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Developments in interactive media practices of young people

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Abstract

This paper presents a cross-sectional analysis of interactive media practices of young people, in perspective of consequences for education. Contemporary youths move in a range of spaces, which contribute to their 'learning ecology'. In these spaces, youths engage in activities that allow for the development of experiences, skills and preferences. However, individual learning ecologies develop over time. In order to understand this development, the following research question was formulated: how do patterns of interactive media participation develop among students?

The measurements were done, respectively, in 2008 among 167 and in 2010 among 255 Dutch first-year students in higher education, aged 17 to 23. The respondents of the 2008 measurement were part of a larger dataset consisting of 2138 Dutch students. The results of this larger dataset serve as jumping off point for the analyses presented here.

The data analysis consisted of factor analysis and cluster analysis. Comparing the results of both measurements showed a shift in both membership of user-groups as well as in specific activities.

The results of this study indicate the importance for educators to acknowledge diversity in interactive media skills and preferences among students. In the consideration of consequences for education of this diversity, it is important to acknowledge the development in this diversity and to address students' interactive media experiences and preferences with tailor made assignments, regardless of the application of interaction media. In this manner, this study aims at contributing to educational insights in how to organise learning so that it is in line with daily practice and interests of students.

1. Introduction

1.1 Diversity in interactive media use

Results from recent empirical research show diversity in young people's use of Internet applications and games (Jones & Czerniewicz, 2010; Bennett & Matton, 2010; Corrin, Lockyer, & Bennett, 2010; Eynon, 2010; Schulmeister, 2008). These results undermine the asserted homogeneity and skilfulness found in earlier publications. The diversity in interactive media use implies that generalising labels such as 'Net generation' or 'Digital Natives' are inadequate as a characterisation of contemporary youths. It is time to move beyond the assumptions of the Net generation debate (Sharpe, Beetham, & De Freitas, 2010) because

"on the basis of current evidence there is little to suggest that learners are 'naturally' and 'intuitively' developing radically new models of collaborative knowledge production outside

formal educational settings that can easily be appropriated to the ends of formal education" (Facer & Selwyn, 2010, 39).

Notwithstanding the found diversity, young people make intensive use of Internet applications and games, together labelled as interactive media (Kutteroff & Behrens, 2009; Schulmeister, 2008; Van den Beemt, et al, 2011). This leads to the practice related question for educators how to respond to this diversity in interactive media use? How can students' experiences, skills and preferences for specific interactive media be addressed in learning situations, regardless of the application of interactive media? This question is intended to understand how the intensive, yet diverse, use of interactive media changes the attitude and preferences of young people, rather than to analyse interactive media as learning tool. Answering this question provides suggestions for educational interventions in response to young people's changes in attitude and preferences.

1.2 Learning ecologies

Diversity in interactive media use and related preferences can be interpreted through the social structures in which young people live. All social action is structured in spaces, around objects and in time (Berger & Luckmann, 1966). The whole of a person's patterns of social relations and forms of participation can be called *social space* (Elchardus & Glorieux, 2002). In each part of their social space, people gain experience, skills and preferences to be carried along to other parts. Movements through their social space contribute to people's learning and connecting with others. The result is a '*learning ecology*', a system in which people learn in a 'fluid' manner (Siemens, 2003). This learning ecology helps to conceptualise the development of expertise and experiences across the spaces of home, school, work, and community. Barron (2006) argues that to understand the role of technology in learning ecologies, it is important to analyse pathways of interactive media participation. This analysis should be pursued by looking at events, activities, and processes that spark interest in learning to use these media or in learning with these media. Activities following from the spark of interest allow for the development of expertise, while simultaneously supporting processes of identification. Subsequently, the changes in learning ecologies should be charted in order to advance theories of learning and to assess educational interventions.

The intensive use of Internet and games has made interactive media an essential part of young people's learning ecology. The diversity in interactive media use and related preferences and opinions, can be described by patterns of participation (Van den Beemt et al 2010a). Analysing changes in these patterns among youths provides us with indications for thinking out the consequences for education of developments in interactive media use. In order to describe these developments the following research question was formulated: How do patterns of interactive media participation develop among students?

Answering this research question provides us with a better understanding of the diversity in interactive media experiences, skills and preferences of students and how to respond to developments in this diversity. This paper is part of a growing number of empirical studies that strive to understand the consequences for learning and education of limited interactive media skills and intensive use of these media among youths (for an overview, please see special editions of *Journal of Computer Assisted Learning* (2010) and *Learning, Media & Technology* (2010) and the symposium 'Networked Learning, the Net generation and Digital Natives' (2010) as part of the 7th Networked Learning Conference).

