

Microgames and Language Learning: Performance Before Competence?¹

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Abstract: This paper reports on a study in which pairs of first-graders played microgames on small-screen handheld devices every day for 9 weeks. Its purpose was to find out whether, and if so how, adding digital games into classroom communications could ‘fast-track’ learning, accelerate language and literacy development, and whether it could also help bridge communication barriers for ELL learners, who may be shy, intimidated, or simply linguistically unable to interact as equals with their classmates. The “microgames” students played together were fast-paced, high engagement games that feature almost entirely one-word, verb-based instructions: “Rock”, “Hide”, “Pick”, “Protect”, and so on. Videos, fieldnotes and teacher reports note that social and linguistic interaction between children as and after they played demonstrably increased. Students’ language learning appeared to be accelerated by the game’s imperative to quickly decode and follow written instructions, even though many of these 6- and 7-year-olds did not yet read well enough to do that. The vocabulary which they were, in a matter of days, effectively recognizing and acting on was often far advanced from their usual first grade language arts lexicon, with words like “disguise”, “hypnotize”, “escape” and so on, presumed and treated, from a curricular standpoint, as exceeding their linguistic competence. Equally noteworthy was the technical competence the children displayed in mastering game controls, along with an array of different game mechanics. Using video documentation throughout the study provided both empirical evidence and persuasive examples of how playful interaction with more capable peers can support linguistic development as well as, or even more effectively than, conventional language curriculum and instruction, suggesting that when learning is scaffolded by play, our reach can so often exceed our grasp.

Keywords: Microgames, Language learning, Primary learners, Learning ecologies, English language learners

1. Introduction

The study took place in a first-grade classroom, in a small (under 400 students) ethnolinguistically diverse public elementary school located in a suburban (until recently, rural) area 25 minutes outside a major Canadian city. About a third of the class participating in the project have first languages other than English, with 5 students identified (by their parents and the school’s learning support team) as “ELL”—English Language Learners, at varying levels of English language mastery, with some students just beginning to express themselves in English, and others demonstrating near fluency. Their teacher, Ms. B, has taught for 12 years, with the last 6 being at this same school, where she has taught kindergarten to grade 2. The game played was designed to have mass market appeal, rather than a specialized ‘educational’ game. *Wario: Get it Together* for the Nintendo Switch is an entertaining commercial-off-the-shelf party game that features mostly one-word commands, and timed micro-game play. Students played in teams sharing a designated Switch with a partner, over 9 weeks for 15 minutes a day, followed by a 5-minute ‘debrief’ with their classroom teacher.

1.1 Studying Game-Based Learning Ecologically, a Note on Methodology

We have seen across several previous game-based learning studies, Authors (2017;18) that notwithstanding findings of clear and evident advances in student learning, we can’t conclusively say what proportion of these positive changes came about through gameplay rather than other concurrent factors, such as teacher questions, peer relationships, technology, ‘climate’ and classroom activities, all of which may very likely have impacted that result. We can’t say because we don’t know, and we don’t know because we mostly haven’t looked. Learning through playing digital games is hard to study and even more difficult to measure, because it doesn’t often take the form of “learning” as we’ve known and come to recognize it. Another challenge in providing evidence of game-based learning is that the criteria by which teachers are required to assess, and the terms in which they need to report, student learning are based on traditional monological tools and practices, which do not readily

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map onto or align with the dialogical, interactive structure of digital game-based learning tools and practices. (authors, 2017)

This study was designed to learn more about the interactive structure of game-based learning tools and practices, by digging deeper into the larger system of relations within which gameplay is positioned. We aim to situate our research findings about students' game-based learning 'ecologically', which means finding ways to study gameplay within the larger ('macro-media') ecology of the classroom, a network that includes institutional roles, responsibilities and 'ruling relations', teachers, classmates, and the researcher, both face-to-face and virtually, into which a new 'micro' media ecology of the handheld console game is introduced.

