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ABSTRACT

A survey was conducted with 104 seventh-grade students in four classrooms participating in EQUATIONS tournaments. The tournaments had been taking place on a weekly-basis for several weeks. The study compares four basic pedagogical assumptions behind the tournament structure with student opinion of the tournaments. Student responses to the survey were analyzed in the form of frequency and percents of alternate responses and with chi square tests. It was concluded that students view their place in the tournament hierarchy as reflecting their ability, but they are willing to meet stiffer competition. They view winning as being under their control. The assumptions behind tournament structure for EQUATIONS appear to be consistent with student opinions of the EQUATIONS tournament. (Author/JBW)

Abstract

STUDENT OPINIONS OF EQUATIONS TOURNAMENTS

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One-hundred four students regularly participating in seventh-grade classroom EQUATIONS tournaments were surveyed. Their replies to questionnaires indicated the following:

1) 84% of the students believed that their ability with respect to that of their classmates was reflected by their current position in the hierarchy of tournament tables, or by less than four tables above their current position.

2) 66% of the students, if given a choice, would elect to play at their current table or at less than four tables above their current position.

3) the reasons for their table choices appear to be related to the distance from their current table that they would elect to play.

4) 80% of the students believed that winning was a matter of their control rather than luck.

5) none of the above factors was related to students' present positions in the table hierarchy.

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The instructional game EQUATIONS developed by Layman E. Allen (Allen, Layman E., 1963) lends itself very well to use in the mathematics classroom under a tournament structure (Allen, Layman, Goodman, Fred, Humphrey, Doris and Ross, Joan 1973). In the mathematics classroom, three students participate in a game where players at a given table in the hierarchy are matched in ability. (The game can also be played with two or four players, but a three player game is recommended). Games are played throughout the class hour. The scores are normalized with respect to the number of games played. The player receiving the highest score is moved up a table in the hierarchy, the player receiving the lowest score is moved down a table, and the player receiving the middle score remains at the same table in the hierarchy. At the next class tournament, students play at tables in the hierarchy based on their performance in the previous tournament and the process is repeated. Absent students are automatically moved down a table. A random process is used to handle ties.

The tournament was designed so that all members of a class could participate even if the composition of the class is quite heterogenous in ability. Thus, there is no need to remove students from the classroom for any special attention or organize special classes, as is often the case in many learning innovations. Further it is not necessary to restrict the enrollment to a small number. Individualization can be achieved, even though the class size is large, because all students are actively engaged in mathematics activity at a level that they can handle at that time. Indeed, a large class size has the advantage of increasing the probability of each game having players matched in ability.

The tournament structure is based on the following pedagogical assumptions:

1) The table in the hierarchy where a given student plays, reflects his mathematical ability and his ability to utilize mathematical ideas in the game relative to other members of the class at that time.

2) The tournament structure motivates a student to aspire to a higher table even though it may increase the probability of losing as he meets stiffer competition.

3) A student will learn ideas that can be utilized in later games, even if he loses.

4) Students view the game as being in their control, i.e., that winning and losing is not a matter of chance.

In this study we were concerned with whether or not seventh graders who had participated in classroom tournaments for several weeks viewed the tournament and the Equations game in a manner consistent with these assumptions. If given a choice would they elect to play at a higher, lower or the same table in the hierarchy from where they were currently? What were the reasons for their choices? Did they view their present position in the hierarchy as reflecting their ability? Did they view the game as one in which they had control or as a matter of luck? Was their present position in the table hierarchy a factor in the above opinions?

METHOD

A survey was conducted on one hundred and four seventh grade students in four classrooms at Slauson Jr. High in Ann Arbor, Michigan. Classroom tournaments had been taking place on a weekly basis for several weeks. Each student's table in the hierarchy at the time of the survey was noted.

RESULTS

In Table I are the frequencies and proportions of responses, with respect to the current table, to the question: "If you were given a choice of where to play at the next session, what table would you choose? Circle one
1 2 3 4 5 6 7 8 9 10 11 12."

TABLE I

Table Choice with Respect to Current Table				
	Below	Same	Above	
frequency	8	29	67	104
proportion	(.076)	(.279)	(.644)	1.00

Here we see that about 64 percent of the students would select a higher table. About 28 percent would select the table at which they were scheduled to play and 8 percent would move below. These choices were consistent throughout the table hierarchy. In other words, these choices were not a function of their present position in the hierarchy. What then are the reported reasons for these choices? In Table II are the frequencies and proportions of responses to different alternatives:

TABLE II

Reasons for Table Choice	frequency	proportion
A. I think at that table I would win.	23	(.223)
B. I think at that table I would learn something that would help me to win in later tournaments.	38	(.369)
C. I think I could relax and have more fun at that table.	20	(.194)
D. I want other people to think of me as a person who can win at that table.	3	(.029)
E. I think I would enjoy playing at that table because some of my friends are likely to be playing there.	12	(.117)
F. Other	7	(.068)
Total	103	(1.00)

Again, there was no relationship between these "reasons" and their current table. However, there appears to be some relationship between the reasons for table choice and whether or not they would choose a table below, the same, within three tables above and four or more tables above. (Other data indicates that students tend to move up and down a range of about 3-4 tables once the hierarchy has been stabilized). The data are given in Table III. Numbers without parentheses are frequencies. Numbers within parentheses are row proportions.