This paper provides additional value to other empirical studies because of the combined analyses of Internet and gaming activities, the analyses of bottom-up categories instead of a priori classifications, and the application of multiple measurements.

In the following we describe diversity in interactive media use by means of categories of activities and of users, as found in a previous study (Van den Beemt, et al, 2011). These results form the basis for the cross-sectional analysis described in this paper.

1.3 Patterns of interactive media participation

An important part of describing learning ecologies in relation to technology consists of analysing pathways of interactive media participation (Barron, 2006). An analysis of these pathways of participation among young students showed the importance of peers and informal networks of likeminded people in developing expertise in interactive media (Van den Beemt, et al., 2010b). More profound analysis of the interactive media practices of young people showed diversity in both activities and related opinions and preferences (Van den Beemt, et al., 2011). In that study, which serves as the jumping off point for this paper, four categories of interactive media activities were discerned. Each of these four categories represented a specific type of activity and was labelled accordingly: interacting, performing, interchanging and authoring. The category *interacting* consists of traditional Internet activities, focused on the consumption and exchange of information, such as e-mail, surfing the web, searching for information and MSN. The category *performing*, consists of gaming activities where users play a certain role on a virtual stage. The category *interchanging* consists of all kinds of social networking activities. The last category, labelled *authoring* consists of a larger number of activities, all of them comprising some form of interactive content production.

Furthermore, four groups of interactive media users were discerned. There is a group of relatively low-end technology users, that mainly engages in the traditional Internet activities labelled as *interacting*. We named this group of users *Traditionalists*. There is a small group of high-end technology users, which we labelled *Producers*, that makes relatively intensive use of all possible types of interactive media, notably the tools brought together under *authoring*. Furthermore, two groups of intermediate technology users are defined by mid-level technology use. One group, labelled *Gamers*, shows an emphasis on playing games (*performing*), and the other, labelled *Networkers*, shows an emphasis on using all kinds of social software (*interchanging*). The Networkers and Producers are relatively intensive users of the more traditional interactive media as well. All groups are significantly different from each other on the four types of activities. Furthermore, these user groups are discriminated by different patterns of use across the types of activities, although all, apart from the Gamers, are relatively intensive users of the more traditional interactive media.

Similar categorisations of interactive media activities and users can also be found in other studies (e.g. Eynon, 2010). The question then is how this diversity in activities and users develops itself. After all, it can be expected that the patterns of participation will change under the influence of technological developments. Therefore the results of two measurements on similar groups were compared in order to understand how in two years time the behaviour of respondents could change.

2. Methods

2.1 participants

The research question for this paper will be answered by means of a cross-sectional analysis consisting of two measurements. The first measurement took place Winter 2008. The complete sample consisted of 2138 Dutch students, aged 9 to 23 (Table 1). The participating 24 schools were found through several university networks. The complete sample was used to define the categorisation of activities and users (for an extended description of methods and results, please see Van den Beemt, et al, 2011). With this categorisation as framework, we

use the data of 167 first year higher education students of the complete sample, as the first measurement in this report.

The second measurement was done Winter 2010, among 255 Dutch first-year students aged 17 to 23, all from one and the same higher education institution as the first measurement. Caused by a curriculum focused on technology, this school has more male students, which affected the boy-girl ratio in our samples.

The two-year gap between both measurements was chosen to be wide enough for new technological developments to arise and small enough to compare interactive media activities of respondents.

Table 1: Participants

	Age	Number of participants	Male	Female
First measurement:				
Complete sample	9-23	2138	1095	1043
First year HE students	17-23	167	150	17
Second measurement:				
First year HE students	17-23	255	229	26

2.2 Materials

The online survey consisted of twenty-five questions addressing two main topics: actual use of interactive media applications and opinions about the use of specific media. A number of questions consisted of items that each referred to one of all interactive media used in the Netherlands at the time of inquiry. Fifteen of the twenty-five original questions were used in the analyses. The remaining questions served a different research report. For the second measurement, Twitter and Facebook were added as items to the questionnaire.

It took participants on average fifteen minutes to complete the questionnaire. All questionnaires were completed under supervision during school hours. The respondents remained anonymous, but were supplied with individual codes. These codes made analysis of, for instance, educational level and region possible. The survey's language was Dutch.