Working in classrooms with young children, and using multimodal media, introduces extensive considerations around research ethics, especially where ubiquitous audio and visual data are used, as they must be in a study of this kind. We ensured all parental and teacher permissions, and all student "assent" processes, were based on fully informed consent, and this study was reviewed and approved by both the school district and the several universities from which the research team was drawn.

1.2 Methods and Data Sources

Using a combination of two (fixed) GoPro cameras and one teacher-operated ('roving') iPhone camera provided an audiovisual record of both student play and teacher-led debriefs that could be triangulated to allow a physical description and record of elements like uses of space, movement, uses of tools, and physical and verbal interactions. Designating devices by team and tracking the (few) early changes the classroom teacher made provided information on student/team composition, and game progression by each team was recorded at intervals throughout the study. Student drawings were collected throughout, and classroom records and teacher resources and requirements for grade 1 language and literacy development, including reading lists used and teacher assessments of children's changing reading levels were compiled. Photos of the classroom, the images and information on its walls, and images and videos of students as they played in class and in the playground, as well as short, videotaped interviews with individual children, added to our sources of information about how the project rolled out in "lived actuality". Using an online form posing a set of questions about each week's experiences helped track teacher reflections and observations. Researcher fieldnotes were based on viewing the media materials for weekly play and debrief sessions, and, less often, on being physically present to provide tech or other support. Fieldnotes were completed by both researchers, and shared with the classroom teacher. To elicit individual samples of students' speech, a 'pre-program' activity asked children to explain how to make a paper heart, and their individual responses were video recorded. A "post-program" activity asked children to explain how to play a "microgame" they had played, and their individual responses again recorded.

Through these means we compiled and collated a rich and diverse trove of material on the possible impacts on how 'simply playing' an unrepentantly 'fun' game might promote and even accelerate students' language and literacy development, and build communicative bridges for ELL learners who while having the greatest need for communicative interaction typically engage in it the least. The challenge is of course how to analyze such a wealth of documentation, and that is not something that can be adequately undertaken at this point. This paper will instead concentrate on 4 key 'events' in hopes of illustrating, by the end, how play performs its educational work.

2. "Pre-Play", The Heart Activity

For this study, we wanted to devise a **pre-assessment** of each child's language/literacy capabilities, one that could be easily carried out by the teacher, in order to preserve the classroom environment, and minimize researcher disruption. A specific educational objective was to contribute to developing students' communicative abilities, using gameplay to break down social and linguistic barriers to interaction between fluent English language speakers (ELS) and ELL learners. So we needed a baseline against which to identify change. As a way to gain some indication of each child's communicative abilities prior to their 9 weeks of digital game-based interactions, we used an "everyday communication" activity, in which students are taught a skill, then asked to explain it to others, orally for younger students, or in writing for older ones. The skill, selected by the classroom teacher to align with curriculum goals, could be how to bake cookies, how to fold a paper crane—anything that conforms to the minimal requirement of learning a skill, then communicating how it's done.

Transcribing and viewing the children's videotaped responses provided one basis (among many) for assessing the children's language/literacy development—an indication, or an impression, more than a formal assessment, based as it is on a small sample of students' communicative abilities. To guide and align assessment criteria among the project team of classroom teacher, research assistant, and principal researcher, we first tried out 5

simple criteria: correctness, fluency, detail, and ease and effectiveness of communication. Using transcriptions and videos, up to 5 points were assigned for each criterion, for a total value out of 25. On that basis, each member of the team separately carried out an assessment of each student's abilities to explain how to make a paper heart. Then we met to share experiences and results, and to compare notes. Since this was a pilot study, we particularly wanted to see whether this 5-point analytical framework might prove a useful tool that could be redeployed at the end of this study to tell us whether and how our game-playing first graders' communicative abilities may have changed over the course of 9 weeks of gameplay. Through discussion, we identified conceptual overlaps and ambiguities, modified the initial criteria to include 'explicitness' then performed a re-analysis of the same material. The initial assessments and the subsequent re-analyses are shown below. Yellow indicates that the student is an English Language Learner (ELL), and the letter shown for each student indicates their school-designated levels: e for "emerging", d for "developing", c for "consolidating". Asterisks indicate that the students used materials (pencil, paper, scissors) and/or gestures rather than words to explain how a paper heart is made.