TABLE IYI

Table Choice vs Reasons

	A "Winning"	B Learn Something"	C "Have Fun"	D "Prestige"	E "Friends"	F "Other"	TOTAL
Below	3 (.375)	1 (.125)	2 (.25)	0 (.0)	2 (.25)	0 (.0)	8 (1.0)
Same	6 (.214)	15 (.536)	3 (.107)	0 (.0)	1 (.036)	3 (.107)	28 (1.0)
< 4 above	6 (.146)	16 (.39)	6 (.146)	3 (.073)	7 (.171)	3 (.073)	41 (1.0)
= > 4 above	8 (.308)	6 (.231)	9 (.346)	0 (.0)	2 (.077)	1 (.038)	26 (1.0)

Because of empty cells in columns D and F contributing to expected frequencies less than 5, the last 3 columns were grouped for a chi square analysis.

There was a statistically significant chi square for 9 d.f. for a one-tail chi square test at the .05 level of significance. Table IV is a retabulation of the frequencies in Table III after grouping.

TABLE IV

Reasons Table vs Choice

	A "Winning"	B "Learn Something"	C "Have Fun"	D "Prestige"	E "Friends"	F "Other"	TOTAL
Below	3	1	2		2		8
Same	6	15	3		4		28
<4 above	6	16	6		13		41
=>4 above	8	6	9		3		26
Total	23	38	20		22		103

Chi Square = 17.62
Chi Square at .05 level of significance for 9 d.f. = 16.92

It will be noted that 31 out of 38 students who gave their reason as learning something chose to either remain at their present table or move slightly above. The dominant responses of those choosing extremely high tables is that either they could relax and have fun or they thought they could win.

In Table V are the frequencies and proportions of responses with respect to the current table to the questions: "Do you think the table you're playing at now represents your ability to play equations? Yes ___ No ___. If you checked "No" circle the number of the table that represents your true ability. 1 2 3 4 5 6 7 8 9 10 11 12."

TABLE V

Estimate of Ability with Respect to Current Table				
	Below	Same	Above	Total
Frequency	7	62	35	104
Proportion	(.067)	(.592)	(.337)	(1.00)

Unlike their table choices, where 28 percent chose to remain at the same table, 60 percent indicated that their present table reflected their ability. About 7 per cent believed their ability was reflected below their current table and 34 per cent believed their ability was reflected at a higher table. Twenty-four students out of those 35 believed their ability was reflected at a table less than four tables from their current table. Eleven out of the 35 believed their ability was represented at a table four or more above their present position.

Again there was no relationship between their current table and the table they thought represented their ability.

Finally, we were concerned with whether or not students believed that winning was a matter under their control or a matter of luck. In Table VI are the frequency and proportions of responses to the question: "When you win at EQUATIONS, you usually

win because (circle one):"

TABLE VI

Reasons for Winning

	Freq.	Prop.
1. You are lucky	21	.20
2. You outwit your opponents by your play.	27	.26
3. The other player makes mistakes and you catch them.	55	.54
Total	103	1.00

Here we see that about 20 per cent of the students believed their winning is a matter of luck. The other 80 per cent believed they had some kind of control over their winning. If the students could really distinguish between B and C, the majority believed they won by catching mistakes and the remainder because they outwitted their opponents.

It was the case that out of the 21 students who thought their winning was a matter of luck only one came from Table 3 (none at Table 1 or 2). However, chi square was not statistically significant in an analysis of the responses that grouped the 12 Tables in groups of 3 in descending order. There was no relationship between these responses and their table choices or the reasons for their table choices.

Discussion and Summary

The analysis from a survey of seventh graders who had been participating in classroon EQUATIONS tournaments indicated the following:

1. The vast majority believed their current table or one slightly above their current table reflected their ability.

2. The vast majority of students believed that their winning in EQUATIONS was not a matter of luck.

3. The vast majority of students would not elect to play a table lower in the table hierarchy if given a choice.

4. The reasons given for their table choice was related to how far from their current table they would elect to play.

5. None of these factors was related to their current position in the table hierarchy.

These student opinions are consistent with the basic pedagogical assumptions behind the tournament structure. We conclude that, students view their place in the tournament hierarchy as reflecting their ability, but they are willing to meet a stiffer competition. They view winning the game as being under their control.

But the most important finding is that student responses: 1) to the table that reflects their ability, 2) the table at which they would play if given a choice, 3) the reasons for the choice and, 4) the reasons for winning are not related to the current position in the table hierarchy. In other words, the opinions expressed in these data occurred throughout the table hierarchy and does not reflect solely the opinion of players performing near the top. The assumptions behind the tournament structure for EQUATIONS appear to be consistent with student opinions of the EQUATIONS tournament.

References

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