2.3. Procedure

All respondents received textual instructions to explain the survey's purpose, that it would not be graded, and therefore that any answer would be right. Furthermore, the students were asked to fill in the survey at their own comfortable speed.

2.4 Analytic strategy of the first measurement

The statistical analyses were performed in several steps. Categories of media activities were explored by means of factor analyses based on the activity items from the questionnaire. This EFA (Exploratory Factor Analysis) was employed on a randomly selected training sample of two-thirds of the complete first measurement sample ($n = 2138$). This analysis was performed by means of Principal Component Analysis with Varimax rotation. To verify the validity of the resulting model, CFA (Confirmatory Factor Analysis) was applied by means of the Maximum Likelihood method in a test sample consisting of the remaining one-third of the sample (Kline 2005).

In order to explore a pattern of related interactive media users, hierarchical agglomerative cluster analysis was applied on the cases, by means of Ward's method and z-scores. From this cluster analysis, the 167 higher education students were filtered for further analyses.

Categories of opinions were explored with factor analysis on items, applying Principal Component analysis with Varimax rotation. As a result of a very low average use combined with low sample means, the following activities were left out of our analysis: Second Life, Skype, Uploading a Podcast and Downloading a Podcast.

The relations between activities and users for the higher education students of the first measurement ($n = 167$) were explored through means analyses.

2.5 Analytic strategy of the second measurement

The categories of activities found in the measurement were used as a jump-off for analysing data from the second measurement. The data analyses consisted of exploratory factor analysis to define categories of activities, and hierarchical agglomerative cluster analysis by applying Ward's method and z-scores on the cases, to find user groups.

Categories of opinions were explored with factor analysis on items, applying Principal Component analysis with Varimax rotation.

The EFA was followed by a means analysis for activities and opinions in both measurements. Results from both measurements were compared on the basis of mean scores.

3. Results

In order to explore developments in interactive media practices among the respondents, the results from both measurements of higher education students are compared below. The results from the complete first measurement sample ($n = 2138$) are presented here as earlier findings.

The data show a constant diversity in the use of interactive media applications ranging from social software, to games or video-websites, such as YouTube. All respondents in both measurements reported making use of at least one application once per week or more. This means that there are no non-users in both samples. Both the categories of activities and groups of users remain stable in both measurements. Regarding intensity in interactive media activities, the data show an increase in social media use among Gamers, and an increase in gaming among Networkers.

In both measurements comparable categories of activities were found. Table 3 shows the factor analysis results from the second measurement. Applications such as Twitter and Facebook, which were added to the second survey, form a logical addition to the existing use of interactive media. Some activities, such as playing small games on a mobile device, appear to have become more widespread and thus became part of the factor 'interacting'.

The results of cluster analyses on both measurements suggest identical types of user groups: Traditionalists, Gamers, Networkers and Producers. Table 4a shows the earlier findings of the complete first sample. Tables 4b and 4c show that between the two measurements a change in cluster membership can be found. The percentages of Traditionalists and Gamers have grown at the expense of the Networkers. The percentage Producers in both measurements was the same.

Table 3: Exploratory factor analysis results with standardized factor loadings for interactive media activities (second measurement)

Activities	Component			
	1 interchanging	2 interacting	3 performing	4 authoring
Looking at profile pages	.856			
Leaving a scrap	.817			
Looking at Hyves photos	.807			
Maintaining Hyves profile	.769			
Uploading photo to Hyves	.749			
Maintaining Facebook profile*	.558			
Playing games on profile page*	.438			
Downloading films		.681		
Reading news sites		.609		
Downloading music		.609		
Surfing the web		.608		
Watching videos		.560		
E-mail		.463		
Search		.462		
Reading Wikipedia		.391		
MSN		.382		
Mobile games		.362		
Large pc games			.646	
Casual online games			.547	
Portable games			.520	
Online games			.510	
Small pc games			.432	
Console games			.420	
Maintaining profile other than Hyves or Facebook				.651
Reading weblog other than profile				.650
Maintaining weblog other than profile				.637
Reading weblogs on profile pages				.498
Placing message on forum				.488
Maintaining weblog on profile page				.454
Looking at photos other than profile				.423
Twitter*				.384

Principal Component Analysis, Varimax rotation with Kaiser Normalization.

* = Item in second measurement only.

