Gender Differences in Help-Seeking and Supportive Dialogue during On-line Game

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Abstract

Gender difference plays an important role of helping-seeking and supportive behavior while the players encounter win or lose situation that will affect the cooperation in the on-line game. Our research team developed a game called Strike Up, and used it to investigate the help-seeking and supportive behaviors displayed by children in the cooperative/competitive scenarios. In Strike Up, players must calculate numbers in a strategic fashion so that they can move their flags to the destination faster than their opponents. Game players' help seeking and supportive types in on-line discussion were categorized by Kappa method and data was analyzed by Kappa method, then Chi-square test was employed to examine the gender difference in different types of dialogues. The discourse analysis indicated that boys exhibited used more negative semantics. Girls appeared to display a more communal or cooperative orientation, as they used more positive, socially supported language. At the beginning of the game, boy were less willing to seek help than girls, yet, at the end, as the pressure of the competition mounted, male players became more eager to find assistance from teammates and were seen to adopt more help-seeking behaviors. The results can be implicated to increase the competition in game design to foster the help-seeking and supportive social behavior.

Keywords: Gender differences, Help-seeking, Social support, Discourse analysis, Interactive behavior.

Introduction

Social constructionists contend that knowledge is developed and sustained through social processes, and knowledge and social actions are intricately linked. Berge and Colins (1995) point out the following: "Talk and discussion provide an opportunity to articulate and explain one's own thing and perhaps to modify one's own ideas, beliefs or self-presentation in response to feedback from others. Incorporation of new data, the testing of arguments, and using one's judgment and reasoning helps move a person toward new perspectives and higher levels of thinking" (p. 183). Weinberger, Stegmann and Fisher (2007) have focused on the acquisition of knowledge and the idea that learners may share knowledge by contributing their ideas through discourse (knowledge sharing),

and that other learners integrate these ideas into their own lines of reasoning. Fraser et al. (2005) proposed that social–emotional skills, which involve information processing skills, enhance confidence in one's social skills. It is suggested that playfulness can be enhanced during mathematical games to improve social skills, especially when one seeks to show colleagues the mechanisms of problem solving (Nunokawa & Fukuzawa, 2002; Hanna, 1995). Situations in which colleagues offer reciprocal support in an effort to find possible solutions to a problem will promote their interest in game playing (Nunokawa, 2005). There is some evidence that collaborative discourse and argumentation make learning gains more permanent (Nussbaum, 2008). In line with those excerptions, help-seeking plays an essential role particularly important in computer-based interactive learning environments (Bartholomé, Stahl, Pieschl, & Bromme, 2006), this study generate a game named Strike up which needs the players involve in a cooperative and competitive situation to test their social emotion change.

Research on gender differences in computer game playing suggests that boys have historically been seen as more successful (Greenfield, 1999) and enthusiastic (Mitchell, 1985) than girls, particularly in competitive game play. Carbonaro, Szafro, Cutumisu, and Schaeffer (2010) use an interactive game adventure authoring tool to measure gender difference and find that females scored significantly better than males on higher-order thinking skills. From social cognitive psychology, gender differences appear to be important in help-seeking and support behaviors (Wester et al., 2007). To date most research on help-seeking is restricted to e-learning settings. Due to essential differences between the help-seeking process in e-learning interactive settings and in cooperative-competitive game of these findings would be inappropriate. Thus, there is a need to conduct research on help-seeking in the cooperative-competitive game as an understanding in its own right. As such, this study investigates gender differences in educational game play through exploring following two questions: 1) the different types of help-seeking and supportive behaviors of boys and girls, and 2) the changes in help-seeking and supportive behavior as play proceeds.

Research Contents and Hypotheses

Vygotsky emphasized dialogue. He argued that all cognitive functions originate in social interactions, and that learning is not simply the assimilation and accommodation of new knowledge by learners (Fosnot & Perry, 2005; Vygotsky, 1978). From his perspective, creating meaning involves a process of sharing various perspectives and

experiences in communities of practice (Fosnot & Perry, 2005; Vygotsky, 1978). Therefore, learning is derived from rich conversation with other people who have similar or different perspectives based on their own life experiences (Jonassen, 1999).

