74) and Intentions (0.75) all showed medium-to-high effects, and Knowledge & insight (0.87) showed a high effect.

As for the effect sizes of the dimensions themselves (Y1 and Y2), these were determined by calculating the averages of the (averaged) sub-dimensions, divided by the standard deviations of these averaged sub-dimensions. Both Y1 - *Raising awareness* (0.90) and Y2 - *Raising self-efficacy* (0.88) showed high effects. Judging from these results, the hypothesis, visualized in the conceptual model (see fig. 4), seems to be supported, with the proviso of the limitations of a retrospective pretest/posttest design.

Table 4: Effect sizes retrospective pretest/posttest (n=90)

dimensions	**sub-dimensions**
Y1: Raising awareness (identifying the problem) now 4.15 before 3.60 **Effect size: 0.90**	Awareness (4X) Now 4.25; before 3.57 Effect size: 1.03
	Commitment (2X) Now 4.24; before 3.79 Effect size: 0.53
	Sensitivity (4X) Now 3.96; before 3.44 Effect size: 0.84
Y2: Raising self-efficacy (addressing the problem) now 3.41 before 2.74 **Effect size: 0.88**	Knowledge & insight (6X) Now 3.86; before 3.21 Effect size: 0.87
	Intentions (2X) Now 3.46; before 2.80 Effect size: 0.75
	Self-efficacy/ skills (3X) Now 3.40; before 2.85 Effect size: 0.65
	'Learning-to-learn' skills (2x) Now 3.22; before 2.50 Effect size: 0.74
	Behaviour, action (2X) Now 3.13; before 2.61 Effect size: 0.52

The open questions

The questionnaire contained two open questions: *What is the most important outcome of this activity (so playing the game, the discussions and the follow-up assignment)* and *What caused that outcome?* In tables 5 and 6 the clusters of replies are presented, in order of descending frequency. In line with the quantitative data, both awareness (I.; V.; VI) and self-efficacy (II.; III.; IV.; VII; VIII; IX.)

were convincingly reported outcomes, although relatively few replies referred to concrete actions (VII.; VIII.).

Table 5 – The reported outcomes of the activity

What is the most important outcome of this activity (so playing the game, the discussions and the follow-up assignment)	**Y1: aware-ness**	**Y2: self-efficacy**	**Frequency**	**Example**
I. Awareness, growing realisation (in a general sense)	X		38	I now realise the long-term effects of inequality of opportunity
II. Insights (in a general sense)		X	26	I understand that a bad starting position leads to having fewer opportunities in later life. It is a slippery slope.
III. Insights into what I can do		X	21	I am more aware of what I can do in my role as a teacher.
IV. Knowledge (information)		X	19	The most important outcome for me is more information about inequality in education, diversity and inclusion.
V. Awareness of my own prejudices	X		16	Becoming aware of my own prejudices when deciding on someone else's chances
VI. Think more (in a general sense)	X		14	It was good to think about inequality of opportunity again.
VII. Understanding what my workplace can do about inequality of opportunity		X	9	… a tool to research the situation in my school with regard to inequality of opportunity
VIII. An appeal to do something		X	5	It motivates me to make this subject personal, and it activates [making] plans for the future
IX. Opening up the discussion		X	5	It offers an interactive way to discuss an important aspect of education

The second open question (*What caused that outcome?*) was asked to get more insights into the mechanisms that drive the game. In table 6 the clusters of replies are presented, again in order of descending frequency. Many replies could be fitted under more than one cluster (for instance the very first example in table 6), which explains that the total number of replies (the added frequencies) exceeds the number of respondents.

We had hypothesized (see the conceptual model in fig. 4) two mechanisms: that to experience the effects of inequality of opportunity personally (Z1) and to reflect on one's potential personal impact as a teacher, both individually and collectively (Z2), would lead to the intended outcomes. Both of these mechanisms are largely represented in the replies, although sometimes the replies were formulated too generally to really identify the mechanism. A mechanism not anticipated was the acquisition of knowledge or the transfer of information (cluster VI.), although it could be argued that such acquisition would imply some form of individual reflection.