Table 4a: First measurement, complete sample; Categories of activities, Mean standardised score (and SD) within cluster

Activities	Cluster							
	Traditionalist N=588 (30.5%)		Gamer N=360 (18.7%)		Networker N=841 (43.7%)		Producer N=136 (7.1%)	
interacting	3.02	(0.66)	1.94	(0.51)	3.60	(0.64)	3.82	(0.60)
performing	1.92	(0.67)	2.45	(0.69)	2.26	(0.84)	2.54	(1.02)
interchanging	1.99	(0.80)	1.41	(0.59)	3.21	(0.89)	3.85	(0.81)
authoring	1.22	(0.29)	1.15	(0.27)	1.73	(0.54)	3.13	(0.71)

N = 1925; Cluster analysis: Ward's method, Squared Euclidian distance, Z-scores;

1 = Never, 2 = Less than once a week, 3 = once per week, 4 = more times per week, 5 = daily.

Table 4b: First measurement; Categories of activities, Mean standardised score (and SD) within cluster

Activities	Cluster			
	Traditionalist N=33 (21.6%)	Gamer N=2 (1.3%)	Networker N=101 (66.0%)	Producer N=17 (11.1%)
interacting	3.61 (.59)	2.50 (.39)	4.10 (.45)	4.54 (.35)
performing	2.13 (.56)	2.21 (.51)	2.40 (.61)	2.59 (.68)
interchanging	1.50 (.53)	1.21 (.30)	2.45 (.90)	3.32 (.87)
authoring	1.24 (.29)	1.25 (.12)	1.85 (.51)	3.08 (.78)

N = 153; Cluster analysis: Ward's method, Squared Euclidian distance, Z-scores;
1 = Never, 2 = Less than once a week, 3 = once per week, 4 = more times per week, 5 = daily.

Table 4c: Second measurement; Categories of activities, Mean standardised score (and SD) within cluster

Activities	Cluster			
	Traditionalist N=84 (32.9%)	Gamer N=32 (12.5%)	Networker N=109 (42.7%)	Producer N=30 (11.7%)
interacting	3.40 (.62)	4.40 (.39)	4.00 (.39)	4.13 (.42)
performing	2.35 (.66)	3.06 (.85)	2.62 (.68)	2.68 (.90)
interchanging	1.40 (.47)	1.69 (.52)	2.82 (.68)	3.13 (1.01)
authoring	1.36 (.32)	2.00 (.52)	1.61 (.49)	2.87 (.50)

N = 255; Cluster analysis: Ward's method, Squared Euclidian distance, Z-scores;
1 = Never, 2 = Less than once a week, 3 = once per week, 4 = more times per week, 5 = daily.

Tables 4a, 4b and 4c show similar patterns in intensity of activities. Table 4c shows that Gamers have become more active in interchanging and Networkers more active in performing. Furthermore, the Traditionalists have become more active in performing, which relates to playing games on a mobile device as item on the 'interacting' factor. These changes were also found in a (unpublished) study among 124 middle school students.

Table 5a: First measurement, complete sample; Means (and standard deviation) for opinions on media activities

Opinion	Cluster			
	Traditionalist	Gamer	Networker	Producer
Gaming	2.04 (0.92)	2.16 (0.89)	2.21 (0.97)	2.34 (1.08)
Gaming benefits	2.50 (0.92)	2.75 (0.91)	2.70 (0.97)	2.80 (1.02)
Networking	2.22 (0.79)	1.66 (0.62)	2.70 (0.62)	3.09 (0.94)

Answers on 5 point Likert scale; 1 = completely disagree, 5 = completely agree

Table 5b: First measurement; Means (and standard deviation) for opinions on media activities

Opinion	Cluster			
	Traditionalist	Gamer	Networker	Producer
Gaming	2.56 (.83)	2.83 (.47)	2.86 (.88)	3.19 (.88)
Gaming benefits	2.90 (.89)	3.40 (.57)	3.02 (.84)	3.33 (.57)
Networking	2.22 (.51)	1.63 (.53)	2.54 (.72)	2.75 (1.00)

Answers on 5 point Likert scale; 1 = completely disagree, 5 = completely agree

Table 5c: Second measurement; Means (and standard deviation) for opinions on media activities

Cluster

Opinion	Traditionalist	Gamer	Networker	Producer
Gaming	2.61 (.80)	2.76 (.71)	2.41 (.69)	2.50 (.68)
Gaming benefits	2.83 (.94)	3.15 (.71)	2.89 (.83)	3.07 (.75)
Networking	1.98 (.61)	2.18 (.70)	2.40 (.70)	2.49 (.48)

Answers on 5 point Likert scale; 1 = completely disagree, 5 = completely agree

Tables 5a, 5b and 5c show the means for three opinions per user cluster: a positive attitude towards gaming, a positive attitude towards benefits of playing games, such as learning or experimenting, and a positive attitude towards networking. Table 5a shows the earlier findings, Tables 5b and 5c show the results from the two measurements. The image is roughly similar for all three tables. Notable is the more positive attitude of Gamers towards networking. This relates to the increasing use of social media among Gamers. However, Networkers do not report a more positive attitude towards gaming, despite their increase in gaming activities.