1. Help-seeking and support in game playing

In Vygotsky's socio-cultural view, mental functioning develops as the learner internalizes and transforms the contents of social interaction (Vygotsky, 1978b, 1981). From a coactive systems viewpoint, individual action emerges as the product of coactions among components, and is not the linear outcome of components acting independently (Mascolo, 2005). Therefore, in coactive game playing, mutual benefits are maximized as learners work together to complete common tasks in a supportive, reduced-stress climate. Thus, learning partners have played an important role in previous interventions that incorporated learning through playing (Homles, 2007). Shih (2007) studied the avoidance of help-seeking in upper elementary school students, and observed that if the goal structure was very clear to the students, more adaptive help-seeking tendencies would be displayed. Nevertheless, from a psychological point of view, a partner's unwillingness to share information with others in social interactions is hardly surprising, given that the transmission of information is often regarded as a loss of power (Kimmerle, Cress, & Hesse, 2007). In addition, giving information is associated with extra time and additional effort. Specifically, it is suggested that the exchange of explanations about strategies learned will increase the level of student interest in the content (Webb & Mastergeorge, 2003). To understanding the willingness to help-seeking or supportive from players' dialogues at different stages, the hypothesis to guide this study is:

Hypothesis 1: Players' would have more willingness to seek help and support others while they encounter highly competitive stage.

2. Gender difference in help seeking and supportive game behavior

Under cooperative conditions in game playing, group members will help each other to some extent in rearing and guarding the player mates (Pen & Weissing, 2000; Weibull & Salomonsson, 2006). Some evidence suggests that boys are much more enthusiastic in computer game than females (Connolly, Boyle, Stansfield, & Hainey, 2007; Gorriz & Medina, 2002). In addition, boys' speech is often directive, and is frequently used to assert power and influence over others (Archer, 1992; MaCcoby, 1998). In contrast, girls tend to engage in more intimate social interactions, turn-taking, and cooperative endeavors (Meece, Glienke, & Burg, 2006). Taken together, boys have been characterized

as having a more competitive style of interaction, while girls have a more communal or cooperative orientation (Eagly, 1987; Hartmann & Klimmt, 2006; Leaper, 1994). However, it is also important to note that there are many instances in which girls and boys behave similarly (Underwood, 2004). As those different assertions, the research hypothesis to guide this study is:

Hypothesis 2: Female players would have more willingness to seek helps and support others than those male players.

Game Design

Collaboration has been shown to increase students' knowledge of a wide range of subjects, including biology (Lazarowitz & Karsenty, 1990), mathematics (Fuchs et al., 1997; Webb, 1991), narrative composition (Daiute & Dalton, 1993), and computer programming (Web, Ender, & Lewis, 1986). Based on affordance theory (Gibson, 1977), this study was designed to examine the information-exchange dilemma between game players. Therefore, the game design for this research to analyze players' contribution behaviors represents a particularly stringent test of tools that foster computer-supported cooperation and competition.

To investigate children's behaviors in a competitive situation, a new game that requires cooperation among participants was developed as a research tool for this study. The game Strike Up was adapted from WEST, which was originally developed at the University of Illinois and subsequently revised, based on *Game Design Principles* by Kiili (2005), to increase player engagement. Although the essential elements in WEST were kept intact, some alterations were made to adapt the game for use in this study. The learning theme was changed to four arithmetic operations. In Strike Up, students must calculate numbers to move their flags to the game journey's destination. In the game's competitive mode, players of Strike Up have two choices of mode, 2 vs. 2 vs. 2 or 3 vs. 3. The children must take turns to ensure equal distribution of opportunities for each player. All participants can contribute positively, because the game is designed for children to generate their own strategies according to the rules of game.