The table below illustrates the assessment criteria used, noting the duration of each student's recorded interaction as they responded to prompts to 'tell me how to make a paper heart'. This table shows the principal researcher's (PR) scoring; the same assessment was carried out by the Research Assistant (RA) and the classroom teacher (CT).

	Name	Duration	Correctness	Fluency	Detail/ explicitness	Ease	Effectiveness	Score/25
1.	M1 (d)	.19	2.5	2.5	2.5	4	3	14.5**
2.	F1 (e)	.14	2	1.5	1	2	0	6.5
3.	M2 (e)	.22	2	2	1.5	1	1	7.5
4.	M3	.44	4.5	4	4.5	1	3	17*
5.	M4	.33	4.	5	4.5	5	4.5	23*
6.	F2	.23	4.5	4	4.5	4	3.5	19.5
7.	F3	.28	3.5	4	3.5	4	3.5	18.5
8.	F4	.17	4	4.5	3	4.5	3.5	19.5*
9.	M5	.34	2.5	3	3	4	2	14.5*
10.	F5	.25	2.5	3	3	3	2	13.5
11.	F6	1.31	4.5	5	5	5	5	25*
12.	M6	1.29	4	3	5	3	4	19*
13.	M7	.30	4	5	4	5	4	22*
14.	F7	.28	3.5	4	3.5	4	3	18*
15.	F8 (d)	.24	2.5	2.	1	3	2.	10*
16.	M8	1.21	4	4	2	4.5	4	18.5**
17.	F9	1.12	3	4	2	4	3	15*
18.	F10 (c)	.52	2	3	3	3	3	14*

These speech samples were re-analyzed at the end of the study (to provide enough "breathing space" for the researchers to take a fresh look) using the slightly revised criteria arrived at after reviewing our initial heart activity assessments. Shown below are both the initial and the re-analysis total scores, and the average score among all three coders. Significant changes in the second round of analysis were that the PR's scores for both ELL and ELS students were lowered, as the PR (not a teacher) learned from discussions with the CT and RA (who was also a teacher) how to interpret the language samples more accurately. Interestingly, the classroom teacher's average scores for ELL students shifted significantly upwards by nearly 3 points using the revised assessment criteria to which "explicitness" had been added.

The class average duration of the answer is 39 seconds, but note the sizeable difference in speech duration between ELL learners (5) and non-ELL learners (13), several of whom speak one or more languages other than English: 46 seconds for ELLs; 26 seconds for ELLs.

Initial heart activity assessment:	
PR ELL Score= 12.05	PI ELS Score= 21.6
RA ELL Score= 10.8	RA ELS Score= 18.9
CT ELL Score= 8.	CT ELS Score= 16.5
Averaged ELL assessment: 10.28	Averaged ELS assessment: 19.

Heart activity re-assessment	
PR ELL Score#2=10.5	ELS Score=18.7
RA ELL Score#2= 11.4	ELS Score= 18.9
CT ELL Score#2= 10.7	ELS Score= 16.5
Averaged ELL Assessment: 10.86	Averaged ELS Assessment: 18

Keeping in mind that these are at best only impressions garnered in an initial attempt to create a rudimentary assessment framework, it is worth noting that while the classroom teacher's scores were lower than the RA's and the PR's for both ELL and ELS groups, all three independently scored the ELS students as almost twice as competent communicators as the ELL students. Comparing these rough and ready assessment attempts with the classroom teacher's regular, ongoing assessment of students' reading levels, one month prior to this study, revealed an even greater gap: ELL students averaged a 3.3 reading level while ELS students averaged 8.7. That gave us 'baseline indicators' we could return to at the end of the study to look for changes, both in the class as a whole and in the *relative* progression of English language learners and English language speakers as digital games became a part of their school schedule.