4. Conclusion and discussion

The results of this study show intensity and diversity in interactive media use, which confirms the findings of a growing number of studies on young people's use of interactive media. Diversity in interactive media activities appears to be relatively stable; the earlier found categories 'interacting', 'performing', 'interchanging' and 'authoring' are confirmed by the cross-sectional analysis in this paper. These categories appear to be basic human activities. New applications, such as Twitter or Facebook, for the present have obtained a logical position in this categorisation of activities.

The grouping of users appears to be stable as well: Traditionalists, Gamers, Networkers and Producers were discerned in both measurements. The intensity with which these groups engage in activities shows a small change. The convergence of gaming and the use of social media, caused by for instance playing games on profile pages is represented by an increasing intensity in these activities by Networkers and Gamers. Because of technological developments, it is expected that the user groups will change, or that members of specific groups will engage in different types of activities over time. The image from earlier findings remains: all types of users engage in the traditional interactive media activities grouped under 'interacting', and the small group of Producers intensively uses all types of interactive media applications. By presenting two snapshots of identical types of students made with a two-year interval, these results bring nuance to existing reports of intensity and diversity in interactive media use.

The results of this study are limited by the small sample consisting of mainly male students from a university of technology. In order to have more in-depth comparison, it is desirable to have a larger sample, with an equal gender distribution and several educational levels. However, this type of studies will always be characterised by outliers, which can disturb the analysis. Furthermore, the convergence of media increases confusion over survey questions. For instance, when someone plays a game on Facebook it is no longer clear whether it counts as gaming or social media use.

Learning ecologies are the result of movements in people's social space. These movements cause people to cross boundaries, which enforce learning (Akkerman & Bakker, 2011). It means that experiences, skills and preferences are being carried across spaces. For students, education is one of these spaces. In their social spaces young people make intensive use of interactive media. If education wants to challenge students by connecting to their personal needs and issues, it implies addressing interactive media experiences, skills and preferences. Addressing these can be done for instance by relating interactive media practices of students

to their specific learning approach. Yet, little is known about how for instance the surface approach, deep approach or elaborative approach (Vermunt, 1988) relate to specific types of interactive media experiences. In addition to connecting to existing experiences and preferences, it could be argued that the pallet of experiences should be extended. Gaming boys could practice their social skills with social media assignments, or Networkers could be guided to examine content for instance by wiki's or games.

Addressing experiences, skills and preferences can be done without interactive media. For instance, gamers are used to systems of permanent feedback, instead of one measurement of progress at the end of term. And although effectiveness studies usually do not support trial and error methods, it is a characteristic aspect of games. Important is the awareness among teachers about the diversity in interactive media use and the developments in this diversity. This means that the main implication for education of this study is the combination of user clusters. Most students can be categorized as Networker or Traditionalist. These types of students can be addressed by assignments consisting of collaboration, writing texts and peer-feedback. Contrary to popular belief, the group Producers does not increase in size. Although creating interactive media content can challenge this group of students, the small number of Producers is an indication that school assignments should not focus on content production. Because casual games are becoming more popular, combinations of collaborative assignments and single player learning games can be an interesting direction to explore. In general, the diversity found in both measurements appears to support the usefulness of multimodal learning situations. This can be achieved by connecting to the ever-growing familiarity of technological engagement by learners, which, however, should not be confused with technological skilfulness. Understanding interactive media practices is an essential prerequisite for addressing experiences, skills and preferences. It allows educators to connect to frameworks of existing knowledge that can be extended by assignments in class.

The diversity in interactive media activities and preferences should not be seen as a new truth, but rather as a developing process. In the consideration of consequences for education of this diversity, it is important to a) acknowledge the development in this diversity among students and b) address students' interactive media experiences and preferences with tailor made assignments, or broad learning contexts, regardless of the application of interaction media.

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