Dice were replaced with playing cards (1-9), plus bonus cards (10, J, Q, K) that perform killer functions to increase game complexity. Each card dictates different game conditions. Number Cards are used to indicate numbers used in arithmetic operations,

while certain cards are designated as special Function Cards. Some cards limit or increase players' use of four mathematical symbols (+;−; ×; ÷). For example, mathematical parentheses "( )" may be added to adjust game complexity for different players. In terms of game difficulty, the original bumping range was enlarged from 0 to 5 to increase the opportunity of being bumped back and the difficulty of arriving at the destination (Figure 1). In this scenario, based on students' dialogue, competitive and cooperative behaviors are overt and therefore easy to measure.

Strike Up is an internet-based game. Students can enter the game environment by connecting at home or by going online elsewhere. Besides playing the game, players can also interact with other players by entering design dialogue areas, as depicted in Fig 1.

Fig.1 The Strike Up game scene

Research Design

Social constructionists recognize that meaning is constructed through language in context, and this is of particular relevance to this study. Attention to language is the social constructionists' acknowledgement of the significance of discourse (Young & Collin, 2004). Discourse advances thinking and is central to the process of knowledge construction. As ideas are shared and assessed, feedback is received and interpreted, emerging problems are solved, and joint decisions are made (Hennessy & Murphy, 1999). Cognitive presence represents the analysis, construction, and confirmation of meaning and understanding within a community of learners through sustained discourse (Garrison & Anderson, 2003). Through discourse, ideas, solutions, and decisions are made explicit and visible; partners share information and plan together, and engage in joint reasoning, evaluation and decision-making (Mercer, 1995).

Studies have found that different types of verbal interaction support different types of learning (Cohen, 1994). The resulting protocols that guide interaction are briefly discussed below. Discourse is characterized as messages about other messages (de Souza, 2005). Discourse is a process whereby interlocutors explore existing signification artifacts in order to express what they mean (de Souza, 2005). According to Osgood's classification (Osgood & Tanaha, 1965；Osgood, May, & Miron, 1975), language meanings can be grouped into three types: evaluation, potency and activity. Evaluation messages ('good–bad') are related to the judgment of abilities, for example, "you are very smart" or "you are very lousy." Potency messages ('strong–weak') are related to inspiration or discouragement, for example, "you are close to working it out." Activity messages ('do–undo') are related to instructions for doing more or thinking more, for example, "you can try it again."

The study involved playing Strike Up as a competition. The participants in this study were students from three schools. Each school sent twelve students, and students from the same schools were organized into three teams, based on gender. During the competition, verbal communication was forbidden.   All communication had to be carried out through the embedded dialogue facility. The game dialogue and processes were recorded, and were subsequently examined for gender differences in the conversation content and cooperation modes. According to the theoretical framework below, this study classified the cooperation modes into Tables 1 and 2 (See Tables 1 and 2).

The connotative meaning of words can be reduced in dimension by factor analytic procedures. Principal component analysis of the students' dialogue extracted three components, which corresponded to the Evaluation, Potency, and Activity dimensions of Osgood and Tanaka (1965) and Osgood et al. (1975). The present study used a content analysis method to analyze children's conversations during the game. After classification of their conversations, a quantitative analysis was conducted. Differences in play based on gender were explored through six discourse types (Table 1).

Table 1: The different types of help-seeking and supportive dialogue

Semantics / Interactive behavior	Activity		Evaluation		Potency	
	Positive	Negative	Positive	Negative	Positive	Negative

Help-seeking	1.1	1.2	3.1	3.2	5.1	5.2
Supportive	2.1	2.2	4.1	4.2	6.1	6.2

Table 2: The classification categories and examples of help-seeking and supportive dialogue