3. Wariowords

Would playing this single-word game impact these first graders' language development and would interaction with classmates by a less fluent speaker of English be enabled by a linguistically 'stripped down' game? Would they be able to build lexical bridges with their classmates through a shared game-language?

The game lexicon players are exposed to, and to which they must respond correctly by means of a time limited pre-determined symbolic action manually executed, constitutes its non-negotiable 'rules of play'. These rules of play are imposed by the game system on its human users and interactants. Through play, students will encounter and try to respond meaningfully to these words, which are also voiced as they are displayed. They are noticeably different from the words that make up the widely used word lists, principally Dolch lists, that help classroom teachers guide and track their students' language and literacy development. The game lexicon includes three categories: (1) *Command words*: a term or set of terms conveying a command, which is the game-task instruction. These words are also called out, though the user controls on/off and volume functions and need not necessarily hear the words spoken; (2) *Cross-game words*: terms designating generic game structures and functions that apply to all the minigames like "level up" or "boss stage", and (3) *Action descriptions*: a set of words displayed in nondescript size and font, like "jump" or "attack". Some actions are less often used, and some, like "boomerang" or "shoot a yoyo" are specific to one of the game's 18 different characters, each having different abilities or 'superpowers' to act in/on the game in defined ways—shoot a beam, blow up by contact, etc.

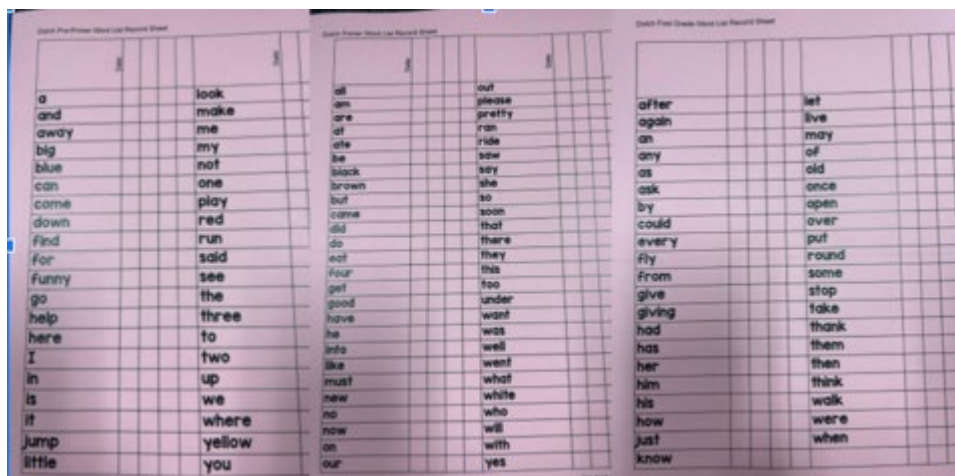
This first phase of the study focused on "Command Words", a term devised to encompass, compile and track all the game-task instructions these students would encounter through play. The first game command words include *Hypnotize, Take off, Light up, Steal, Get him, Draw, Collect, Protect, and Topple*, with the microgames changing rapidly. The students' uptake of "command words" is of special interest because acquiring a reliable ability to decode the game screen is a non-negotiable condition of playing. We wanted to see how their language might develop alongside their game progression. We created a command word list for each of the first 8 games, and a wall chart with each game's word list along one side, and a column with each child's initials along the top,

the idea being to invite children to add a star in their column for the new words they learned as they progressed through each minigame.



Some children were eager, some compliant, some entirely shunned the whole thing, and some possibly just answered randomly—the idea here was just to find multiple ways for the children to interact with the words they were being exposed to under the “microgames” conditions of timed recognition and response.