Table 6: The reported causes of the outcomes

	Frequency	**Example**
I. Playing the game	68	I thought playing the game was very confrontational. We joked about it, but some of our statements were pretty profound
II. The discussions, the exchanges of ideas and practices	26	…by discussing various examples.
III. The collective reflection afterwards	21	The discussions after the game, in which various people shared from their own or their children's experiences of how they dealt with inequality.
IV. Identification – being the other	18	The game made me realise how it is to be viewed in a certain way and also how people seemed to decide things for me.
V. The Canvas activity	15	It made me think about how can detect poverty and inequality in my own classroom and think about solutions.
VI. The explanation of the workshop leader	10	…by all the information the leaders of the workshop gave us.
VII. The examples (not in the game but inspired by it)	8	… the various examples that people came up with
VIII. Realising your prejudices	8	The realisation that – without knowing it – our opinions are shaped by our prejudices.
IX. Other reasons	7	The name of the game [IQ110]. It makes you realise how children's starting position would be equal if not for external factors.

The canvasses

The third and last instrument was the analysis of the canvasses that respondents were asked to create to direct and monitor their own (potential) activities. These data offer indications of the eventual effects the intervention could have. Not all players chose to participate in this part of the project: out of the 90 that filled in the questionnaires, 66 identified a theme; a problem they would like to address in their workplace. 61 of these also reported in what way they would do this.

The replies showed a great variation. 27 different (types of) problems were identified. In the table (7) below only those that were mentioned by four or more respondents are recorded. The most frequently mentioned theme (by far) relates to socio-economic status, maybe because it is more obvious, more easily identifiable than cultural, social and psychological capital (the persona cards also mentioned these forms of capital). In the responses on proposed actions (see table 8), what strikes out is that many of these are aimed at creating more awareness – both personally and for colleagues. It suggests that the game started the process of awareness but leaves room for more of it – not only to share with colleagues (which would be expected), but also to further promote one's own awareness. This corresponds with the project's ambition to putting inequality of opportunity (back) on the agenda of teachers.

Table 7: Reported problems to address (canvas)

What problem will you address?	**Frequency**	**Example**
Financial issues, poverty (lack of learning materials or a place to study; extra lessons)	16	Detecting poverty under students by seeing whether they have a laptop/ computer. Also ask colleagues to look out for that,
Language deficiency	7	Some of our students have a migrant background. They manage the level of study but fail the language test and drop out or their progress is delayed. We now have a one-size-fits-all programme that does not take all the differences into consideration
Differentiation (treating pupils differently)	6	Our students have a great variation of educational backgrounds, but we expect they enter at the same level. Many of the students that drop out at het end of the year indicate they found it hard to find a rhythm/ planning/ way of working.
Cultural differences	4	Identify street culture in the classroom and teachers' reactions to that. Create awareness that these students need a different kind of guidance.

Table 8: Reported actions (canvas)

What are you going to do?	**Frequency**	**Example**
Talk with pupils/ students	11	During the introductory meetings I will ask students individually how they have organized their learning so far. If they have little experience in this, I will pair them with other students who also need extra support.
Teacher professional learning	10	Help the team become aware of this theme, for instance when they are teaching or coaching students. And of course, do that myself as well: as a coach, be supportive for students with difficult circumstances (…) Give them safety and trust as a basis to learn.
Identify and address financial problems	6	With my team leader I will discuss how we can address poverty (students not having a laptop). With my team I will check if and how we can identify this issue. E.g., open computer rooms for students to study.
Organise a language programme	5	Identify which pupils have a different mother tongue and what kind of assistance they need

Conclusions: implications and applications

It is important for teachers to develop critical awareness of the oft hidden mechanisms behind inequality of opportunity, and to find strategies that can compensate for these mechanisms, to support all children to fulfill their potential. The data presented in this paper suggest that IQ110 ('*an exceptionally unfair game*') at least helps teacher to make a start with that. The hypothesis, visualized in the conceptual model (see fig. 4), is supported by the data generated by all three instruments. The vast majority of the respondents reported to have grown in terms of awareness and self-efficacy, and many of them gave concrete examples of the kinds of follow-up actions they envision. They attributed their learning results to having played the game, including the exchanges and collective reflections, as well as the process of identification.

Some of the direct consequences of this project are that a number of the programs or course units of whom students were involved have decided to include the game in their curricula. Some students (who were also experienced teachers) planned to play the game with their workplace colleagues.

On a more abstract level, this project could be used as an argument to put inequality of opportunity more firmly on the agenda of teacher training programmes or programmes aimed at teacher professional learning. The game could be a good starting point for this. Also, the results suggest that (serious) game-based learning could be a suitable tool to help teachers develop complex attributes that require personal experiences and deep reflection, such as sensitivity, multi-perspectivity and agency. The idea of persona cards being used as lenses to look in various ways at various situations is a promising one and could be used in other contexts that require invoking multi-perspectivity.

The research project presented in this paper was conducted in the Netherlands and was based on a Dutch version of the game. The design group have since developed an international, English language version of the game and welcomes invitations to share the materials with you.

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