Semantics			Content	Examples
Activity	1.1	**Positive Help-seeking**	Directly request assistance	Help me. Help me count.
	1.2	**Negative Help-seeking**	Use provocative words	Are you able to figure that out for me?
	2.1	**Positive Supportive**	Directly provide assistance	(9-6)/1*2+1 (8+4)*8-1/2 Look carefully at where the steps of the short-cut derive the bigger sum.
	2.2	**Negative Supportive**	Use challenging words	Why can't you do addition and subtraction before multiplication and division? If you count it wrong again, I will hit you.
Evaluation	3.1	**Positive Help-seeking**	Use praise to gain assistance	Your mathematical ability is the best.
	3.2	**Negative Help-seeking**	Use self-criticism to gain assistance	I am lousy at math, or, I am stupid.
	4.1	**Positive Supportive**	Use praise to provide less assistance	You are great; I only have to tell you a little for you to figure it all out.
	4.2	**Negative Supportive**	Use negative criticism to provide less assistance	You can't figure it out. I really want to

				scold you (stupid!).
Potency	5.1	**Positive Help-seeking**	Express confidence by using self-assertive words	This question is so easy for me to count.
	5.2	**Negative Help-seeking**	Use discouraging and/or unfortunate words	This one is difficult. My card no. is very low.
	6.1	**Positive Supportive**	Use encouraging and/or motivational words	Keep going, the right answer is very close.
	6.2	**Negative Supportive**	Use discouraging and/or unfortunate words	Hurry up! There is no time for you to count. You got bad luck. You really are a joker's sister.

2. Data collection and analysis

In this sense, social support can be defined by the perception of support. These concepts are best measured by observations and reports, by indices of satisfaction, or by scores of perceived support (van Dam et al., 2005). Interpretive discourse analysis (developed from the perspective of an insider) can be used to explore issues (e.g., those relating to role extension) implicit in texts arising from computer data mining, interviews, diary notes, questionnaires, institutional documents, and throughout the literature. Data are subjected to analysis at various stages in the research process. The processes of transcription and participant checking constitute further acts of interpretation. More formal analysis involves deliberately engaging in the act of interpretation and making sense purposefully through the exploration of themes and discourse in various categories (Boyes, 2004). Help-seeking and support related to game playing are accomplished through language. Approaches to language and textual analysis take many forms, and are closely related to issues of representation. To collect conversational data during game playing, students must type their thoughts in the "dialogue area." This text can then provide the data for discourse analysis.

A content analysis research method was used in this study. Before the analysis, all players' dialogue was stored in the computer game, which provided a large amount of dialogue data to be analyzed. Content analyses were focused on the following: (1)

semantics; (2) the relationship between gender and semantics; (3) interactive behavior; (4) the relationship between gender and interactive behavior; (5) the relationship between time and semantics; and, (6) the relationship between time and interactive behavior. In order to obtain consistency between the analyzers, the Kappa method was applied to examine the coefficient of discourse sentence analysis (Fleiss, 1971). The resultant kappa value was .709, which indicated that the analysis of the two focus groups (4 members in each group) reached significant consistency. Thus, all discourse could be classified into the 12 categories shown in Table 1.

Research findings

Data from 36 participants was collected in the Strike Up game. Researchers used a total of 382 sector dialogues. Their contents were analyzed according to the three dimensions: semantic activity, evaluation, and potency. Furthermore, each classification was divided into help-seeking and supportive interactive modes, and was encoded by positive and negative valences. The researchers also observed whether there were any changes in dialogue content as play time increased. Because the game was run three times and took a total of 75 minutes, the timeframe of analysis was divided to three 25-minute segments to check whether there were semantic changes as the game proceeded. The results of this study are illustrated as follows:

1. Semantic use in general

Through the analysis of gender and semantic frequency cross-reference (see Table 3), the category of positive supportive activity was found to have the highest frequency (23.6%). Examples of this category are: "Look carefully at where the stairs are," "Look carefully!" or "8+4*8-1/2=39.5" (direct formula). These are the statements that demonstrate direct assistance or are more directive-oriented. The second-highest frequency rate, 20.9%, was in the category of positive supportive potency. The statements that exemplified this type were encouraging words such as "Keep going!" Finally, 15.7% of the overall statements were classified as a positive help-seeking activity, which demonstrated direct assistance seeking.