Then we compared the number and complexity of the game vocabulary that these game-playing first-graders had acquired and used and recognized, with the classroom word list the teacher was already using for first grade. Displayed on the wall in her class, Ms. B. has a Dolch word list, an early language learning resource extensively in use by teachers. Ms. B. uses words drawn from the Dolch pre-primer list to track her students’ reading levels. Devised originally in 1938 based on the frequency of their occurrence in children’s books, Dolch word lists are internationally relied upon for tracking students’ reading development, and look like this:

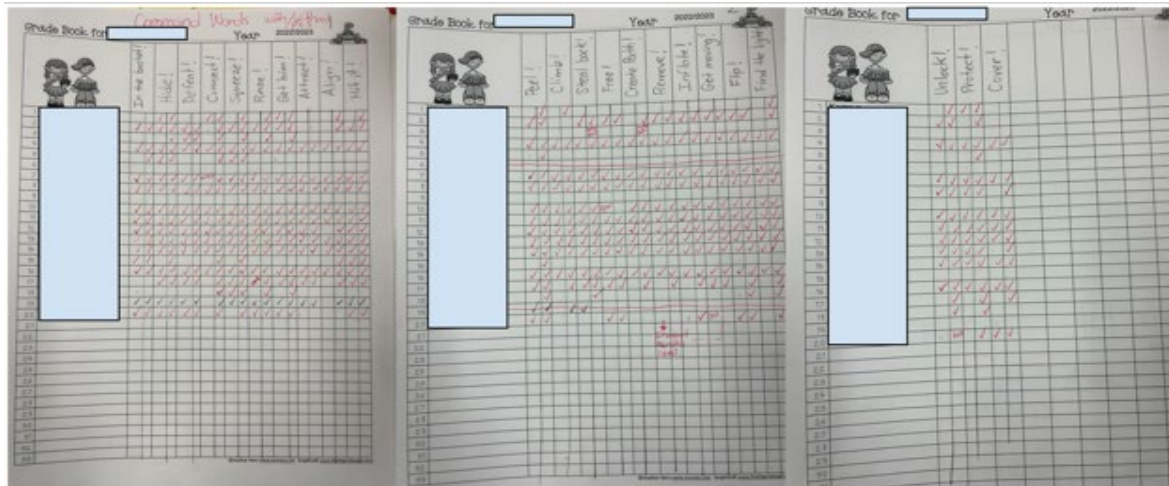


These are assessments in which the teacher sits down with each student and goes through a wordlist, tracking the growth of their ‘sight word’ reading vocabulary. These are completed at different times, and over the span of the school year. At the start of our study, Ms. B. had compiled information on her students’ progress in learning to read this set of Dolch words and, as noted above, class reading levels recorded in the month before the study began showed ELLs averaging a 3.3 reading level while ELS students averaged 8.7.

3.1 Dolch Words and Wariowords

To create a comparable record of students’ growing game vocabulary, Ms. B. carried out a parallel assessment, using 23 of the game’s command words. Her checklist, completed between April 24- 28th and shared below, shows which words the students were able to read. The first column shows each student’s recognition of the word presented as “plain text”, (black letters on white background) and the second shows recognition of the same command word presented in the game screen. Note how many more of the words children were able to

decode when given the whole image (304) than when given plain text (247)—a 23% increase in correct responses.



4. Drawing on Play: Representing Characters and Mapping Story

One of the “Big Ideas” in the first grade curriculum is that “Stories and other texts can be shared through pictures and words”. When children were asked to draw a picture of their favourite character, and to write about why they liked that character, everyone, including students who usually do not enjoy drawing, fully engaged in this activity, despite differences in fine motor skills, and the amount of detail in their drawings. Exploring and representing character through a game is a different experience than exploring a character through reading, because the player acts on behalf of the character, and the character’s goal becomes the player’s goal. The children loved these characters and all of them had a favourite and could explain why they liked them. Most of the girls chose a female character as their favourite. In the beginning level the only female character is Mona, who rides a scooter and throws a boomerang. Students could explain that they liked 9-Volt because he shoots a yoyo, Red because he drops bombs, Ashley because she flies, and Dribble “because he is powerful”. One student wrote that they like Dribble because he shoots but, “Sometimes I find it hard because he only does it a way”.

There were three ‘developmental indicators’ students drawings displayed: 1. colour, 2. detail, and 3. using the whole ‘canvas’. Ms. B. mentioned a standard expectation at first grade was the use of at 5 colours, noting these game-based drawings were far more **colourful** than most of the students’ drawings had been—a first expectation met. They were, as well, much more **detailed** than previous drawings, representing scale, perspective, activity, and movement, accomplishing the second curricular criterion. Inviting students to represent a “command word” not just as text, but as displayed in the context of the game, led directly to students representing characters within their own distinctive gamescreens. This meant paying close attention to context, detail, and the game’s central mechanic/movement. The game they played maximized meaningful **use of the entire space**, which is what they proceeded to imitate, and in this way, every student attained a third ‘developmental indicator’ of competence.



Taking students beyond characters, characteristics, and powers, the last objective pursued through drawing was to help them pay attention to the game’s story, to contextualize the levels they were playing within the narrative

frame of the game as a whole. This was a way to explore ‘setting’, in Language Arts, and to work on a grade one Social Studies curricular competency, where students are expected to be able to examine different perspectives on people, places, issues, or events in their lives. Ms. B. first created an outline of the map of levels so that students could create a travelogue of where they had been and where they had left to go in the game before they completed all the levels. The children were heavily invested in filling in their maps by drawing the locations of the character’s domain within the game, using their Switch consoles to look at the game map and the characters and objects associated with the specific locations (levels) on the maps. Extremely proud of their work, students would often ask to work on their maps, and would do so in their free time as well. They also created a collaborative class map of the game, which was posted on the wall throughout the study.

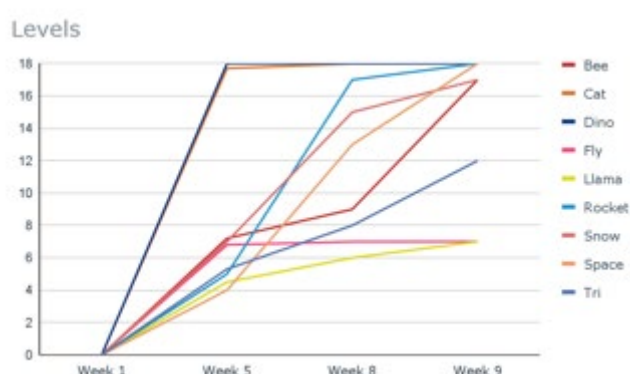


5. “Post-Play”: Tracking Changes

At the conclusion of the gameplay program, students’ game progression was recorded, along with their progress in learning new words, as measured by the number of stars they added to their Wariowords wall chart. Their maps and drawings were compiled for review (not reported here), and students were again individually assessed based on how well they could communicate how to play a microgame of their choice. To track game progression, students had been assigned to play in pairs, with team names based on distinguishing stickers on the back of each Nintendo Switch console. When tracking student play progress, each level was noted by their acquisition of a character, listed as levels 1-18 for each character that joined the team. The game is completed when all eighteen characters join Wario’s team. These characters were referenced in student discussion and artwork, both throughout and beyond the duration of the study.

5.1 Gameplay Progression

In order to track student play progression over time, at three different weeks in the study we marked how many characters had been acquired. The figure below shows the play progression over the nine weeks of the study, marked at five weeks’ play, eight weeks’ and the final week.



Especially notable is the speed with which 2 of the teams completed all 18 levels, the fact that ALL teams made progress, and the fact that, of the two ‘lowest’ teams, one team, both girls, had one of the class’s most experienced video game players, who was also one of its top students, paired up with a relatively novice ELL student. They enjoyed their play together, reached a level they liked playing, and opted for familiarity and repetition rather than progression. This was a surprising result, and contrasted with the progression of an equally very experienced girl who was teamed with a (quite advanced) ELL boy with negligible video game experience—that team was one of the two reaching completion the fastest. We haven’t yet delved into the analysis of game progression results, and simply report these here.