Each of these three types was positive. Overall, 67% of the statements showed a positive tone. This result demonstrates that the participants in this study tended to construct linguistic expressions filled with positive encouragement and assistance.

2. Gender differences in semantic usage

There were significant differences in semantics between the two genders ($\chi2 = 19.706$, $p < .05$). Table 3 shows that the proportion of statements in the categories of positive and negative supportive potency, were higher in girls than in boys. This suggests that girls tended to express encouraging types of words, such as "Go" or "Hurry up," more than boys did. Boys had a slightly higher frequency of negative supportive evaluation wording than the girls. This suggests that boys tend to use "You are stupid" types of sentences more frequently. Statements classified as positive supportive evaluation were not observed in this study. This means that neither boys nor girls in this study said anything that could be classified as praising another's abilities.

Table 3: The percentage in each classification by gender

Classification			Girl		Boy		Total	
Semantics	Interactive model	Trend	Count	%	Count	%	Count	%
Activity	Help-seeking	Positive	33	8.6	27	7.1	60	15.7
		Negative	2	0.5	2	0.5	4	1
	Supportive	Positive	37	9.7	53	13.9	90	23.6
		Negative	6	1.6	8	2.1	14	3.7
Evaluation	Help-seeking	Positive	5	1.3	2	0.5	7	1.8
		Negative	4	1	6	1.6	10	2.6
	Supportive	Positive	0	0	0	0	0	0
		Negative	7	1.8	18	4.7	25	6.5
Potency	Help-seeking	Positive	9	2.4	10	2.6	19	5.0
		Negative	26	6.8	17	4.5	43	11.3
	Supportive	Positive	48	12.6	32	8.4	80	20.9
		Negative	21	5.5	9	2.4	30	7.9
Total			198	51.8	184	48.2	382	100

3. Interactive behavior in general

Overall, the percentage of interactive behaviors providing assistance (62.6%) was higher than those seeking assistance (37.4%). This demonstrated that the children in this study tended to offer help more often than they asked for help.

4. Gender differences in interactive behavior

There were no statistically significant differences in interactive behavior between

girls and boys ($\chi 2 = 1.066$, $p = .302$). As shown in Table 4, the percentages of supportive and help-seeking dialogue were very similar between girls and boys.

Table 4: The percentages of interactive behavior by gender

Interactive Behavior	Girl		Boy		Total	
	Count	%	Count	%	Count	%
Help-seeking	79	20.7	64	16.8	143	37.4
Supportive	119	31.2	120	31.4	239	62.6
Total	198	51.8	184	48.2	382	100.0

5. Semantic changes over time

The time frame for analysis was divided into three periods, each of which lasted for 25 minutes. The interactive dialogue between the players was recorded in the system. The results of Chi-square testing revealed that there were no significant differences in semantics among the three time periods ($\chi 2 = 43.261$, $p < .05$). As shown in Table 5, greater amounts of dialogue were recorded in the first and second periods (counts of 128 and 161, respectively) than in the third period (93). This trend was observed in most of the semantics classifications. The exception was in positive supportive words, where the first time period had a lower count than the second and the third time periods, with a ratio of 17.2/25.5/29.0. This means that direct assistance seeking increased towards the middle and end of the game.

Table 5: The percentages of each semantic classification by time period

Classification			First section		Second section		Third section	
Semantics	Interactive model	Tendency	Count	%	Count	%	Count	%
Activity	Help-seeking	Positive	7	5.5	29	18	24	25.8
		Negative	2	1.6	0	0	2	2.2
	Supportive	Positive	22	17.2	41	25.5	27	29.0
		Negative	5	3.9	3	1.9	6	6.5
Evaluation	Help-seeking	Positive	4	3.1	2	1.2	1	1.1
		Negative	5	3.9	2	1.2	3	3.2
	Supportive	Positive	0	0	0	0	0	0
		Negative	11	8.6	11	6.8	3	3.2
Potency	Help-seeking	Positive	6	4.7	8	5.0	5	5.4
		Negative	17	13.3	21	13	5	5.4

Supportive	Positive	35	27.3	33	20.5	12	12.9
	Negative	14	10.9	11	6.8	5	5.4
	Total	128	100	161	100	93	100

6. Interactive behavior change with time

There were no statistically significant differences in interactive behaviors among the three time periods ($\chi2$ = 2.910, p > .05). The ratios were very similar for the three time periods. This suggests that participants tended to provide assistance at a consistent level from the beginning of the game to the end.

Table 6: The percentage of interactive behavior by time period

Classification	First period		Second period		Third period	
Interactive Behavior Model	Count	%	Count	%	Count	%
Help-seeking	41	32.0	62	38.5	40	43.0
Supportive	87	8.0	99	61.5	53	57.0
Total	128	100	161	100	93	100

Discussion

An article, by Clark and Sampson (2008), addresses a broad array of social factors for creating open discussion. The article specifically focuses on the generation of new ideas in small groups, and finds that rudeness—disagreeing with others in a direct and confrontational way—is less effective in generating new ideas than polite disagreement.

Boyle and Connolly (2009) assert that "understanding the relationship between gender and computer games is extremely important for creating computer games that will function as effective educational tools." This study examined gender differences in dialogue during game playing. In particular, male and female players and their semantic usage in help-seeking and supportive behaviors, and changes in interactive behaviors as the game progressed, were analyzed. The following conclusions are offered:

1. *Interactive behavior in general*: Positive words are very important to motivate teammates to attain the goal state (Custer & Aarts, 2005, 2007). Context-sensitive help functions are especially susceptible to gaming behavior directed at better performance (Bartholomé et al., 2006). In the present study, children tended to use directive or ordering language in the cooperative-competitive game. However, more positive than negative statements were observed in general. The context of this game can generate a

public-goods dilemma (De Cremer, Snyder, & Dewitte, 2001) that accelerates the speed of play to complete the game, which is mainly the result of increasing interpersonal trust as playing time increases.

2. *Gender differences in interactive behavior*: Men and women differ in emotional arousal; women have been reported to use positive expression more frequently (LaFrance, Hecht, & Paluck, 2003; Schirmer, Kotz, & Friederici, 2005). In this study, girls tended to use more encouraging statements than boys, and boys tended to use more negative expressions, such as words with scolding connotations, in playing the game. In the sense, the research hypothesis 2 was supported.

3. *Gender differences in playing stages*: Help-seeking among adolescents has been described as a necessary ingredient in successful coping (Grinstein-Weiss, Fishman, & Eisikovits, 2005). Children's coping includes help-seeking for academic problems, yet they do not always seek help when it is needed, and help-seeking generally declines during early adolescence (Grades 5–6) (Marchand & Skinner, 2007). That result seemed only proved at age related study, from game playing perspective, the other observations of this study show that boys' helping seeking behavior was less at the beginning stage, in contrast, relatively high help-seeking behavior while the other team surpassed. Thus, the research hypothesis 1 was supported.

Concluding Remarks

In summary, the context of the Strike Up game can be helpful in group cooperative and competitive learning. The interactive discussions supported by the context of the Strike Up game also help to improve children's social abilities. The analysis of our study data found that the meaning dimensions described by Osgood and Tanaka (1965) and Osgood et al. (1975) could be confirmed, even some 40 years later in a totally different subject population. We also verified that the activity dimensions explained most of the dialogue. The findings further demonstrated that positive semantic words were nearly identical in female groups of subjects. Self-monitoring of expressive behavior comprises self-observation and self-control, and is guided by situational cues for social adequacy (Gangestad & Synder, 2000). Girls in this study displayed better self-monitoring behavior than boys, from their conversation while playing the game. Thus, the use of internet digital games as a stimulus material for the semantic classification of help-seeking and supportive behaviors in experiments can be considered very reliable.

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