5.2 Better Communicators?

Using the framework we had developed initially for pre-assessing students' communicative competence in the heart activity, we applied the same criteria to a "post-program" analysis of children's explanations of how to play. By no means a comprehensive speech assessment, the framework was designed to broadly characterize students' everyday communicative abilities, to gain an ecologically valid picture of students' expressive competence. Their teacher conducted the informal assessment, asking each student about their favourite minigame within WarioWare, and how they might tell someone else to complete the same task within the game, following the same protocol as the pre-assessment by asking the participants to describe the steps in making a paper heart. Students could select any minigame they'd played, describe what they liked about it, how they figured out the solution to playing it and winning, and how they might tell someone how to complete it. The assessments were conducted individually, within the classroom, and in each recorded assessment other students could be heard in the background. While there is more data analysis to do, we found that as a class, students held longer conversations, used more complex language, and used more detail to describe the minigames they played, than they had in their heart activity accounts. Each post-assessment video was at minimum close to twice as long as the pre-assessment video, understandably, since the explanatory task was more complex, and the students had no explicit instructions for playing the minigames, as they did have, along with teacher-modelling, of how to make a paper heart. In the pre-play heart activity, the duration of ELL students' explanations averaged 26 seconds, nearly half as long as the heart activity recording for the ELS students, who averaged 47 seconds in the post-play "how to play" explanations. Unexpectedly however, ELL students this time around averaged closer to twice as long at 5.26 minutes as their ELS classmates, at 3.03

Using the same assessment framework as in the heart activity assessments, the greatest improvements in fluency and ease and effectiveness of communication were made by the ELL students, who (averaging the scores of the three assessors) improved from 10.86 to 12.9, with the ELS students showed only a fractional increase from 18 to 18.3. Beyond literacy assessments and vocabulary counts, the confidence with which participants discussed their play was characterized as dramatically higher by their teacher, and every child succeeded at learning gameplay and progressing through the game. Every student produced both individual and whole-class drawings, mastered a digital device with ease and fluency, and expanded their interpersonal experiences, skills and relationships within the classroom. Students could be heard using gameplay language and command words in everyday conversation, as well as in the playground, demonstrating the impact of gameplay environments beyond the classroom. These communicative accomplishments are not restricted to language, as seen subsequently in the children's playground activities, in their art and free time activities, their understanding of game mechanics and in the overall comradery of the classroom.



6. Just Playing

A significant and surprising "absent presence" in game-based learning research has been any interest in studying the educational value of *just playing*, in taking playing seriously as a foundational element in learning and development. In this pilot project "just playing" was the object of study, and all the play sessions, except for a few at the start as we ironed out technical challenges, were videorecorded. There was no instruction going on, no 'discipline' was needed, there was little to no direction, and nothing students had to other than "just play" for 15 minutes. Just under 20 hours of gameplay time was logged and reviewed, and fieldnotes written for every play session.

What we saw was that playing effected considerable shifts in the learning ecology. Children's use of **classroom space** changed over time, beginning with a dispersal away from the usual learning areas—the large, alphabet-design rug, where each child sat quite close together on a single “letter”, and the shared tables and chairs where they did their classwork. Instead, dyads and small groups would huddle over their Switches, and look over each other's shoulders, and pass them back and forth in corners, around the perimeter of the classroom. There was no ‘off-task’ behaviour and no need for the teacher to urge or remind or direct, and there were no constraints on student movement within the classroom space. The movement data captured in the full set of videos needs yet to be analyzed, however what appears is a limited return to those evacuated centralized spaces by the end of the project. In terms of **children's physical proximity** during play, which again merits further exploration, we saw almost no aggression, no misuse of the technology, and remarkable closeness, including “snuggling up” while playing, or just leaning against one another looking at a handheld screen—as if in genuine friendship, or as if they might be siblings, without the rivalry. **Affectively**, facial expressions and bodily positions displayed pleasure, relaxation, excitement, intense attention, and of course some frustration—but not much. For while there was plenty of intense disappointment at timing out or otherwise messing up, this is a game in which things move too quickly to hold on to disappointment for long, and so the emotional climate was both exciting and, in another way, peaceful. Everyone got along. This result has particular importance for the post-covid generation of early learners who have missed out on the kinds of socialization they need to manage school. Interestingly enough, these foundational social skills of building relationships, joint attentional activity, collaboration and mutual support, sharing and taking care of resources, and making new friends, would appear to have been dramatically advanced in just two months—simply by playing a game! And everyone chatted. Because authority was distributed, **language** was, too. More children talked more of the time, and at the same time across the dyads and small groups. Simply, there was more ‘space’ for more voices, and this ought to have been of greatest benefit to the children who we found (not surprisingly) spoke the least. This dynamic also created more (and ‘safer’, because its all “just play”) opportunities for other children who able to participate in dialogue, but who don't speak often. In her week 3 notes, the classroom teacher observed *“The kids who are often quiet are animated, more talkative and laughing out loud while they play.”* The class as a whole shared, in a remarkably short space of time, a **common language**: a vocabulary that included an extensive number of fairly advanced “command words”, as well as language of game technology, of controllers and controls, of mechanics, and of game design elements (like characters and powers and maps) that ought to transfer well to their future learning.

In these and other ways, it's possible to see how the competencies of individual children can be built up or stripped away by classroom practices. Games can provide, and this game did provide for these children, a “socio—technical” ecology that helps scaffold performance. In our final interviews with the children, they were unable to explain the ‘competencies’ underlying successful gameplay—and maybe that's because gameplay knowledge is just not that kind of knowledge. But many of the children could and did talk about how to scaffold successful performance: “try again, hit the eye, ring the bell, just try again, ask if you want me to show you how to play, or if you want to play it and I can help you...” Whether or not competence actually results in good performance just might depend a LOT on the kinds of experiences, and the kinds of support, “just playing” affords in a classroom.

7. Conclusion: What Games can do for you!

In-game learning is inextricably bound up with action, both bodily, (real-world controller actions), and virtual (scripted sequences responding to controller input that directs game-world actions). What that intimate connection with player activity means, importantly for educators, is that degrees and kinds of understanding multiply. In this game for example, players can succeed at an activity by: reading/recognizing the word in print; by hearing and comprehending the word spoken in the games audio track; by recognizing the image within which the word appears, or by salient visual elements within the game screen (a turntable, a curtain, a watering can); by imitating a classmate's play; or by looking at a Youtube video and following the actions represented. Understanding game-based learning's intimate connection with player activity means recognizing that language, more precisely *linguaging*, human communication, is multimodal and multisensorial.

It means, too, that we can pedagogically recognize how comprehension changes and evolves, and that development over time happens when you are enabled to continue in an activity even if you are just beginning to grasp it, so long as you can succeed at playing well enough to “stay in the game” long enough to discern more of what is being communicated, and to develop ever-enlarging abilities to communicate reciprocally. There are far fewer ways of being wrong when there are multiple ways of being right, which is what this game-based, activity-driven language and literacy project made possible. And that suggests educators will gain by acknowledging and building on the diversity of ways children **can** succeed, even if that means taking different

pathways, and using different tools and methods to get there, instead of focusing on establishing their individual 'competencies'. It might then be possible to pursue the success of every child more than their academic ranking, to concern ourselves less with assessing children's competence relative to homogenized testing and instead invest pedagogical energies into scaffolding their successful performance. We might then better appreciate how great can be the contribution of the classroom community, learning technologies, and the environment to every child's abilities to both develop and display their learning.

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